

Western Public Health Casebook 2015

Cases from the Schulich Interfaculty Program in Public Health

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DEDICATION

To the memory of Dr. M. Abdur Rab



December 22, 1949 - August 8, 2015

Dr. Mohammad Abdur Rab

MBBS, DTM&H, DMP, MPH, PhD

Founding Director of the Schulich Interfaculty Program in Public Health

TABLE OF CONTENTS

Foreword	vii
Acknowledgements	ix

INTRODUCTION

What is Case Teaching in Public Health?	1
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CASES

Case 1: Deciding Value for Money: Improving Prenatal Genetic Screening in Ontario	11
Case 2: Understanding and Developing Conceptual Frameworks and Causal Models in Maternal and Child Health Programming	27
Case 3: Hospitals Don't Burn: Caribbean Island Regional Hospital	47
Case 4: Returning to Our Roots: Building Capacity in Public Health for Action on the Social Determinants of Health	60
Case 5: Let's Agree To Agree: Management Techniques in Calibrating Oral Health Screening Systems	73
Case 6: Reducing Poverty in Canada: Public Policies & Population Health	87
Case 7: Integration of FP-MNCH Services to Accelerate Reduction of Maternal & Child Deaths: Bangladesh Experience.....	117
Case 8: Mentor Mothers Preventing Mother-To-Child Transmission of HIV/AIDS in Jinja	140
Case 9: Combating Food Borne Illnesses through Safe Food Handling Practices in the United Nations/African Union Mission in Darfur (UNAMID)	156
Case 10: Youth as Change Agents	180
Case 11: Knowledge Dissemination and Private Well Water Testing in Middlesex County, Ontario	197
Case 12: Health Operations in Emergencies (HOPE).....	211
Case 13: Chikungunya in the Americas: Estimating the Burden of Disease and the Cost of Illness.....	227

INTEGRATED WORKSHOPS

Integrating a Curriculum at the Program Level	239
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FOREWORD

In 2010, the Schulich School of Medicine & Dentistry set out to establish a new Interfaculty Master of Public Health program at Western University. In the fall of 2013 we were able to open a wonderful new facility that is purpose-built for the innovative case method that is used by faculty and students from across our campus. This book represents cases written by students in the inaugural Class of 2014. We are very pleased to offer it as a resource to the educational community with the goal of broadening the reach of public health case teaching into classrooms around the world.

– Dr. Amit Chakma, President, Western University

Public health is inherently multi-disciplinary. The Schulich Interfaculty Program in Public Health is innovative in three major ways. First, it brings together dedicated teachers from the many faculties whose work touches on public health – health studies, law, medicine and dentistry, science, and social science. Second, it uses the case method of learning instead of the more traditional lecture method. And finally, the Western MPH program empowers the students themselves to author public health cases based on their practicum placements. The cases in this book cover some key topics in public health including food-borne illnesses, healthy mothers and children, and the determinants of health that we as health professionals can to some extent control.

– Michael Strong, MD, FRCPC, Dean, Schulich School of Medicine & Dentistry

The Schulich Interfaculty Program in Public Health is radically innovative in many dimensions; this case book exemplifies our commitment to case based pedagogy. We firmly believe that cases are an essential tool in the public health educator's armamentarium, but more importantly, are a public good. Sharing of knowledge should have no barriers, and it is to that end we make our cases freely available. We will be publishing our case book annually in the future, and encourage you to widely share the cases and your experience of using them. Please send us your feedback at publichealth@schulich.uwo.ca. We look forward to hearing from you on how we can together train tomorrow's public health professionals.

– Amardeep Thind, MD, PhD, Director, Schulich Interfaculty Program in Public Health

Teaching with cases is one of those things that looks easier than it is. It requires going beyond the effort required of the traditional lecture. It requires extensive planning, yet often looks spontaneous. While the lecturer has considerable control over the order in which concepts will be covered in a session, the case teacher has to face the unpredictability of not knowing beforehand exactly how the class will unfold. But, when teaching with cases, you see furrowed brows replaced by looks of enlightenment; you see students demonstrate their abilities in leadership and develop their self-confidence, and you see complex concepts covered at a depth that is seldom matched in a lecture. We believe that this is the way to teach and to learn the complexities of public health, and are honored to serve as the editors of our first casebook.

– Mark Speechley, PhD, Amanda Terry, PhD, Editors

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We are grateful for the sustained contributions, guidance and wise counsel of Dr. Murray Bryant, Professor Emeritus, Richard Ivey School of Business at Western.

As well as the preceptors and other staff who welcomed our students and helped them build their skills and confidence, we would also like to thank the many members of the public health community who have contributed to our program as guest teachers and subject matter experts during our integrated workshops. This book would not have been possible without the dedication of our staff: Diana Lee, Courtney Hambides, Lisa Metselaar, Judith Thomas, Brandy McIntee, and Jennifer Nangreave. Finally, our heartfelt thank you to the entire MPH Class of 2014.

Mark Speechley
Amanda Terry
London, Ontario
July, 2015

INTRODUCTION

WHAT IS CASE TEACHING IN PUBLIC HEALTH?

WHAT IS CASE TEACHING IN PUBLIC HEALTH?

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BACKGROUND

Planning for our new case-based interfaculty Master of Public Health program began in July 2010, with our first cohort of 32 students enrolled in September, 2013. Our original view of ‘cases’ was based on those used in professional programs such as those at Harvard. Harvard is credited for introducing the case method in the law school in 1870, and then in business administration in 1920 (Shugan, 2006). Part of our initial enthusiasm was practical: Western University’s business school, the Richard Ivey School of Business, had adopted the Harvard approach in 1922 (Richard Ivey School of Business, n.d.), and we were very fortunate to have Ivey faculty, who were experienced with case teaching and writing, willing to help us develop our new curriculum.

Early in the planning process, we searched the literature for published educational cases on public health topics to use in our new curriculum. We quickly realized that there is a paucity of teaching cases in public health. While there are many “healthcare industry” cases available, these cases predominantly use a business lens. These cases omit details that are of interest to public health professionals and are required for situation analysis and decision-making. Thus, these cases are often not directly transferable to a public health curriculum. In addition, many existing health related cases were set in the US and therefore did not reflect the reality of Canadian health systems, our uniquely Canadian issues, or the voices of the communities our students work with. Furthermore, given our program’s focus on the public health of Southwestern Ontario, and First Nations across Canada and globally, the availability of appropriate teaching cases was further reduced. Case repositories (e.g. Harvard Publishing, Ivey Publishing, European Case Clearinghouse, etc.) have few teaching cases that can be adopted as written by a public health program, creating an opportunity for Western’s faculty and practitioner colleagues to develop *de novo* cases for their courses by building on their own research and practice experiences.

Initially, we adapted existing cases to our curriculum by focusing on and using the relevant public health content. Our faculty also began to write their own cases. Our students were to be placed in practica in local, national, and international public health organizations, where they would be working on an exceptionally broad array of projects. These diverse practicum placements were designed as penultimate learning experiences for students to apply the knowledge and skills acquired through the course of their study (Council on Education for Public Health, 2011). We realized that the students’ practica experiences were potentially a valuable resource for relevant case material. As a result, we required that each student write a teaching case in which they would demonstrate their mastery of knowledge, including its synthesis and integration, through a real-world experience. This book represents a selection of public health cases written by students in the inaugural Western MPH Class of 2014.

¹ Author affiliations: all authors are faculty members affiliated with Western University.

PEDAGOGIES

We continue to learn from like-minded colleagues about a group of related pedagogies called *discussion teaching; active learning; experiential learning; case method learning; simulations; and problem-based learning*.

There are differences in approach among these subtypes, and we still have much to learn about the subtleties. However, it seems clear that what these approaches all have in common is best appreciated by describing what they are not: traditional didactic lecturing. As with many complex concepts, two 'pure types' form poles of a continuum. We have attempted to explain our current pedagogical approach by contrasting these pure types in two columns of a table (please see Table 1).

Table 1: Contrasting extremes: lecture-based teaching versus experiential learning

	Lecture-based	Experiential learning
Terms and labels	<ul style="list-style-type: none"> • Lecture method • Didactic (lecturing) • "Student" 	<ul style="list-style-type: none"> • Discussion teaching; active learning; case method learning; problem-based learning; advanced seminar; simulations • "Learner"
Characteristic		
View of learning	<ul style="list-style-type: none"> • Learning-as-product; can be precisely measured • Learning ends with last lecture • Learning is information 	<ul style="list-style-type: none"> • Learning-as-process: cannot be precisely measured • Learning is life-long skill • Learning is experience
Learning style	• Passive	• Active
Student preparedness, attendance and participation	<ul style="list-style-type: none"> • Varies; can be entirely optional 	<ul style="list-style-type: none"> • Preparation, attendance, and participation essential to learning
Responsibilities	<ul style="list-style-type: none"> • Professor has major responsibility for teaching, which is transferring information 	<ul style="list-style-type: none"> • Learners have major responsibility for learning, both for themselves and contributing to the learning of their colleagues, in both individual and group settings
Optimized for	<ul style="list-style-type: none"> • Small details • Memorization • Un-integrated bits of information • Facts: "right answers" • A "canon" of core concepts • Short-term recognition • Knowing 'about' • Certainty 	<ul style="list-style-type: none"> • Large, broad concepts • Application • Synthesized, integrated knowledge • Ideas: "alternative approaches" • Skills and competencies • Long-term understanding • Knowing 'how to' • Uncertainty
Rate of "information transfer"	<ul style="list-style-type: none"> • High: many "facts per hour" 	<ul style="list-style-type: none"> • Low – few "facts per hour"
Faculty resources	<ul style="list-style-type: none"> • Fewer faculty resources required 	<ul style="list-style-type: none"> • Substantial faculty resources required
Role of theory	<ul style="list-style-type: none"> • Theory as end in itself 	<ul style="list-style-type: none"> • Theory informs practice; practice informs theory
Role of professor	<ul style="list-style-type: none"> • Professor is most important teacher • Professor is "expert instructor" • Professor teaches students 	<ul style="list-style-type: none"> • Learners become their own best professors • Professor is "expert facilitator" • Professor learns from students

What is Case Teaching in Public Health?

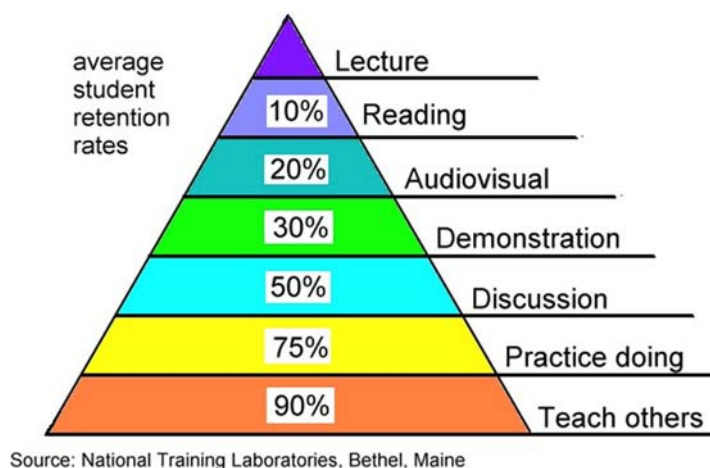
	Lecture-based	Experiential learning
Time allotted for questions and discussion	<ul style="list-style-type: none"> Varies from none to quite interactive; often spontaneous 	<ul style="list-style-type: none"> Extensive, designed into each session
Visual aids	<ul style="list-style-type: none"> Slides prepared by professor 	<ul style="list-style-type: none"> Words and diagrams drawn on board by professor and/or learners
Adaptability to emerging 'news'	<ul style="list-style-type: none"> Less flexible/structured (because lecture topics and slides are pre-set) 	<ul style="list-style-type: none"> Flexible/adaptable (i.e. can be a story from that morning's news)
Order in which concepts are covered in a particular session	<ul style="list-style-type: none"> Often, largely predictable 	<ul style="list-style-type: none"> Sometimes, largely unpredictable
When learning ends	<ul style="list-style-type: none"> Right around the final exam, when forgetting begins 	<ul style="list-style-type: none"> Learning never ends if one has a learning need and the tools to locate knowledge

Medical students memorize many common terms, but also learn Latin and Greek prefixes and suffixes (*myo-*, *osteo-*, *-itis*, *-osis*) so they can discern the meaning of novel terms from their component elements. This simple example is somewhat analogous to the transition from many undergraduate programs to more sophisticated graduate-level study. The emphasis shifts from short-term regurgitation to longer-term recall, from basic multiple-choice recognition to innovative application, and from undifferentiated facts to integrated understanding.

HEURISTICS

Education researchers have used various graphical devices as heuristics to illustrate how outcomes differ between methods of instruction. Many are familiar with the Learning Pyramid – often attributed to the National Training Laboratories, Bethel, Maine – which is intended to demonstrate that lectures are associated with the lowest rates of retention, whereas active forms of learning are associated with greater retention (please see Figure 1). The Learning Pyramid is controversial because its original source is unclear, as is the research foundation that underlies it (see, for example, Lalley & Miller, 2007). Another criticism is that the outcome – ‘retention rates’ – is itself a low level outcome compared to evaluation, critical appraisal, or application of knowledge in a novel situation.

FIGURE 1
Learning Pyramid



But even if the average retention rates given in Figure 1 cannot possibly be accurate for all learners, curricular content, and settings, most adults intuitively know from their own experience that the more active forms of learning – especially actual practice – are associated with better long-term recall and application of knowledge. We do not deny that first principles can be learned in a lecture, or by reading or watching a video. But the knowledge base of the public health profession is too complex to be considered a ‘canon’ of knowledge that every practitioner must memorize (or that any practitioner could). Some memorization of fundamental first principles is essential, but then students use practice to call up, modify, merge, and tweak them as they are applied to entirely novel problems in unfamiliar circumstances.

The number of supporters of a move from didactic to experiential learning in health professional education is growing. Most recently, a global independent commission of health professional educators has urged a move to systems based thinking with competency-driven instruction (Frenk et. al., 2010). The authors urge all health professionals to be “educated to mobilize knowledge and to engage in critical thinking” so they are “competent to participate in ... population-centered health systems as members of locally responsive and globally connected teams” (Frenk et. al., 2010:6).

Case method learning

Case method learning is aligned with competency-driven instruction. At the Richard Ivey School of Business, a case is “a description of an actual situation, commonly involving a decision, a challenge, an opportunity, a problem or an issue faced by a person (or persons) in an organization” (Richard Ivey School of Business, n.d.). At the Harvard Business School, a case is defined as:

a partial, historical, clinical study of a situation which has confronted a practicing administrator or managerial group. Presented in narrative form to encourage student involvement, it provides data – substantive and process – essential to an analysis of a specific situation, for the framing of alternative action programs, and for their implementation recognizing the complexity and ambiguity of the practical world (“Teaching with Cases at the Harvard Business School”, 1994:44).

The archetypal case for teaching business managers often involves a single protagonist making a key organizational decision in the face of incomplete or imperfect information. The objective is not for the learners to memorize circumstances and facts in that particular context that led the protagonist to make that decision. Rather, through individual study and group discussion, the objective is for the learners to imagine how they would act in a similar situation (and perhaps a different context). Learners think about how they would balance the various macro-, meso- and micro-level factors, in order to select the most reasonable course of action from a set of alternatives. Decision-making cases often involve a series of thought experiments where learners imagine the consequences of doing A, B, or C.

In a review paper on case-based learning (CBL) by Thistlethwaite and colleagues (2012:e422), the authors reported that international consensus does not exist on the definition of case-based learning. Accordingly, they defined case-based learning in terms of its goal: “The goal of CBL is to prepare students for clinical practice, through the use of authentic clinical cases. It links theory to practice, through the application of knowledge to the cases, using inquiry-based learning methods.” While there is clearly much in common across all of these approaches, the emphasis on ‘clinical cases’ suggests to us a focus on individual patients, which limits its applicability to public health.

MODIFYING CASE METHOD LEARNING TO PUBLIC HEALTH

Most problems in public health are multidimensional, faced not by one individual decision maker but by communities and entire populations. These decisions are often best approached as complex trade-offs among multiple stakeholders. Stakeholders frequently represent distinct cultural groups or organizations that have different amounts of political power and, often, competing (or incompatible) interests. For example: should the Minister of Health fund a promising new screening program? To do so, she needs to find the funds. Should she completely cut an existing program, or cut ten programs by 10 percent each? In other situations such as infectious disease outbreaks and natural disasters, many people make multiple decisions in a dynamic fashion, sometimes changing their minds as the situation evolves and the amount and quality of information improves. In spite of some differences between a focus on individual patients and a focus on entire populations, all experiential learning has common elements: learners develop and practice applying skills to actual complex situations that have been faced by real people, with a bias towards action: a carefully considered and justified set of recommendations about what should be done next.

Given the realities of public health problems and decisions, we propose the following definition of a public health case:

A real-world situation that promotes independent thinking as well as group discussion which ultimately allows the learner an opportunity to explore complex public health issues and apply theory to practice by analyzing, integrating, and synthesizing knowledge.

A public health case is a narrative-based (with optional multi-media supplements) pedagogical tool that describes a public health situation faced by an individual, group, organization, or health system that reflects the complexity and ambiguity of the real world. It provides learners with the opportunity to demonstrate an understanding of the complexities within health and health systems (for example: cultural, economic, environmental, historical, legal, and social factors that influence health). It allows learners to acquire and demonstrate public health competencies (such as: the formulation of strategies for health promotion and health protection, design and evaluation of health programs, and the application and critical appraisal of epidemiology, biostatistics, and health economics methods). Through the use of narrative (and optional multi-media sources), public health cases provide a unique opportunity to illustrate the challenges faced by disadvantaged groups, and because of the decision orientation, they are an optimal way of illustrating public health leadership.

AN INTEGRATED ONE-YEAR MPH CURRICULUM USING CASE METHOD LEARNING

From inception, the intent of the Interfaculty Program in Public Health at Western University was to design a case-based MPH program that would fill a novel niche at the intersection of leadership, sustainability, and policy within the Canadian health care system. Without any models of public health programs using the case method of learning, we embarked on developing an integrated curriculum that would prepare tomorrow's leaders and change agents to shape the future of public health.

COURSE-LEVEL

Our program consists of 14 courses over two academic semesters. The first step in our effort to integrate learning is at the course level. Faculty meet frequently to inform each other what topics are being covered in their courses, and what cases are being used. This allows faculty to know what topics have been covered, and also permits references to other cases in the classroom, as a means of reinforcing concepts and also of identifying similarities between issues that may not

have been apparent. These discussions also open the opportunity for faculty to co-lead specific cases.

PROGRAM-LEVEL

Once in the fall, and twice in the winter, we devote an entire day to an Integrated Workshop (described in greater detail in the last section of this book). The objective is for students to integrate and synthesize their learning to date from all their courses together on a single topic. By presenting students with a public health controversy, these workshops require them to work quickly and effectively in their learning teams. The workshops are important because public health situations usually require clarification of the problem and an inventory of alternatives before a decision can even be contemplated. Even so, there is often no obvious basis for choosing among starkly different alternatives. This is where collaborative group-based decision making shines in comparison to decisions made by individuals. Even if there is no obvious 'correct' decision to be made, individuals learn new perspectives from others in their learning team. When the teams present their work at the end of the workshop, the teams learn from each other.

We attempt to have the integrated workshops build in complexity over the fall and winter semesters. In 2013-2014, the integrated workshop topics/situations were: i) the public health impacts of industrial wind turbines; ii) supervised injection facilities for individuals who use injection drugs; and iii) a chemical spill and refinery fire, and evacuation of the surrounding community.

LEARNERS BECOME TEACHERS: STUDENT CASES FROM THE PRACTICUM EXPERIENCE

The summer semester sees students undertaking a practicum placement. One deliverable from each practicum is the completion of a project for the agency in which the student was placed. A second deliverable is a public health teaching case written by the student, with input from their practicum preceptor and faculty advisor. We have selected thirteen student cases from the Class of 2014 for publication in this book.

Because cases differ in terms of problem complexity and multiple decision implications, we decided to give the students considerable leeway in terms of their case topic, structure, and learning objectives. Most importantly, we wanted the student authors to think of ways a case can be applied in the public health classroom, the public health competencies covered, and the usefulness to public health students and faculty in our program and others.

INSTRUCTOR GUIDANCE

Each case is accompanied by a one-page Instructor Guidance, an idea we borrowed from the Johns Hopkins School of Public Health. This allows an interested instructor to quickly judge the potential usefulness of each case using keywords, learning objectives, and a brief synopsis of the case.

VERITÉ

In addition to having a protagonist with whom the reader can identify, our business school colleagues emphasized the importance of having a case describe a real situation, rather than a composite of several situations or a theoretical hypothetical, even if it means the real situation must be disguised to avoid identifying an agency or employee. Each case in this book describes a real public health situation faced by our students.

The cases are presented in alphabetic order by the first (student) author. As we continue to develop new cases and refine their application in the classroom, we would welcome feedback on these cases and testimonials about how you have used them. Any corrections to this set of cases will also be gratefully received. Please get in touch with us via the program's email: publichealth@schulich.uwo.ca.

In addition, we will publish this casebook in electronic form on the Schulich Interfaculty Program in Public Health's website. Please stay tuned for that release at <http://www.schulich.uwo.ca/publichealth>.

We welcome you to the Class of 2014 MPH student casebook. We are proud to present this work and hope you are able to learn from our students' unique and collective experiences.

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CASES

CASE 1**Deciding Value for Money:
Improving Prenatal Genetic Screening in Ontario**

Dawn Beck, RN, MPH (MPH Class of 2014)

Julie Toole, RM, MHSc (Risk Management Specialist, Association of Ontario Midwives)

Ava John-Baptiste, PhD (Assistant Professor, Western University)

BACKGROUND

The Ministry of Health and Long-Term Care (MOHLTC) has supported prenatal genetic screening in Ontario since 1993, publically funding an array of screening options. In February 2013, a new screening option became available in Ontario. This technology, known as non-invasive prenatal testing (NIPT), promises improved accuracy and safety and is currently only available to those willing to independently pay for the test (Okun, Teitelbaum, Huang, Dewa, & Hoch, 2014). With increasing public interest in the technology and wanting to maintain a centralized, standardized, high quality provincial screening program, the Ministry has recognized the need for an urgent response on the use of NIPT within the public system. In March 2014, the Ministry appointed a Prenatal Genetic Screening Group (PGSG) to advise on current screening practices and make recommendations for an improved prenatal genetic screening program in Ontario. As part of the group's work, the Ministry has requested an economic evaluation, examining the costs and performance outcomes associated with NIPT and its introduction into the public system.

INTRODUCTION TO PRENATAL GENETIC SCREENING

Prenatal genetic screening for fetal chromosomal abnormalities began in the mid-1960s. At this time the screening involved offering women who were considered of advanced maternal age (>35 years of age at expected date of delivery) an invasive test called an amniocentesis. This test carried with it a small risk of fetal loss (0.01% to 0.5%). The age 35 was chosen as it was the determined point where the risk of fetal loss related to screening was less than the chance of identifying a significant fetal chromosomal condition (Prenatal Screening Ontario, 2014). Since this time, great advances in prenatal genetic technology have been made, lessening the need for invasive testing and subsequently reducing the number of fetal losses due to complications. Today, prenatal genetic screening consists of minimally invasive procedures such as blood work and ultrasounds and has become a routine part of publicly funded prenatal care for all women in Ontario.

Women may choose to have screening done if they wish to learn more about their pregnancy, want to gather the best information and prepare for their newborn and the delivery, or want the opportunity to terminate a pregnancy if a diagnosis is made. Prenatal genetic screening does not screen for all chromosomal abnormalities nor does it provide a definitive diagnosis. Women who receive a positive screen are given the option of further diagnostic testing. This consists of either chorionic villus sampling (CVS) or amniocentesis. Both procedures carry a small risk of fetal loss (1% and 0.01% to 0.5% respectively; Prenatal Screening Ontario, 2014).

With the discovery of cell-free fetal DNA (cffDNA) in maternal blood, a new form of screening has evolved. This screening is referred to as non-invasive prenatal testing (NIPT) and offers an improved detection rate (DR) and fewer false positives. This test has the potential to further reduce the number of invasive tests performed, subsequently reducing the number of fetal losses due to complications (Langois & Brock, 2013).

FETAL CHROMOSOMAL CONDITIONS

Typically, individuals have 46 chromosomes or 23 pairs of chromosomes in each cell of their body. This is the result of proper chromosome alignment during the creation of an egg or a sperm. If the chromosomes do not properly align during this process, too few or too many chromosomes can result. This is referred to as aneuploidy and once this occurs the chromosome imbalance will be in every cell and cannot be treated. The cause of this misalignment is unknown; however, it is known that it occurs more often as women age. The misbalance of chromosomes can lead to development and growth challenges in the fetus, often resulting in spontaneous miscarriage (Prenatal Screening Ontario, 2014). The incidence of any fetal chromosomal condition is approximately 1 in 160 live births, with the majority of these being aneuploidies (Canadian Agency for Drugs and Technologies in Health, 2014). The most common fetal aneuploidies include Trisomy 21 (Down syndrome) and Trisomy 18 (Edward syndrome). Prenatal genetic screening assesses the chance of carrying a fetus with one of these conditions, along with assessing for open neural tube defects (ONTDs) and other structural chromosomal conditions.

Down syndrome (Trisomy 21)

Down syndrome is the most common aneuploidy, occurring in about 1 in 1000 births in Ontario (Prenatal Screening Ontario, 2014). This rate varies with age, being more common as women age. The common characteristic shared by those with Down syndrome is extra genetic material associated with chromosome 21. The effects associated with the extra genetic material are highly variable among individuals. Individuals with Down syndrome may be predisposed to certain medical and learning-style challenges. Common medical conditions associated with Down syndrome include heart, stomach, thyroid, hearing, and vision problems. Each individual with Down syndrome is different and there is no way to predict the level of disability during pregnancy. There is no cure for Down syndrome, but early intervention and medical management can improve the common conditions associated with it (Canadian Down Syndrome Society, 2009).

Edward syndrome (Trisomy 18)

Edward syndrome is less common than Down syndrome, occurring in about 1 in 6,000 births. This condition also varies with age, being more common as women age. Individuals with Edward syndrome have extra genetic material associated with chromosome 18 and are predisposed to serious congenital malformations. Of the pregnancies diagnosed, 95% will result in a miscarriage and of the babies born, 95% will die within the first year of life (Prenatal Screening Ontario, 2014).

Open Neural Tube Defects (ONTDs)

ONTDs occur when the spine or brain does not develop properly during the first trimester. During this time the neural tube folds together; if complete closure or folding of the tube does not occur, an opening remains. Depending on the location of this opening, the type and severity of ONTD varies. An opening lower in the spine is called spina bifida, which can lead to physical and intellectual disabilities. An opening higher in the spine is called anencephaly, which is considered incompatible

with life. The incidence of ONTDs in Canada is 1 in 2,000 births (Prenatal Screening Ontario, 2014).

CURRENT SCREENING SYSTEM

Clinical practice guidelines indicate that all pregnant women in Canada should be offered the option of prenatal genetic screening. This should be done through an informed counseling process, where non-directive information is provided and client decisions are respected (Chitayat, Langois, & Wilson, 2011). In Ontario, four different screening tests are available, three if the client presents before 14 weeks gestation and one if the client presents after 14 weeks (Prenatal Screening Ontario, 2014). All options involve the measurement of maternal serum biomarkers through a maternal blood sample. This may be accompanied by a second maternal serum sample and/or a nuchal translucency (NT) ultrasound.¹ The level of accuracy of each test varies, with each screen carrying a different detection rate (DR) and false positive rate (FPR). Screens that have a higher DR (proportion of those with the condition with a screen positive result) and a lower FPR (proportion of those without the condition with a screen positive result) are considered superior. The Society of Obstetricians and Gynecologists Canada (SOGC) recommends that the minimum standard of any prenatal screen for Down syndrome offered in Canada should be a DR of 75% and a FPR no greater than 3-5% (Chitayat et. al., 2011). The overall accuracy of the four tests currently offered in Ontario ranges from a DR of 75% - 90% and a FPR of 2% - 10% (Prenatal Screening Ontario, 2014; see Exhibit 1).

The current available screening options that may be offered and are publically funded include:

- **Integrated Prenatal Genetic Screening (IPS):** Has the highest DR and lowest FPR. It involves two maternal serum samples, one in the first trimester (before 14 weeks gestation) and one in the second trimester (after 14 weeks gestation). It also involves an NT ultrasound. Due to its superior accuracy, the majority of women in Ontario undergo this screen (Okun et al., 2014).
- **First Trimester Screening (FTS):** This screen provides the earliest results (first trimester). It involves one maternal serum sample and a NT ultrasound. It has a lower DR and higher FPR than IPS.
- **Serum Integrated Prenatal Screening (SIPS):** This test requires two maternal serum samples, one in the first trimester and one in the second. Few women (2%) in Ontario undergo this screen (Okun et al., 2014), as it does not involve NT ultrasound. This test is mainly used in geographical areas where first trimester ultrasound is not available (Chitayat et. al., 2011).
- **Maternal Serum Screen (Quad screening):** This is a second trimester screen (only screen offered to those over 14 weeks gestation) that involves taking one maternal serum sample. This screen has the highest FPR.

Overall, the uptake rate of screening in Ontario is estimated to be 67% (Okun et al., 2014). The type of screen offered and chosen may depend on geographical location, gestational age, and provider and client preference. In addition to one of the above screens, all pregnant women should be offered a detailed second trimester ultrasound (between 18 and 20 weeks gestation). This ultrasound screens for anatomic abnormalities, including ONTDs, and can be used to modify the known chance of aneuploidy established by prior screening (Chitayat et. al., 2011).

¹ NT ultrasound is done between 11 and 13 weeks gestation. It measures the thickness of tissue on the back of the fetus's neck, which can be indicative of certain chromosomal conditions. Its use is recommended by the International Society of Prenatal Diagnosis; however, its use depends on geographical location, as some areas within the province do not have access to first trimester scanning expertise.

If a client receives a screen positive on any of these tests, it indicates that the chance of a fetal chromosomal condition or ONTD is higher than the specified cut-off. It does not necessarily mean that the fetus has one of these conditions. The majority of screen positives will be false positives (meaning the fetus does not actually have the condition); however, there is no way of knowing this until the baby is born or diagnostic testing is performed (Prenatal Screening Ontario, 2014). It is estimated that approximately 60% of screen positive women and 1.2% of screen negative women will choose to undergo diagnostic testing (Okun et al., 2014).

Diagnostic Testing

Diagnostic tests are invasive tests that are highly accurate at detecting fetal chromosomal conditions. Clinical practice guidelines indicate that clients who have a screen positive may be eligible for diagnostic testing if they are 35 years of age or older, have a family history of genetic chromosomal conditions, conceived through IVF with intracytoplasmic sperm injection, or have certain ultrasound findings (Prenatal Screening Ontario, 2014; Ministry of Health and Long Term Care, 2012). Two forms of testing exist: amniocentesis and CVS. CVS involves the removal of placental cells in order to analyze fetal genetic material. This procedure is performed between 11 and 13 weeks gestation. It carries a fetal loss risk of 1% and does not test for ONTDs (Prenatal Screening Ontario, 2014). The majority of women do not receive screening results in time for CVS and therefore their only option is amniocentesis (Okun et al., 2014). Amniocentesis is performed between 15 and 22 weeks gestation and involves the removal of amniotic fluid to analyze fetal genetic material. This test carries a slightly lower fetal loss risk (0.01% - 0.5%, Prenatal Screening Ontario, 2014); however, because the procedure occurs at a later gestational age, women may experience increased anxiety and may be at higher risk of complications if choosing to terminate (Vanstone, King, deVrijier, & Niskier, 2014).

NEW DEVELOPMENTS IN PRENATAL GENETIC SCREENING

Advances in technology have led to the development of a new type of prenatal genetic screening. This technology is known as non-invasive prenatal testing (NIPT) and offers the promise of improved accuracy and safety² in the screening of Down syndrome. Just like current screening approaches, NIPT involves the analysis of a maternal blood sample. However, instead of analyzing maternal biomarkers (as current approaches do), NIPT analyzes fetal DNA found in maternal blood. This DNA is known as cell-free fetal DNA (cffDNA) and it makes up 10-20% of the maternal plasma (Langois & Brock, 2013). With advanced technology, this DNA can be sequenced and analyzed for certain fetal chromosomal conditions. cffDNA can be detected and analyzed throughout pregnancy, starting as early as ten weeks gestation. Results are generally received within ten days (Vanstone et. al., 2014), opening the window to earlier diagnostic testing (CVS).

Several clinical studies have been published assessing the use of NIPT for the detection of fetal chromosomal conditions. The majority of these studies have focused on the detection of Down syndrome among women with an increased chance of fetal chromosomal conditions. The results of these studies have been consistent, reporting a DR rate reaching 100% and a FPR of <1% (see Exhibit 2; Langois & Brock, 2013). Studies examining the effectiveness of NIPT for the detection of other common fetal chromosomal conditions have also been carried out, with similar results being reported for Trisomy 18 (see Exhibit 3; Langois & Brock, 2013). Overall,

² With improved accuracy, specifically a reduced false positive rate, it is expected that fewer women will undergo unnecessary invasive testing, which is associated with fetal loss.

published results suggest NIPT to be a more accurate screening approach (than the current) for common fetal aneuploidies in high-chance populations (Langois & Brock, 2013; Vanstone et. al., 2014). Studies investigating the applicability of these results in average-chance populations are currently underway (Vanstone et. al., 2014). The largest published study to date, with a cohort of 2049 women, reported a DR of 100% and a FPR of <0.1% for Down syndrome and Trisomy 18 (Nicolaidis, Syngelaki, Ashoor, Birdir, & Touzet, 2012). This suggests the test may be universally appropriate.³

As with current screening approaches, although the chance is much lower, the chance of receiving a false positive exists. Because of this, NIPT remains a screening tool and does not replace invasive testing for diagnosis. Those who would consider termination based on a diagnosis are still advised to undergo CVS or amniocentesis for confirmation (Langois & Brock, 2013). In certain situations, women may have to undergo a repeat test due to initial test failure. This can happen in up to 6% of tests (Children's Hospital of Eastern Ontario, 2014), often as a result of poor quality control measures or low fetal fraction (less than 4% cfDNA in maternal blood; Vanstone, et. al., 2014). Low fetal fraction may be a result of early gestation (fetal fraction increases as gestational age increases) or maternal obesity. Other identified limitations of the test include unclear results with multiple gestation pregnancies or chromosomal mosaicism.⁴

CURRENT INTEGRATION IN ONTARIO

In light of the evidence, the SOGC recommends NIPT be offered to women as a second tier screening option (Langois & Brock, 2013). This means that NIPT should be offered to individuals whose pregnancies have been identified as high-chance (on the basis of current screening modalities) and who wish to continue testing, but avoid invasive testing. Similar recommendations have come from other professional bodies, including the American College of Obstetricians and Gynecologists (American Congress of Obstetricians and Gynecologists, 2012), the National Society of Genetic Counselors (National Society of Genetic Counselors, 2012), and the International Society of Prenatal Diagnosis (Children's Hospital of Eastern Ontario, 2014). Although NIPT is currently an available option to this population of women in Canada, it is expensive, costing more than \$800, and for the most part is only accessible to those who can afford to pay for it (Okun et al., 2014).

In Ontario, the MOHLTC has recently begun supporting the use of NIPT in certain circumstances. These circumstances are limited and are based on specific indications.⁵ Eligible providers (genetics or maternal fetal medicine specialists) who believe their client meets the criteria can submit an application for funding to the Ministry.⁶ Women who do not qualify for NIPT funding and who wish to have the test must find a provider who is willing to facilitate the process (with blood samples being sent to the U.S. for analysis) and pay out-of-pocket for the service.

CURRENT CHALLENGES

Jenny Black, Maternal Fetal Medicine Specialist and chair of the PGSG, has experienced applying to the MOHLTC on behalf of clients for funding of NIPT. Receiving variable responses

³ The majority of studies use the gold standard of comparing the detection rate of Down syndrome by NIPT with the detection rate by diagnostic testing.

⁴ Mosaicism is a condition in which cells within an individual have a different genetic makeup.

⁵ Funding eligibility indications may include, in a singleton pregnancy, any one of the following: screen positive result, women > 40 years of age at expected date of delivery, NT > 3.5 mm, pregnancy history or previous child with aneuploidy. Other indications may include: anomalies identified on ultrasound and/or other risk factors (MOHLTC, 2014).

⁶ Approval from the ministry must be received prior to receiving the services (MOHLTC, 2014).

from the MOHLTC and having few applications approved, Jenny has not been satisfied with the current process. Discussing her challenges with colleagues, Jenny heard her frustrations being echoed. Following the annual Ontario conference on new developments in prenatal genetics, Jenny met with providers (midwives, family physicians, and genetic counselors) from across the province to discuss their experience with NIPT. From the meeting, Jenny realized that confusion regarding the appropriate use and funding of NIPT in Ontario was strong. Inconsistencies in practice were common, with some providers offering the test to all clients (mainly out of liability concern), while others were just learning of the new technology and had not been offering it at all.

Jenny suspected that much of the confusion and variability in practice was attributable to the rapid emergence of this new technology through the private market. Wanting to support the ministry's vision of a centralized, standardized, high quality screening program for Ontario (Okun et al., 2014), Jenny knew changes to the current system would need to be made. She also knew that the changes would need to be cost-effective, as resources were scarce within the publicly funded system.

ECONOMIC EVALUATION⁷ OF NIPT INTEGRATION OPTIONS (OKUN et. al., 2014)

Different scenarios have been proposed for which the Ministry could introduce NIPT into the public system. This includes NIPT as a second-tier contingency screen or NIPT as the primary screen. These scenarios are compared to the current system, where NIPT remains mainly within the private market. Three algorithms (see Exhibit 4) are presented, demonstrating the screening pathway of each scenario. Numbers informing the algorithms and evaluation were retrieved from the provincial Better Outcomes Registry Network (BORN) (fiscal year 2012-2013) and the five Ontario regional laboratories. This includes data on test performance and cost, number of total pregnancies, expected number of cases of Down syndrome, uptake of screening and diagnostic testing, and pregnancy loss rate due to diagnostic testing (see Exhibit 5).

Within each scenario the system performance and costs are analyzed (see Exhibit 6). The performance outcomes analyzed include the total number of cases of Down syndrome detected, the total number of invasive tests (amniocentesis) performed, and the total number of fetal losses (false positive cases) related to invasive testing. The cost outcomes include the total cost of the screening program (up to and including prenatal diagnosis of Down syndrome), the cost per woman screened, and the cost per case of Down syndrome detected.

Overall assumptions within the evaluation include:

- Diagnostic testing may be directly offered to women identified as high-chance for fetal chromosomal conditions;
- Diagnostic testing following primary screening is amniocentesis whereas NIPT is accompanied with a first trimester ultrasound;
- Where contingent NIPT screening follows FTS as the primary screen⁸ it is assumed that 100% of those who receive a screen positive after FTS will undergo NIPT and 100% of those who receive a positive result after NIPT will undergo amniocentesis; and

⁷ Information informing this section was retrieved from the economic evaluation conducted by Okun et. al., (2014). This is a recent 2014 Ontario study, with its quality being validated within a critical appraisal by the Canadian Agency for Drugs and Technologies in Health.

⁸ FTS is the only screening option that provides results within the first trimester. Using this screen as the primary screen ensures NIPT (if warranted) can be performed within a reasonable time. FTS has a DR of up to 85% and FPR of up to 9%. The high FPR is not of concern as screen positives will be screened with NIPT prior to diagnostic testing. The lower DR however means that fewer cases of Down syndrome may be detected than if IPS were used.

- A provincial lead centre will be established to monitor and evaluate NIPT and therefore an operating cost of \$1,044,000 is added to the scenarios that include publicly funded NIPT.

1. NIPT as a Commercial Test

NIPT would remain in the private market, with companies promoting its use directly to the public and providers. Two different models were used to demonstrate this scenario (models 1-2 in Exhibit 6), with one using current FTS/IPS screening modalities and one using FTS as the only screening modality. Based on the evaluation of these models, the total screening costs to the system would range from \$17,353,789-\$17,580,080, with the cost per woman screened being \$179-\$182, and the cost per case of Down syndrome diagnosed being \$112,919-\$114,391. The performance of this scenario includes 3,211-4,247 invasive procedures being performed, 154 cases of Down syndrome being detected, and 31-41 procedure-related fetal losses occurring.

2. NIPT as a Contingency Test (second-tier screening)

The use of NIPT as a contingent test would mean it is only offered to individuals based on certain criteria. In this evaluation, NIPT is only offered to women who receive a screen positive following FTS. Five different contingent NIPT models were created (models 4-8 in Exhibit 6). These models depict possible alternatives and are based on the assumption that as technology becomes safer and more accurate the rate of uptake will be higher, the accuracy of FTS will improve with continued research and quality assurance, and the cost of NIPT will decrease over time. Taking the different models into consideration, it is estimated that the total cost of screening to the system will range from \$17,353,081 to \$21,372,742, with the cost per woman screened being \$179-\$208, and the cost per case of Down syndrome diagnosed being \$68,530-\$71,474. The performance of this scenario includes 293-1,358 invasive procedures being performed, 253-337 cases of Down syndrome being detected, and 0-13 procedure-related fetal losses occurring.

3. NIPT as the Primary Testing Method

In this scenario (model 3 in Exhibit 6), NIPT would replace the current primary screening options and would be offered to all pregnant women. This scenario is estimated to cost the system a total of \$85,146,250 with the cost per woman screened being \$879, and the cost per case of Down syndrome diagnosed being \$286,428. The performance of this scenario includes 394 invasive procedures being performed, 297 cases of Down syndrome being detected, and 1 procedure-related fetal loss occurring.

RECOMMENDATION

Based on the evaluation, the introduction of NIPT into the public system would result in more cases of Down syndrome being detected, fewer invasive tests being performed, and fewer related pregnancy losses. However these benefits would come with an increased cost to the healthcare system. NIPT as a primary test (which evidence does not yet fully support, but may relatively soon) significantly increases the cost to the system, costing four to five times more than the current system. NIPT as a contingency test is a more feasible option, costing slightly more than the current system, yet deriving similar benefits to that of the primary approach.

Taking the economic evaluation into consideration, along with other relevant decision-making elements, Jenny, together with the PGSG, needs to make recommendations to the MOHLTC for an improved prenatal genetic screening program in Ontario.

EXHIBIT 1
Current Prenatal Genetic Screening Options in Ontario

Tests	Down syndrome DR	Down syndrome FPR	Comments
Integrated Prenatal Screening (IPS) <i>First Trimester (11-13^{+6/7} wks)</i> - ↑NT – by registered sonographer - maternal serum: ↓PAPP-A <i>Second Trimester (15-20^{+6/7} wks)</i> - maternal serum: ↓AFP, ↑hCG, ↓uE3	85-90%	2-4%	- Results available in 2 nd trimester after blood taken - Diagnostic test after counselling for screen positive = amniocentesis
Serum Integrated Prenatal Screening (SIPS) <i>First Trimester (11-13^{+6/7} wks)</i> - maternal serum: ↓PAPP-A <i>Second Trimester (15-20^{+6/7} wks)</i> - maternal serum: ↓AFP, ↑hCG, ↓uE3, ↑DIA	80-90%	2-7%	- Results available in 2 nd trimester after blood taken - Diagnostic test after counselling for screen positive = amniocentesis - Is available in most places where NT ultrasound is not available
(*) First Trimester Combined Screening (FTS) <i>First Trimester (11-13^{+6/7} wks)</i> - ↑NT – by registered sonographer - maternal serum: ↓PAPP-A, ↑fbhCG	78-85%	3-9%	- Results available in 1 st trimester after blood taken – usually end of 1 st trimester, earliest results - CVS for diagnostic testing - Does not screen for NTD*

(*) First trimester screening is not available in all areas of Ontario

* NTDs (open neural tube defects) can be screened for by MS-AFP and/or ultrasound at 18-20 weeks

DR: detection rate – also known as sensitivity, is the probability that a fetus affected with Down syndrome will be detected by the prenatal test

FPR: false positive rate – the proportion of women with unaffected pregnancies who have positive results

↑: increased value

↓: decreased value

Test	Down syndrome DR	Down syndrome FPR	Comments
Maternal Serum Screen (Quadruple Screening – MSS) <i>Second Trimester (15-20^{+6/7} wks)</i> - maternal serum: ↓AFP, ↑hCG, ↓uE3, ↓DIA	75-85%	5-10%	- Results available in 2 nd trimester - Amniocentesis for diagnostic testing

Source: Prenatal Screening Ontario, 2014b.

EXHIBIT 2

Published Studies Examining the Use of NIPT for the Detection of Down Syndrome

Table 2. Results of validation studies for non-invasive detection of fetal trisomy 21

Study	Number samples tested	Failure rate*	Sequencing approach	Detection rate	False-positive rate
Chiu et al. 2011 ⁸	764	1.4%	8-plex shotgun	79.1% (68/86)	1.1%
	232	N/A	2-plex shotgun	100% (86/86)	2.1%
Palomaki et al. 2011 ⁹	1696	0.8%	4-plex shotgun	98.6% (209/212)	0.2%
				95% CI 95.9 to 99.7	95% CI <0.1 to 0.6
Ehrich et al. 2011 ¹⁰	467	3.9%	4-plex shotgun	100% (39/39)	0.2%
				95% CI 89 to 100	95% CI 0.1 to 1.5
Lau et al. 2011 ¹¹	108	0	12-plex shotgun	100% (11/11)	0
Sehnert et al. 2012 ¹²	47	0	1-plex shotgun	100% (13/13)	0
Sparks et al. 2012 ¹³	167	0†	96-plex selective	100% (36/36)	0.8%
Ashoor et al. 2012 ¹⁴	400	0.75%	96-plex selective	100% (50/50)	0
Bianchi et al. 2012 ¹⁵	532	3%	6-plex	100% (89/89)	0
				95% CI 95.9 to 100	
Norton et al. 2012 ¹⁶	3228	4.5%	96-plex selective	100% (81/81)	0.03%
				95% CI 95.5 to 100	35% CI 0.002 to 0.2

*Percentage of samples that did not meet quality control requirements for the sequencing so that no results could be obtained.

†5% failure in their training set.

N/A: not applicable – only samples that passed original sequencing quality control were retested within the 2-plex.

Source: Langois & Brock, 2013 (by permission of The Society of Obstetricians and Gynaecologists of Canada).

EXHIBIT 3

Published Studies Examining the Use of NIPT for the Detection of Trisomy 18

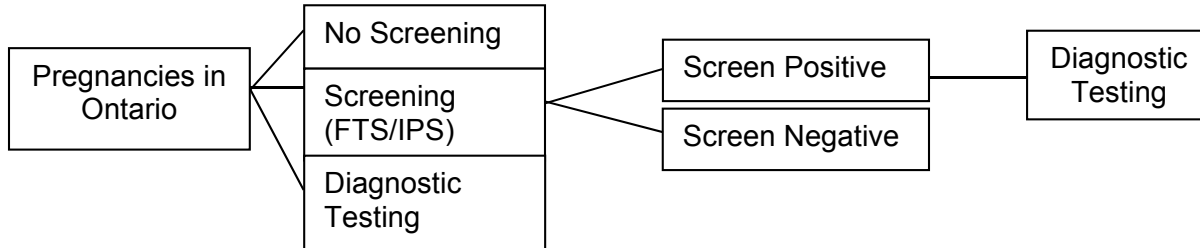
Table 3. Results of validation studies for non-invasive detection of fetal trisomy

Study	Sequencing approach	Trisomy 18 detection rate	Trisomy 18 false-positive rate
Lau et al. 2011 ¹¹	12-plex shotgun	90% (9/10)	0
Sehnert et al. 2012 ¹²	1-plex shotgun	100% (8/8)	0
Sparks et al. 2012 ¹³	96-plex selective	100% (8/8)	0.8%
Ashoor et al. 2012 ¹⁴	96-plex selective	98% (49/50)	0
Bianchi et al. 2012 ¹⁵	6-plex	97.2% (35/36)	0
Norton et al. 2012 ¹⁵	96-plex selective	97.4% (37/38)	0.07%
Palomaki et al. 2012 ¹⁵	4-plex shotgun	100% (59/59)	0.28%

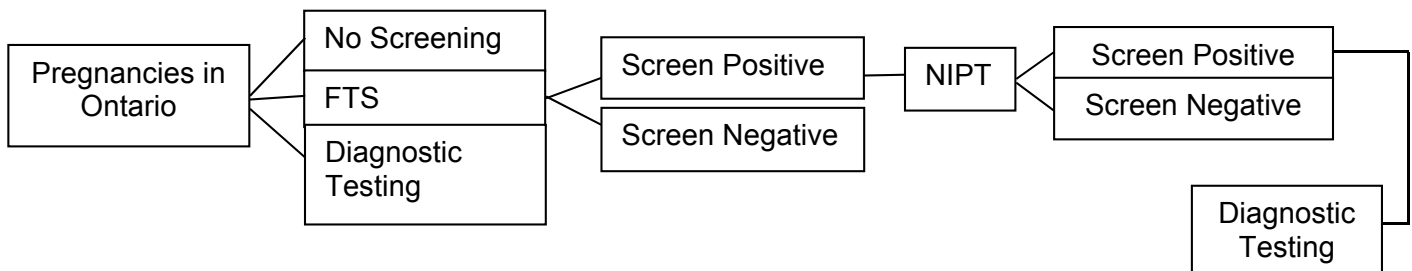
Source: Langois & Brock, 2013 (by permission of The Society of Obstetricians and Gynaecologists of Canada).

EXHIBIT 4
Algorithms of Screening Pathways

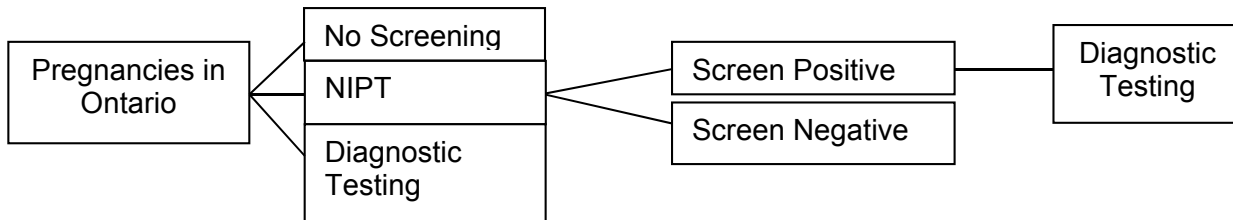
1. Current model



2. Contingent model



3. Primary model



Source: Adapted from Okun et. al., 2014.

EXHIBIT 5
Evaluation Assumptions

Table 1 **Background conditions and assumptions for various scenarios of prenatal screening for Down syndrome in Ontario**

Conditions/ assumptions	Current system, No cffDNA (1)	FTS, No cffDNA (2)	Primary cffDNA DS screen (3)	Contingent cffDNA				
				Current FTS performance (4)	Cost recovery (5)	Improved DR (6)	Higher uptake (7)	Optimized FTS (8)
# total pregnancies	144 570	144 570	144 570	144 570	144 570	144 570	144 570	144 570
Expected number of cases of DS	448	448	448	448	448	448	448	448
Uptake of prenatal screening	67%	67%	67%	67%	67%	67%	80%	80%
Number of screened pregnancies	96 862	96 862	96 862	96 862	96 862	96 862	115 656	115 656
Detection rate of IPS/FTS	85%	85%	99%	85%	85%	95%	85%	95%
Positive rate	3.6%	5.4%	0.1%	5.4%	5.4%	11.2%	5.4%	11.2%
Rate of diagnostic testing among screen-positive women	60%	60%	100%	100%	100%	100%	100%	100%
Rate of diagnostic testing among screen-negative or no screening group	1.2%	1.2%	0%	1.2%	1.2%	0%	1.2%	0%
Pregnancy loss rate due to amniocentesis (ref RCT)	1%	1%	1%	1%	1%	1%	1%	1%
Cost of cffDNA test (ref)			\$795	\$795	\$744	\$795	\$795	\$600

cffDNA, cell-free fetal DNA; FTS, first trimester screening; DS, Down syndrome; DR, detection rate; IPS, integrated prenatal screening.

Source: Okun et. al., 2014 (by permission of John Wiley and Sons and Copyright Clearance Center).

EXHIBIT 6
Evaluation Outcomes: Models 1-3

Table 2 **Performance and cost outcomes with different modeled scenarios of prenatal screening for Down syndrome in Ontario**

Outcomes	Current system, No cffDNA (1)	FTS, No cffDNA (2)	Primary cffDNA DS screen (3) ^a
# amniocentesis performed	3211 ^b	4247 ^b	394 ^c
# prenatal cases of DS detected prenatally	154	154	297
# amniocenteses related losses of non-DS affected pregnancies	31	41	1
Total program cost	\$17 353 789	\$17 580 080	\$85 146 250
Cost/woman screened	\$179	\$182	\$879
Cost/prenatally diagnosed pregnancy with DS	\$112 919	\$114 391	\$286 428
Cost/additional prenatally diagnosed pregnancy with DS	—	—	\$472 139

cffDNA, cell-free DNA; FTS, first trimester screening; DS, Down syndrome.
^aIncludes cost of first trimester ultrasound.
^bAssumes 1.2% of screen-negative women continue to request amniocentesis.
^cAssumes only contingent screen-positive women undergo amniocentesis

Source: Okun et. al., 2014 (by permission of John Wiley and Sons and Copyright Clearance Center).

EXHIBIT 7
Evaluation Outcomes: Models 4-8

Table 3 Performance and cost outcomes with different cell-free fetal DNA contingent modeled scenarios

Outcomes	Contingent cffDNA with current FTS performance (4)	Contingent cffDNA with Cost recovery (5)	Contingent cffDNA with Improved DR (6)	Contingent cffDNA with Higher uptake (7)	Contingent cffDNA with Optimized FTS (8)
# amniocentesis performed	1358 ^a	1358 ^a	293 ^b	1621 ^a	350 ^b
# prenatal cases of DS detected prenatally	253	253	282	302	337
# amniocenteses related losses of non-DS affected pregnancies	11	11	0	13	0
Total program cost	\$17 619 839	\$17 353 081	\$20 184 795	\$20 836 046	\$21 372 742
Cost/woman screened	\$182	\$179	\$208	\$180	\$185
Cost/prenatally diagnosed pregnancy with DS	\$69 583	\$68 530	\$71 474	\$68 913	\$63 383
Cost/additional prenatally diagnosed pregnancy with DS	\$2673	\$0	\$21 933	\$23 423	\$21 900

cffDNA, cell-free DNA; FTS, first trimester screening; DS, Down syndrome.

^aAssumes 1.2% of screen-negative women continue to request amniocentesis.

^bAssumes only contingent screen-positive women undergo amniocentesis.

Source: Okun et. al., 2014 (by permission of John Wiley and Sons and Copyright Clearance Center).

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INSTRUCTOR GUIDANCE

Deciding Value for Money: Improving Prenatal Genetic Screening in Ontario

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BACKGROUND

Since 1993, the Ontario Ministry of Health and Long-Term Care (MOHLTC) has financed prenatal genetic screening through its provincial health insurance plan. In 2013, a new technology became available. Non-invasive prenatal testing (NIPT) promises improved accuracy and screening safety at a higher cost than other screening tests. Since 2013, pregnant women in Ontario have been paying for the test themselves. In March 2014, the Ministry appointed a Prenatal Genetic Screening Group (PGSG), to make recommendations on making NIPT available through the provincial health insurance plan. The Ministry requested an economic evaluation, appraising the value of NIPT.

OBJECTIVES

1. Understand the role of economic evaluation in health policy decision-making
2. Critically appraise the quality of an economic evaluation and evaluate its applicability
3. Interpret economic evaluations and use the results to inform policy recommendations
4. Discuss the challenges of interpreting cost-effectiveness analysis as compared to cost-utility analysis
5. Consider broader social, political, and ethical concerns such as equity, quality assurance, allocative efficiency, and appropriate use of screening in making health policy decisions

DISCUSSION QUESTIONS

1. How should scarce resources be allocated within a publically funded healthcare system?
2. What type of economic evaluation was performed (cost-minimization, cost-effectiveness, cost-utility, cost-benefit)?
3. How would you appraise the quality of the economic evaluation? Is it adequate for use in policy decision-making?
4. What are the challenges associated with using the cost per case of Down syndrome diagnosed as a measure of value for money? Are there additional analyses you would recommend?
5. What recommendations would you make about NIPT screening based on the results of economic evaluation?
6. Are there important factors not addressed by the economic evaluation?
7. Should the ministry allocate resources to supporting parents of children with Down syndrome?

KEYWORDS

Economic evaluation; cost-effectiveness analysis; genetic screening; Down syndrome.

CASE 2

Understanding and Developing Conceptual Frameworks and Causal Models in Maternal and Child Health Programming

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THE FIRST DAY

Leading Child Health Research: The Centre for Global Child Health, The Hospital for Sick Children

"The world has become a small place. Even if we wanted to isolate ourselves from global health issues, we could not. Just think of SARS. We have an obligation to participate and use our skills and expertise in issues pertaining to child health everywhere."

– Stanley Zlotkin, Chief of Global Child Health at SickKids

On Monday May 12, 2014, Jasleen walked into the Peter Gilgan Centre for Research and Learning (PGCRL) building located at the corner of Bay and Elm in downtown Toronto. The \$400 million Research and Learning Tower was a 21-storey high building that was built to bring together the 2,000 scientists, trainees, and staff at the SickKids Research Institute (Hospital for Sick Children, 2010). For the next three months, Jasleen would embark on a new journey whereby she would work on the 11th floor of the building in the Centre for Global Child Health at The Hospital for Sick Children with leading child health experts to improve child health globally.

Only a few weeks ago, Jasleen received some documents from Julianna, the data manager at the Centre for Global Child Health, on the project that she would be working on for the next little while. In 2012, The Centre for Global Child Health at The Hospital for Sick Children and the Munk School of Global Affairs at the University of Toronto partnered with four Canadian non-governmental organizations (NGOs) to form the Muskoka Initiative Consortium (MIC) Knowledge Management Initiative (KMI). The MIC-KMI was intended to develop a knowledge management strategy and analyze data collected within ten NGO-led Maternal, Newborn and Child Health (MNCH) projects in seven low and middle-income countries in Africa and Asia (Bangladesh, Ethiopia, Ghana, Mali, Pakistan, Tanzania, and Zimbabwe). The goal of the initiative was to identify the lessons learned and best practices that could be shared to inform programming, monitoring, and implementation to impact the lives of mothers and their children in low and middle-income countries.

As Jasleen received her security badge and made her way through the revolving doors, she remembered that each of the NGOs had provided a document that outlined a framework to plan,

implement, and evaluate their interventions. Her task was in no way simple – her phone conversation a few weeks ago with the key principal investigator on the project, Dr. Howard Khan, and data manager, Julianna, had left Jasleen with a challenging task. This task involved reviewing and understanding conceptual frameworks and causal models. She had started researching these concepts prior to her arrival, yet she still knew the biggest challenge she faced would be figuring out where to start. The elevator door opened and Jasleen stepped in. She had an idea!

WHAT IS CANADA DOING?

Keeping Promises: Improving Maternal, Newborn and Child Health

“Saving the lives of mothers and children is not only a moral imperative, it is also the foundation for building prosperous communities for this generation and the next. With Canadian leadership and the help of partners in Canada and around the world, we can achieve this goal and ensure that all women, newborns and children can live healthy and productive lives.”

– Stephen Harper, Prime Minister of Canada

The year 2010 was when saving the lives of women and children became a global priority for many key global organizations, leaders, and funders across the world. During the 36th G8 Muskoka summit, held in June 2010 at the Deerhurst Resort in Huntsville, Ontario, the Prime Minister of Canada, Stephen Harper announced the “Muskoka Initiative – to mobilize global action to reduce maternal mortality and improve the health of mothers and children in the world’s poorest countries” (Government of Canada, 2014). Canada led the top leaders of the world to commit \$7.3 billion to improve maternal, newborn, and child health in the poorest countries across the world (Government of Canada, 2014). Canada invested a total of \$2.85 billion on MNCH programming for five years (2010-2015) (Government of Canada, 2014). The Muskoka Initiative was established to help achieve the 2015 Millennium Development Goals (MDGs) set out by the United Nations (UN) in 2000 at the UN Millennium Summit.

Following the Muskoka summit, the United Nations Secretary, General Ban Ki-moon, led the UN Millennium Development Goals Summit in September 2010 at the United Nations (UN) Headquarters in New York. At the summit, he announced a \$40 billion commitment to the “Every Women, Every Child Initiative – to mobilize and intensify global action to improve the health of women and children around the world” (United Nations Foundation, 2014). The funding was provided to this global strategy to reduce child mortality and improve maternal health, MDGs 4 and 5 (United Nations Foundation, 2014), to be achieved by 2015.

In November 2010, The Minister of International Cooperation, Beverly J. Oda, announced how the funding of \$2.85 billion would be filtered through the Department of Foreign Affairs, Trade and Development (DFATD¹) in Canada, into the Muskoka Initiative focusing on three key paths: 1) strengthening the health systems; 2) decreasing the burden of infectious diseases; and 3) improving nutrition (Government of Canada: Foreign Affairs, Trade and Development Canada, 2015). During this time, the Muskoka Initiative Partnership Program was also announced (Government of Canada, 2014). Overall, Canada had committed to devoting \$82 million to the Muskoka Initiative Partnership Program from 2010 to 2015 (Government of Canada: Foreign Affairs, Trade and Development Canada, 2015).

¹ Known as CIDA – the Canadian International Development Agency.

As Jasleen reviewed the timelines on how Canada became an integral partner in improving MNCH, they provided an insight not only into the involvement of Canada in the past five years towards global issues surrounding MNCH, but how the partnerships had formed through the Muskoka Initiative Partnership Program, such as the one she was working on at the Centre for Global Child Health. These projects were being funded through DFATD, as part of the commitment to advancing MNCH, through the Muskoka Initiative. This gave Jasleen a clear understanding of the task that she had to complete: it was clear to her that since DFATD was a funding body and provided grants to projects put forth by organizations, they also had requirements that needed to be met. One of these requirements was to provide a framework or model that outlined the programs and activities that were implemented by organizations (see Exhibit 1). She wondered, was this the only framework used by organizations to plan, implement, or evaluate interventions? What were the processes or steps needed to develop a framework or model? She pulled out her MacBook.

UNDERSTANDING THE TERMINOLOGY

Facing the Challenge: The First Step in Program Planning, Implementation, and Evaluation

"If you don't know where you are going, how are you going to know when you get there?"
– Yogi Berra

Jasleen thought the best way to understand how to develop a conceptual framework or causal model would be to understand what the terms 'conceptual framework' and 'causal model' actually meant. She opened up a Google search page and typed in the terms 'conceptual framework' and 'causal models' and quickly became overwhelmed when she saw the various ways in which the terms were defined:

- **Conceptual Frameworks**

"A conceptual framework is typically developed from theory. It identifies the concepts included in a complex phenomenon and shows their relationships. The relationships are often presented visually in a flowchart, web diagram or other type of schemata" (Leshem & Trafford, 2007).

"Explains, either graphically or in narrative form, the main things to be studied the key factors, concepts, or variables—and the presumed relationships among them" (Adamson, 2005).

- **Causal Models**

"Causal models can take several forms and may be used at different stages in research. For example, a pictorial model is a way of portraying possible relationships between several variables and in this sense should be treated as an integrated set of hypotheses which are worthy of further investigation. Lines are drawn between variables to indicate potential relationships and when arrowheads are added they indicate causal direction" (Jupp, 2006).

"In a pathway approach, you would specify each connection that you think might be relevant. You might specify that activity A affects short-term outcomes A and C, which in turn affect medium-term outcomes E and F, and long-term outcomes A and D. You might also expect that there will be feedback loops in your model. For instance, changing the results of a short-term outcome could trigger a change in

another short-term outcome that then reverberates in or feeds back to the first outcome” (Cornell University: Office of Research on Evaluation, 2009).

Jasleen knew this would not be easy – she would need to look up other terms as well. She started with a comprehensive literature review on conceptual frameworks (i.e., Logic Models (LMs)), causal models (i.e., Directed Acyclic Graphs (DAGs)), and path analysis models (i.e., Structural Equation Models (SEMs)). Jasleen needed to understand the differences between the various frameworks, models, and pathways that existed. Therefore, the greatest challenge Jasleen faced was grasping the terms and concepts that were being used by programmers and evaluators to plan, implement, and evaluate their programs and interventions. The terms and concepts used to describe the specific function and set of cause-effect relationships seemed to vary between authors. However, Jasleen soon came to realize that even though there were different ways to define the terms, the logical process that each author followed was similar. The relationships were illustrated either through a framework, model, or diagram and started with underlying conditions and assumptions (i.e., theory, strategy, resources, activities, contextual factors, determinants of health), which followed through the immediate (short-term) and intermediate (medium-term) outcomes, finally leading up to an end result (long-term) (i.e., ultimate outcome, disease state, impact) (see Exhibit 2 for an example of a conceptual framework and Exhibit 3 for an example of a causal model (path analysis)).

Jasleen had learned that organizations were using frameworks, models, or pathways when applying for grant funding and reporting their final results. In particular, one of the four Canadian NGOs working with the Centre for Global Child Health and the Munk School of Global Affairs had developed a similar framework to reach the 2015 MDG goals. Jasleen thought if she were to develop a model or framework that would assist in planning, implementing, and evaluating interventions, specific details would be needed. A recent report published by the UN “Trends in Maternal Mortality: 1990-2010” mentioned that “of the 40 countries with the world’s highest rates of maternal death, 36 were located in sub-Saharan Africa” (World Health Organization, 2012). Therefore, it was not surprising that Mali was one of the African countries with a maternal mortality ratio of 1200 maternal deaths per 100,000 live births, ranking among the top 10 countries in which women faced the highest risk of death during pregnancy and childbirth (Gage, 2007). Now that Jasleen knew what the terms meant and when to use them, did she not need to know how to apply them? Jasleen turned back to her MacBook: the next step was clear.

THE SITUATION

Creating the Big Picture: Maternal Health Around the World

“Women are not dying because of untreatable diseases. They are dying because societies have yet to make the decision that their lives are worth saving. We have not yet valued women’s lives and health highly enough.”

– Mahmoud Fathalla

At the September 2000 Millennium Summit held at the UN headquarters in New York, with the world’s top leaders from 189 nations, the largest assembly in history came together to embrace the UN Declaration (2014). The Declaration was the first step taken to address the issue of extreme poverty around the world and to combat the underlying issues of poverty by the year 2015 (United Nations, 2015). The result of this declaration was the development of the eight MDGs (see Exhibit 4). The fifth MDG was aimed at improving maternal health by reducing maternal mortality rates by three quarters by 2015.

According to the World Health Organization (WHO), in 2013, an estimated 289,000 women died during pregnancy and childbirth due to limited access to skilled health care professionals and emergency care (WHO, 2014). However, between 1990 and 2013, maternal mortality had reduced by 50% – a decline of 2.6% deaths per year. This was nowhere close to the 5.5% decline needed per year to reach the goal set in MDG5. There had been significant progress in working towards reducing maternal mortality, however even with this decline the maternal mortality ratio in developing regions was still 14 times higher than that observed in developed regions (UN, 2015). As Jasleen continued to read the reports provided by WHO on maternal mortality around the world, she could not believe the difference in risk associated with maternal death in developed versus developing countries, specifically that “the probability of a 15 year old woman dying from a maternal cause was 1 in 3,700 in developed countries, versus 1 in 160 in developing countries” (WHO, 2014).

Jasleen knew complications could arise during and following pregnancy and childbirth, but what she was surprised to see was that nearly 75% of all maternal deaths in developing countries were due to “unsafe abortions, severe bleeding and infections after childbirth, high blood pressure during pregnancy, and from complications that might occur during delivery” (WHO, 2014, see Exhibit 5). These were complications that could be reduced by implementing key interventions that involved connecting women with the healthcare system to improve the delivery, access, and utilization of maternal health care services, especially during the initial stages of pregnancy. Antenatal care packages focused on delivering interventions that could potentially reduce the complications that women faced during pregnancy, and could have a significant effect on maternal death in developing countries.

As Jasleen read further she came across the term “Continuum of Care” (see Exhibit 6). The WHO had stated this is “a principle that emphasized the linkage between health care packages across time and through various service delivery strategies” (Kerber et. al., 2007). In other words, this was a “strategy that looked at the needs of the mother, newborn, and child throughout their life cycle in places where care was provided, and this could include the home, local health clinics, and at district and regional hospitals”. Antenatal care was one of the eight basic health packages that were present in almost every health system. Jasleen wondered why the rate of maternal mortality was so high, especially when there were antenatal care packages available in developing countries. The WHO recommended a minimum of four antenatal visits, comprising interventions such as “tetanus toxoid vaccination, screening and treatment for infections, and identification of warning signs during pregnancy” (WHO, 2014b). The proportion of pregnant women in developing countries who had attended at least four antenatal care visits increased from 37% in 1990 to about 52% in 2012. Yet, this did not change the situation in even the poorest countries, where only 38% of pregnant women visited a skilled health care provider four or more times for antenatal care between 2006 and 2013 (WHO, 2014b, see Exhibit 7).

Jasleen sat in front of her computer and took a few minutes to reflect on what she had read about maternal health on a global level. She could only begin to imagine what the situation was like in Mali. She continued with her literature review.

Thinking about the Details: Maternal Health Care in Mali

“Our target population is mainly mothers, and everyone thinks, if you educate mothers everything will be solved, but this is not the case.”

– Community Health Worker in Mali

Historical Background

The Republic of Mali is located in western Africa with an approximate area of 1,241,248 square kilometers (Bergh et. al., 2012). The countries that border Mali are Algeria in the north, Niger in the east, Burkina Faso in the southeast, Côte d'Ivoire and Guinea in the south, and Senegal and Mauritania in the west (Bergh et. al., 2012). In the northern part of Mali, flat sand-covered rolling plains can be seen reaching the Sahara desert (Bergh et. al., 2012, see Exhibit 8).

The country of Mali is divided into eight regions and one district. The largest city in Mali is the capital city Bamako. In 1880, Mali became a French overseas territory and was known as "French Sudan" (WHO: Global Task Force in Cholera Control, 2009). Mali's major economic activities are agriculture and fishing, including natural resources like gold, uranium, livestock, and salt (Bergh et. al., 2012). However even with several economic opportunities, Mali ranked 175 out of 187 on the 2011 UNDP Human Development Index (WHO: Global Task Force in Cholera Control, 2009) and remains one of the poorest countries in the world (Bergh et. al., 2012).

Mali's population was nearly 15 million in 2012 and has tripled in the past 50 years (WHO, 2014). By 2050, it is projected that Mali's population will reach 45.3 million (Population Institute, 2013). Almost half of Mali's population is 15 years of age and the number of women modestly outweighs the number of men (94 men per 100 women) (The DHS Program, 2001). Furthermore, in 2012, there were approximately 3,251,159 women aged 15-49 living in Mali, giving birth to 495,992 children. The number of deaths that occurred in 2010 due to inadequate maternal health care services was approximately 3,800, with a maternal mortality rate of 540 per 100,000 live births (WHO, 2014d). Therefore, during pregnancy, women in Mali have a 1 in 24 risk of dying (The DHS Program, 2001). In 2011, the total fertility rate per woman was 6.2 (WHO, 2014c). The maternal mortality rate in Mali is a growing public health concern. Evidence suggests that the high mortality rates are in fact due to the antenatal and postnatal infections that are seen in the poorest population groups in Mali.

Healthcare System

The Mali health system is organized into a pyramid with four levels (The World Bank, 2011, see Exhibit 9). There are 59 health districts, which are divided into catchment areas and connected to a Community Health Centre (Centre de Santé Communautaire [CSCOM]). As such, the first point of contact is with the CSCOM. On the second level, there is a Referral Health Centre (CSREF) for each district that takes on cases that are referred from the CSCOM. This level is called the "first referral" (The World Bank, 2011). At the third level, there are seven "second referral" public hospitals, located in each region's capital, which receive patients referred from the CSREF. At the top of the pyramid, there are four "third referral" public hospital institutions (two generalist and two specialized) (The World Bank, 2011). In 2011, Mali spent \$73 on health care per capita and 6.8% on health care as a percentage of its GDP (WHO, 2014c). Within Mali's health care system there were significant gaps in staffing and health service delivery. In 2005, there were 0.8 physicians available per population of 100,000, compared to 4.3 nurses and midwives (WHO, 2014c). The majority of the health care system was managed and facilitated by nurses and midwives. In all of Africa, Mali is known to have the lowest number of health-care providers per population. In particular, rural areas of Mali have one-eighth the number of health care providers than that of urban areas (Hurley, Warren, Doumbia, & Winch, 2014).

Maternal Health Care Services

Mali is one of the African countries with the poorest maternal health care in sub-Saharan Africa (Manda, Kandala, & Ghilagaber, 2014). Maternal health is defined as “the health of mothers during pregnancy, childbirth, and in the postpartum period” (Manda et al., 2014). Women in Mali have a 5% lifetime risk of maternal death and it is estimated that for every maternal death, an additional 20 women will experience childbirth-related illness or injury (Hurley et al., 2014). The greatest obstacle in sub-Saharan Africa for not reaching the MDGs is the decreased number of skilled health care providers available to women during antenatal care. In sub-Saharan Africa, fewer than half of the women receive four or more antenatal care visits from skilled health care providers (White, Dynes, Rubardt, Sissoko, & Stephenson, 2013). In Mali, approximately 35% of women had four or more antenatal care visits in 2006 (WHO, 2014d).

Jasleen sat back and looked out the window. She thought to herself, what if adequate maternal health care services were provided to the women of Mali? Would providing these services decrease the observed maternal mortality rate? Were there any other barriers that women faced during pregnancy that limited their access and utilization of antenatal care services? Providing antenatal care services was one of the key packages in the Continuum of Care strategy and led to identifying many of the complications that could be determined early on during pregnancy. At what level could these factors or barriers have an effect? Jasleen started to think about these factors and barriers.

Factors and Barriers Effecting the Delivery, Access, and Utilization of Maternal Health Care Services

There are several factors women face when accessing and utilizing maternal health care services. These include, but are not limited to:

- Lack of education (i.e., mother’s and husband’s education level);
- Lack of decision-making authority (i.e., women’s authority and autonomy);
- Socioeconomic barriers (i.e., low household living standards, low household income, no insurance coverage);
- Limited access to healthcare facilities (i.e., transportation);
- Geographical location (i.e., distance to health care facilities); and
- Lack or shortage of trained and skilled health care professionals (i.e., capacity and knowledge of skilled health care professionals).

In Mali, the adult literacy rate is 26% (Canadian Red Cross, 2014). Based on the Demographic and Health Survey of Mali (DHSM) conducted in 2001, nearly three quarters of women aged 15-49 have had no education (The DHS Program, 2001). Moreover, 77% of women over six have never attended high school, and less than 2% of women have completed the primary level schooling (The DHS Program, 2001). Given this lack of education, it is likely that Malian women are unaware of the negative impacts of not going for routine antenatal care visits. This also impacts their authority and autonomy to make their own decisions. In Mali, husbands are the principle decision makers in households when it comes to women’s health, especially on matters related to seeking maternal health care for complications that might arise during pregnancy (Gage, 2007). This also can be limited by not having adequate transportation. Having transport services available to women is important for maternal survival (Traore et. al., 2014). Transport support systems should be developed to provide women access to first-level facilities and to facilities where there are trained health care professionals in emergency obstetric and neonatal care (EmONC) (Traore et al., 2014). However, difficulty arises when women live in remote rural areas where poor road conditions do not allow for easy access in

and out of the community. In Mali, the nearest health centre is 15km away for 88% of the population (The World Bank, 2011). Accessing health care services using roads in poor conditions can be a major barrier for women in these communities. It can also be very difficult to travel to and from the health care facilities when women in these communities also have other obligations to their families. Though Mali has a four-level health system, there is still a shortage of trained and skilled health care professionals (Traore et al., 2014). Additionally, the knowledge and skills required by health care professionals does not always meet the standards needed in communities given the high maternal mortality rates in Africa (Traore et al., 2014). Thus, another reason why women might be reluctant to travel long distances to visit a health care provider is because of the shortage in health care professionals and not knowing whether a professional will be available.

As Jasleen read the last document illustrating the maternal health problem in Mali, she wondered: if one of the partnering organizations wanted to further improve the maternal health of women and girls in Mali, what interventions, programs, and activities would they plan and implement? And how would this be illustrated in a model or framework?

WHAT TO THINK ABOUT

Next Steps: Applying the Concepts

“Only one thing registers on the subconscious mind: repetitive application – practice. What you practice is what you manifest”

– Fay Weldon

Jasleen had received an invitation to watch the “Saving Every Woman, Every Child: Within Arms Reach Summit” which was being held in Toronto, Ontario from May 28 to 30th of 2014. She was excited! She really wanted to see what the next steps were for Canada in moving towards ending maternal and child deaths globally beyond 2015. After all, Canada had invested in the Muskoka Initiative, to reach MDGs 4 and 5 by 2015. As Jasleen sat at the atrium at the Hospital for Sick Children watching the final days of the summit, Prime Minister Stephen Harper made an announcement that Canada would continue to invest and commit to supporting global efforts in ending maternal and child deaths beyond 2015 to 2020 by investing another \$3.5 billion into the Muskoka Initiative (World Health Organization: The Partnership for Maternal, Newborn and Child Health, 2014e). This was an announcement that came as a big surprise to many. It was five years ago that Prime Minister Stephen Harper had laid the foundation to assist developing countries in reaching the MDG goals 4 and 5 by 2015 and now he had committed another five years.

Jasleen started to think! If new funding was available for MNCH beyond 2015, and organizations would be applying for new funding, how would Jasleen develop a conceptual framework for programs and interventions on maternal health in Mali? What theory or strategy would she base the interventions on? Were there factors or variables that might sway the effect of the interventions in a positive or negative direction? Even after looking at the bigger picture globally and taking a closer look at the maternal health situation in Mali, how would she apply what she had just learned? What interventions or programs would she need to think about to work towards improving maternal health and reducing maternal mortality?

EXHIBIT 1
Logic Model Framework used by DFATD

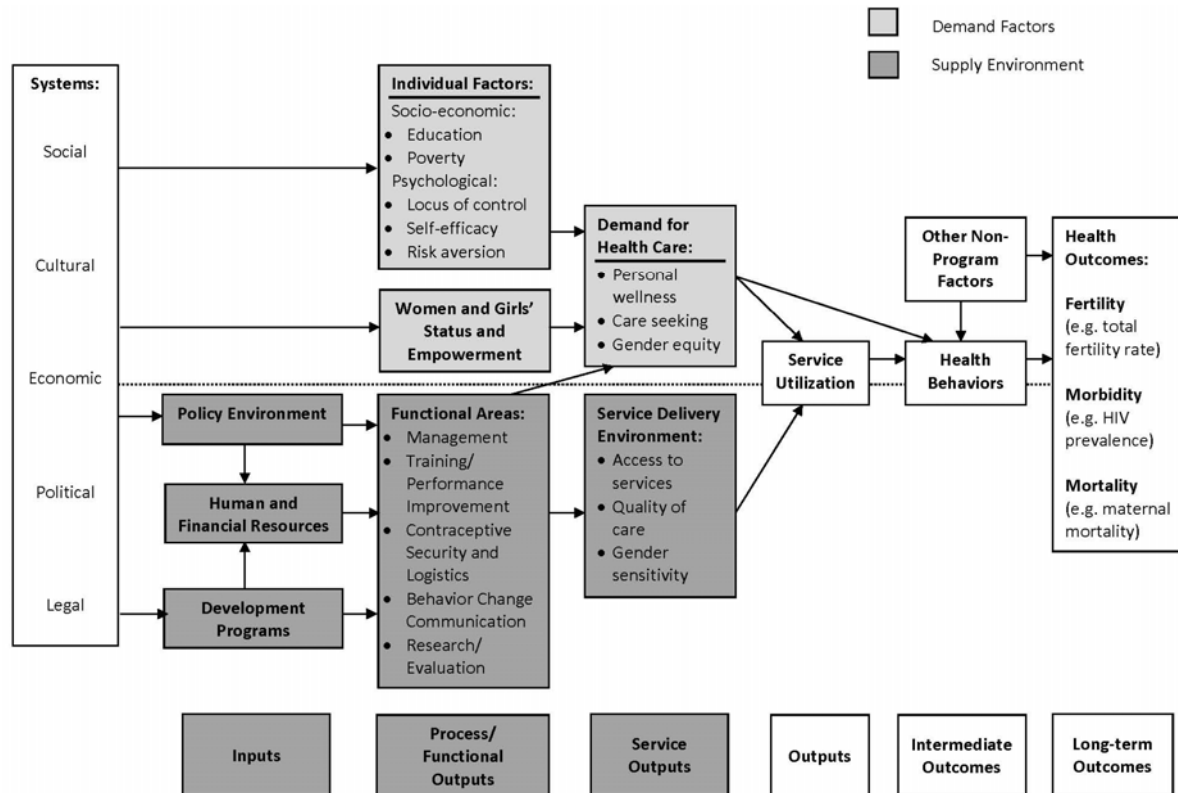
Canadian International Development Agency		Agence canadienne de développement international		LOGIC MODEL (LM)		Version:	Date:
Title	Country/Region/Institution		Number		Team leader		
			Budget		Duration		
ULTIMATE OUTCOME ↑		1000 ↑					
INTERMEDIATE OUTCOMES ↑		1100 + X 1200 + X ↑					
IMMEDIATE OUTCOMES ↑		1110 + X 1120 + X 1210 + X 1220 + X ↑					
OUTPUTS ↑		1111 + X 1121 + X 1211 + X 1221 + X ↑					
ACTIVITIES ↑		1111 + X 1121 + X 1211 + X 1221 + X ↑					
Notes:							

Please access the [Guide on RBM Tools at CIDA](#) to help you fill out this document

Source: Government of Canada: Foreign Affairs, and Trade Development Trade, 2015b.

Understanding and Developing Conceptual Frameworks and Causal Models in Maternal and Child Health Programming

EXHIBIT 2
A Conceptual Framework



Source: USAID, n.d.

EXHIBIT 3
A Causal Model (path analysis)

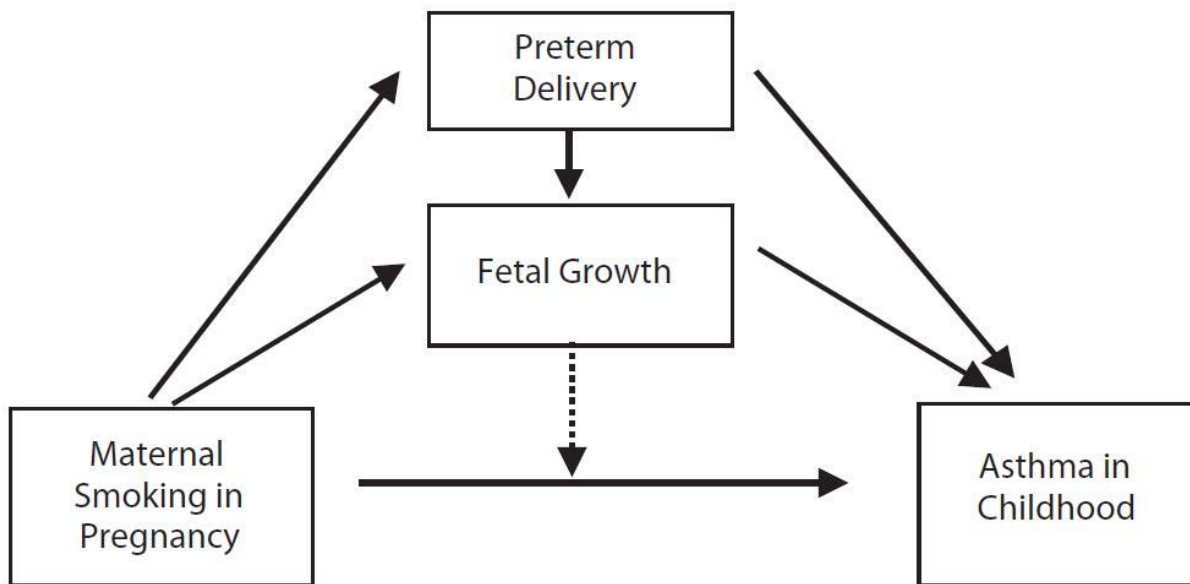


FIGURE 1—The hypothesized causal model of the effect of maternal smoking in pregnancy on childhood risk of asthma. Solid arrows indicate a causal relationship; the broken arrow indicates effect modification.

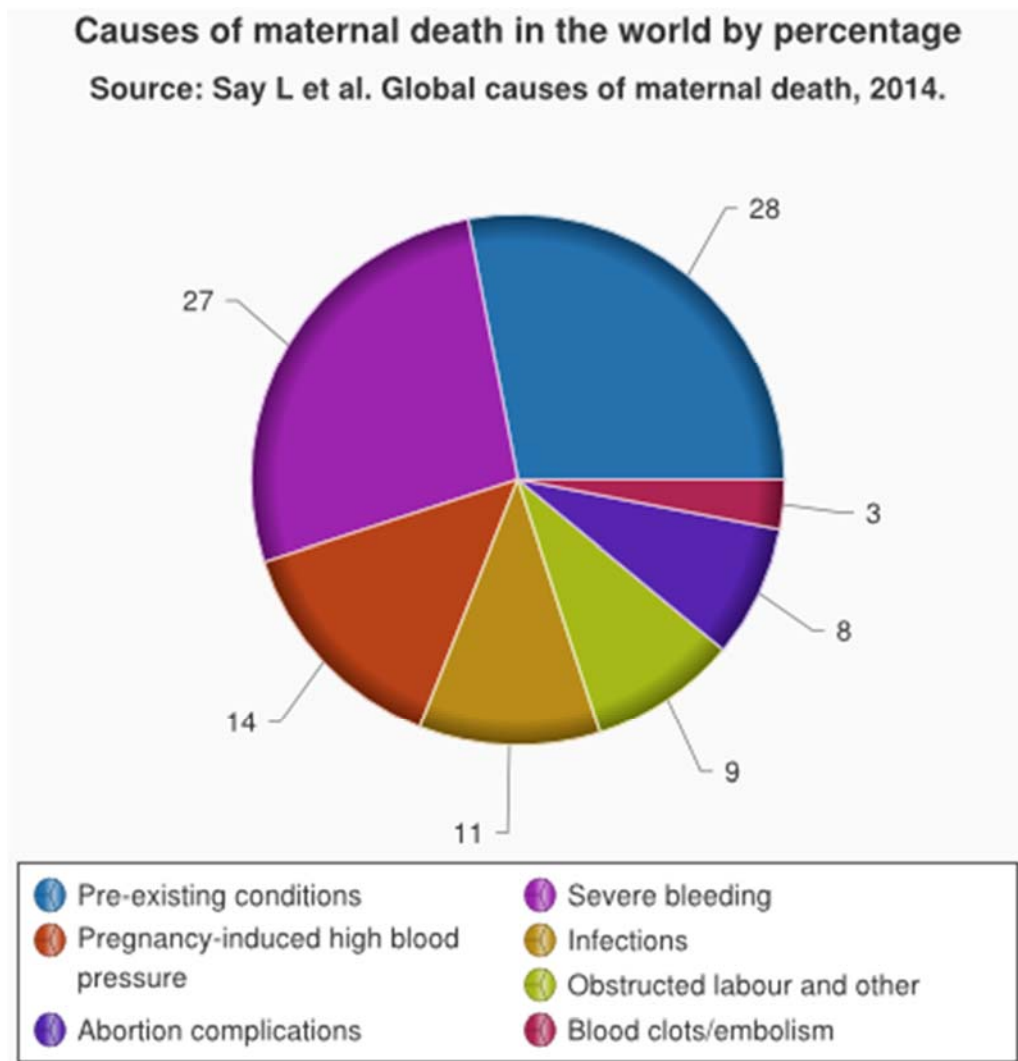
Source: Jaakkola & Gissler, 2004 (by permission of The Sheridan Press).

EXHIBIT 4
A List of the Eight Millennium Development Goals (MDGs)



Source: United Nations, 2015.

EXHIBIT 5
The Global Causes of Maternal Death



Source: WHO, 2014.

EXHIBIT 6
A Diagram of the Continuum of Care Strategy

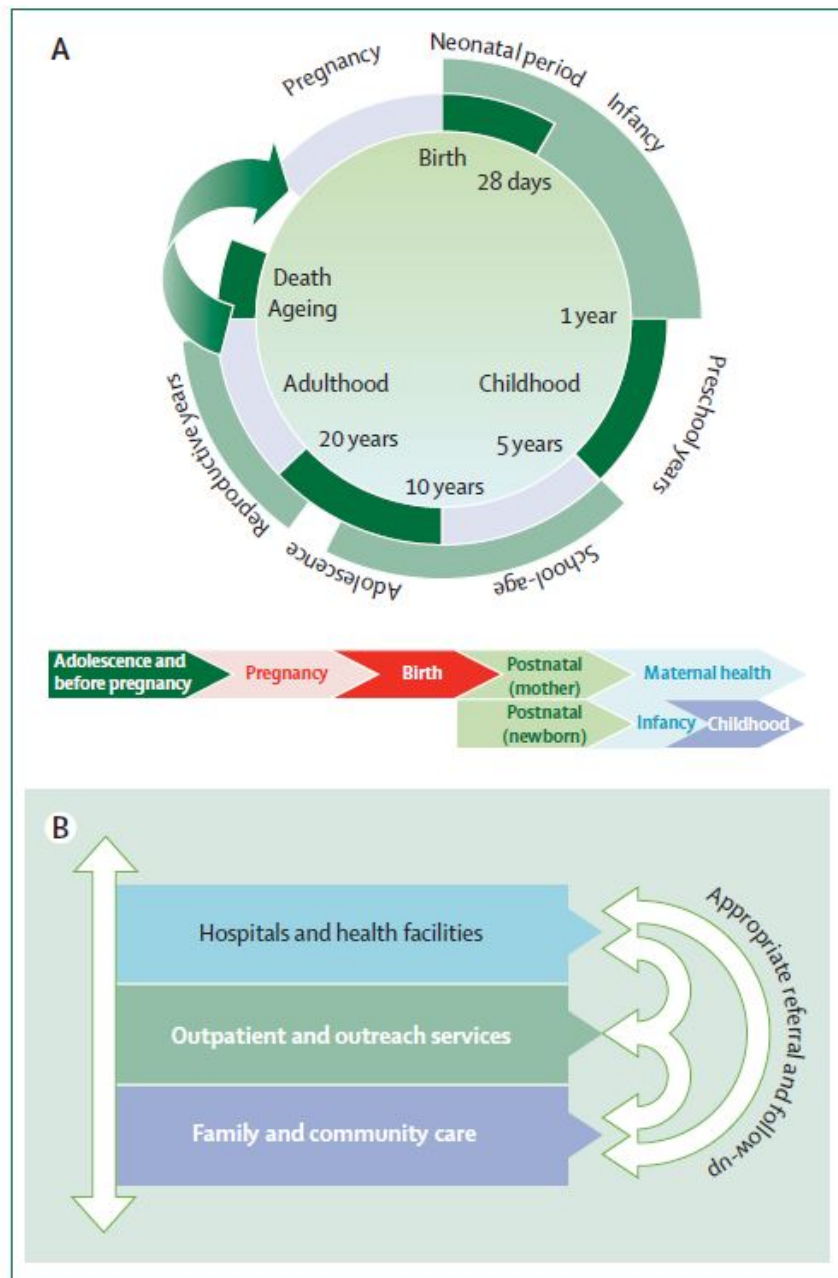
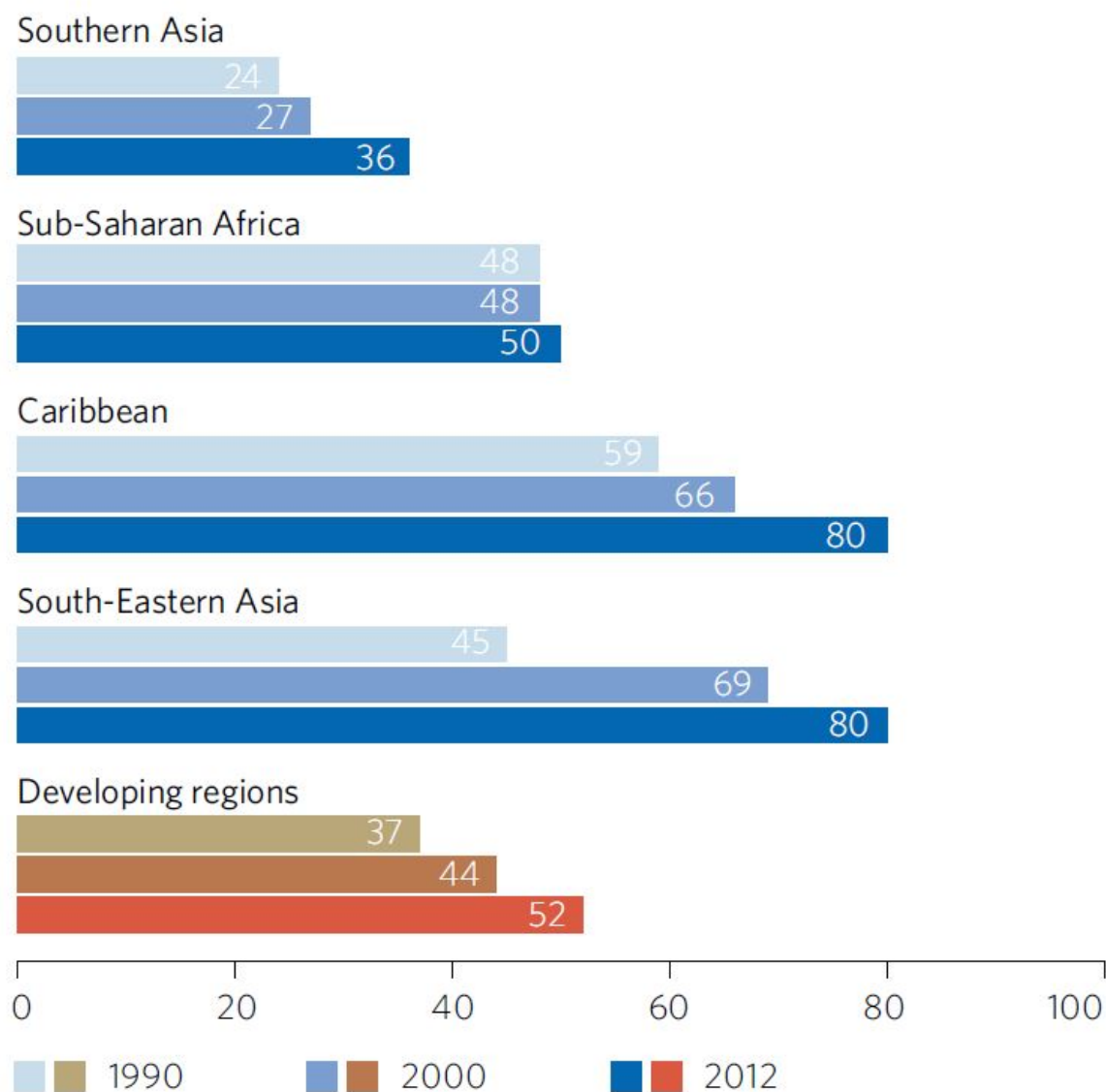


Figure 1: Continuum of care
Connecting care during the lifecycle (A) and at places of caregiving (B). Adapted from Partnership for Maternal, Newborn and Child Health, with permission.⁴⁵

Source: Kerber et. al., 2007 (by permission of Lancet Publishing Group via Copyright Clearance Center).

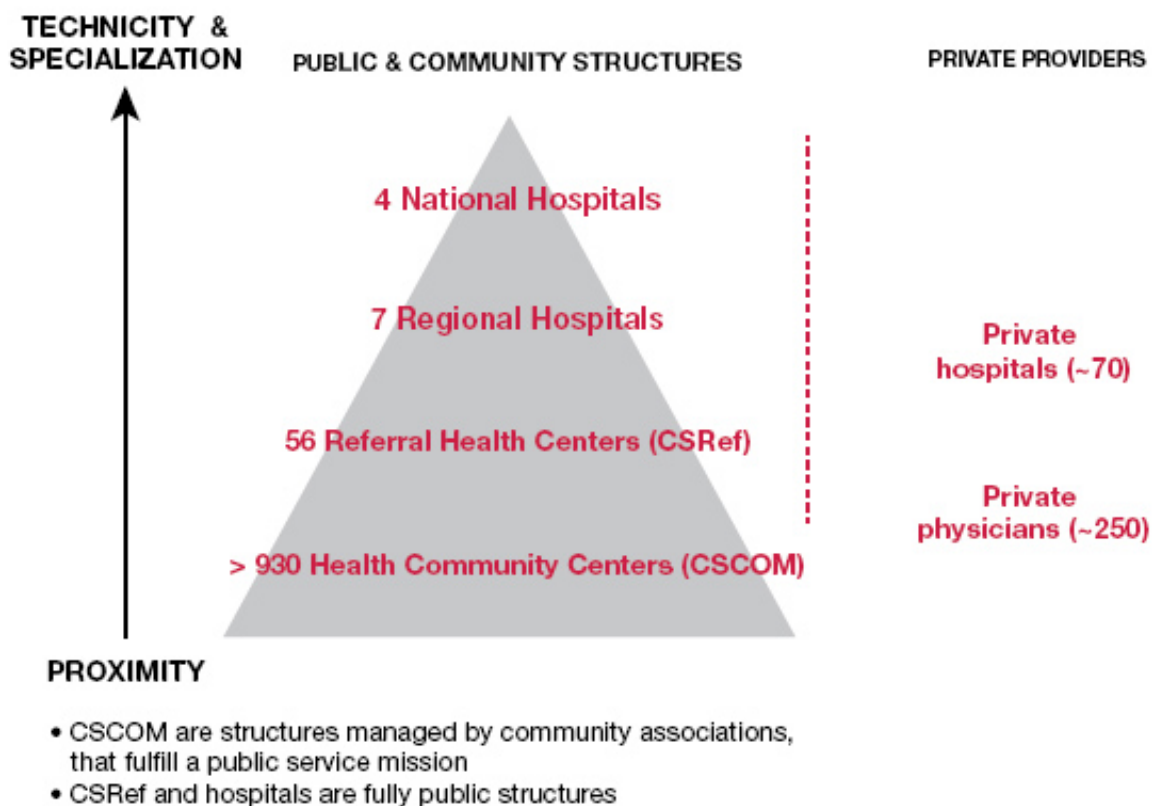
EXHIBIT 7

**Proportion of women aged 15–49 attended
four or more times by any provider during pregnancy,
1990, 2000 and 2012 (Percentage)**



Source: UN, 2014.

EXHIBIT 9
The Health System Structure in Mali



Source: Clerck, Roos-Weil, Carpentier, & Clerck, 2012 (by permission of Creative Commons Attribution 3.0 license).

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INSTRUCTOR GUIDANCE

Understanding and Developing Conceptual Frameworks and Causal Models in Maternal and Child Health Programming

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BACKGROUND

This case attempts to help students understand the various terminologies (“frameworks”, “pathways”, “models”, etc.) used by organizations in planning, implementing, and evaluating programs and interventions. It is based on the work done by the Center for Global Health at The Hospital for Sick Children in Toronto on the Knowledge Management Initiative (KMI) of the Muskoka Initiative Consortium (MIC). The case starts by reprising the Muskoka I and II Initiatives, and then focuses on the global context before narrowing down to programs and interventions for maternal health in Mali.

OBJECTIVES

1. Understand conceptual frameworks and models (e.g. logic models, structural equation models, directed acyclic graphs, etc.), with an emphasis on the similarities and differences.
2. Understand the usability of a framework when planning, implementing, and evaluating programs or interventions in maternal health care.
3. To develop a framework to improve maternal health care in Mali.

DISCUSSION QUESTIONS

1. What are conceptual frameworks?
 - a. What are different types of such frameworks?
 - b. What are similarities and differences between possible frameworks?
2. What is the problem or situation with respect to maternal health in Mali?
 - a. Why does the problem exist? What are some issues creating this problem?
 - b. What is the long term goal?
 - c. What needs to be changed? What are some immediate (short term) and intermediate (medium term) outcomes?
 - d. What specific actions and activities can affect change at the immediate outcome level?
 - e. Are there any other factors that need to be considered that might have an effect on the outcomes and activities?
 - f. How are you going to measure outcomes? What indicators will you use to assess the effectiveness of the program at the immediate, intermediate, and ultimate outcome level?

KEYWORDS

Conceptual framework; maternal health; Mali; program evaluation.

CASE 3

Hospitals Don't Burn: Caribbean Island Regional Hospital¹

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Marlene Janzen Le Ber, PhD (Assistant Professor, Brescia University College)

INTRODUCTION

Adrianus Vlugman ("Ton"), a senior advisor for the Pan American Health Organization (PAHO) in the Office of Caribbean Program Coordination (CPC), sat at his desk in Bridgetown, Barbados looking over his notes. He was preparing a report following the recent fire evacuation drill on June 19th, 2014 at the Caribbean Island Regional Hospital. Overall, the drill had been moderately successful but there were some issues that could have become dangerous if it had been a real emergency. His task now was to prepare recommendations that would help improve the hospital's disaster management plan and future drills. With only a few hours left before the debriefing meeting, Ton needed to finalize his recommendations.

THE CARIBBEAN ISLAND REGIONAL HOSPITAL

The island is located off the north-east coast of South America. The official language of the country is Dutch, however over 15 other languages are also spoken. The interior of the island is mostly rainforest, and the majority of the population lives on the northern coast.

The district where the hospital is located is on the North-West coast, 250 km from the capital city, and has a population of around 37,000 people. The Caribbean Island Regional Hospital, rebuilt and inaugurated in 1959, is the only hospital in the western district of the island and services a total population of around 60,000. Since the 1950s, the hospital underwent many changes and expansions in order to service the growing population. Funding and loans from the government and international agencies enable the hospital to stay up to date with medical equipment and services provided.

The Caribbean Island Regional Hospital is a public hospital and offers many specialties including, gynecology, surgery, urology, anesthesia, internal medicine, and pediatrics. However,

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the hospital has a difficult time keeping their specialists because they cannot compete with the higher wages at the larger hospitals. There are a total of twenty-four departments, five wards (male, female, children, maternity, and medium-care), seventy-eight beds, and five ambulances. The hospital is built on a single level with no stairs or elevators.

PAN AMERICAN HEALTH ORGANIZATION

Founded in 1902, PAHO is the oldest international public health agency in the world, governed by the Pan American Sanitary Conference, the directing council, and the executive committee (see Exhibit 1). The role of PAHO focuses on improving health and quality of life in the Americas (North America, South America, Central America and the Caribbean) with the specific vision of being the “major catalyst for ensuring that all the peoples of the Americas enjoy optimal health and contribute to the well-being of their families and communities” (PAHO, 2011).

PAHO is the World Health Organization's (WHO) regional office for the Americas with its headquarters located in Washington, D.C. There are 28 country offices throughout the Americas. It was in 1978 that the Office of Caribbean Program Coordination (CPC) was established in Bridgetown, Barbados. In 2006, the Office of Eastern Caribbean Countries (ECC) joined the office of the CPC in Bridgetown. This office was formed to provide technical support to the Eastern Caribbean countries and territories (PAHO, 2014).

Since its inception in 1902, PAHO has had many achievements and has seen many advances in the Americas. These achievements include a thirty-year increase in life expectancy, the eradication of many diseases including smallpox, polio, measles, and rubella, improved access to health care, and reduced under-five mortality rates (PAHO, 2013).

Over the years, PAHO has provided technical support in many areas, including but not limited to: epidemic preparedness, disaster preparedness, mitigation and response, health promotion, mental health, and access to healthcare. In 1976, PAHO established the Department of Emergency Preparedness and Disaster Relief (PED) as a technical unit to act in disaster preparedness, mitigation, and response. PED has offices in Washington, D.C, Barbados, Columbia, and Panama.

SAFE HOSPITALS INITIATIVE

Given that many of the Eastern Caribbean and Latin American countries are at high risk of natural disasters it is critical that these regions are capable of managing mass casualties and are prepared to respond readily. For this reason, the functionality of hospitals and health care centres during emergencies is of utmost importance. With this in mind, PAHO, along with many experts, created the Hospital Safety Index (HSI) in 2008. The HSI is a tool that is used to assess how well a hospital would fare in the face of a disaster. It takes into account both structural and non-structural factors as well as organizational aspects with regards to hospital function.

An evaluation of hospital facilities is done by an evaluation team, which included engineers, architects, and hospital staff, and the hospitals are given a score. These scores range from A to C, with A indicating that the hospital would be able to function during an emergency situation, and C indicating that the hospital and its occupants would be at risk during an emergency situation (PAHO, n.d.).

As a second part of the Safe Hospitals Initiative, funding is provided to PAHO by the Disaster Preparedness European Commission's Humanitarian Aid department (DIPECHO) to improve the resilience of health services to respond to emergencies in the Caribbean. As part of this

project, disaster response plans were to be assessed and created for seven hospitals in the Caribbean. Once these plans were developed, the safety level of the hospitals would be reassessed.

The Caribbean Island Regional Hospital was evaluated in November 2009. It achieved a score of 0.47, which ranked it as a B Class Hospital. The hospital would be reevaluated as part of the DIPECHO project in November 2014.

ADRIANUS “TON” VLUGMAN

Adrianus, or Ton as he was known to many, obtained his Masters of Science in Environmental Health Engineering at the Technical University of Delft, in the Netherlands in 1984. Not long after graduating he was hired by PAHO as a Junior Professional Officer as a Sanitary Engineer at the CPC office in Bridgetown, Barbados. Over time, Ton was promoted through the ranks to a Senior Advisor in Water, Sanitation and Environmental Health.

Not long after joining PAHO, Ton became a member of PAHO's "Post Disaster Rapid Assessment Team." Since 1989, he had responded to many natural (floods, hurricanes, landslides) and manmade (fires, cyanide spill in Guyana) situations. Since working with PAHO, Ton had gained a wide range of experience in environmental and public health and had been stationed in many Caribbean countries including Barbados, St Lucia, Suriname, the Bahamas and Guyana. His focus had ranged from environmental health, drinking water quality, wastewater and solid waste management, pollution control, health promotion, groundwater monitoring and even malaria bed netting projects. Based upon these projects, Ton has written and published many technical papers and handbooks that were used by PAHO. Some of these included: "Drinkingwater in Emergency Situation," "Operational Status of Wastewater Treatment Plants in the Caribbean" and "A handbook for safe and healthy schools."

HOSPITAL DISASTER RESPONSE PLANS AND DRILLS

Having and maintaining current and comprehensive disaster response plans for hospitals and health care centres can be the difference between life and death. In the case of an external disaster, hospitals can easily be overwhelmed by mass casualty incidents. External disasters or emergencies can range from vehicular collisions to natural disasters. In these situations, hospitals have to be prepared for expansion of triage and treatment areas while maintaining essential services. Internal disasters or emergencies, such as fires or flooding within the hospital, are also an area that needs to be addressed in disaster response plans. This type of emergency often required partial or complete evacuation of the hospital.

Creation of disaster response plans helps to ensure a safe environment for hospital patients, staff, and the public. Having a plan in place prior to a disaster also helps to maintain critical and essential hospital services, and makes it easier to anticipate emergency situations. In addition, a disaster plan helps to establish decision making mechanisms and command structures. All of these assets enhanced the hospital's ability to return to a pre-incident state of readiness as soon as possible (PAHO, 2012).

In addition to the actual contents of the plan, it is crucial to ensure that staff members received training regarding the disaster management plan and are aware of their roles in a given emergency situation. Once staff members are trained, simulations and drills should be undertaken to test their knowledge and skill levels. Based upon these drills and experience over time, the plan can be evaluated and updated as needed.

CARIBBEAN ISLAND REGIONAL HOSPITAL RESPONSE PLAN

Caribbean Island Regional Hospital (CIRH) does have a draft disaster response plan. This plan includes an introduction and three main sections: 1) Coordination in Disasters/Emergencies, 2) Plan of Action for Epidemics, and 3) Fire Prevention. The introduction of the plan describes the population that CIRH hospital services and gives an introduction to the response plan. In this introduction, external and internal disasters are defined, and the procedure for an external disaster is described briefly.

Section One introduces the Coordination aspect. The hospital CEO was identified as the Incident Commander in a disaster and each department had an identified incident coordinator present during each shift. Additionally, it stated that each department would have an agreed upon plan and telephone cascade. Only the coordinators of each department were given the authority to give a command to transfer or evacuate patients and staff, once they received the command from the Incident Commander. This section also discusses that in the event of an emergency, the Incident Commander would be directly notified, then he/she would relay the message to the coordination team, the IC, Fire and Police would investigate, and only then would they direct Department Coordinators to evacuate.

Section Two of the plan (Epidemic Preparedness) is not relevant to this case, however because CIRH was the only hospital in the west of the country, it is appropriate for the staff to be prepared to respond to an epidemic situation.

Section Three of the plan indicates that all staff members should be trained to use fire suppression devices, that regular fire drills would be held, and that evacuation plans would be accessible with identified emergency exits and routes. This section also includes the procedures in case of a fire, which are as follows:

1. Inform Department Coordinator of potential fire;
2. Try to extinguish the fire;
3. Call fire services and police;
4. Switch of electricity and oxygen supply;
5. Commence evacuation procedure; and
6. Transfer fire victims to the Accident and Emergency department.

See Exhibit 2 for Sections One and Three of the Response Plan.

THE DRILL²

Preparation

On Thursday, June 18th, Ton travelled to the Caribbean Island district to conduct a desktop simulation exercise on fire safety and review the emergency plan of the Caribbean Island Regional Hospital. He also intended to aid in the preparation of an evacuation exercise and observe its execution in order to help staff re-assess and develop their hospital response plan as part of the DIPECHO project. This exercise was to be conducted in the Dutch language and in collaboration with the Health Sector Disaster Coordinator who was responsible for organizing the workshop.

Upon his arrival, he met with the senior hospital staff, the health sector disaster coordinator (HSDC), senior police, military and fire officers, and district commissioners. The meeting

² Interview with Adrianus "Ton" Vlugman on July 2, 2014.

included presentations by the health sector disaster coordinator on mass casualty management and incident command post management.

The drill was to take place in the male ward of the hospital. Initially it was discussed having a full surprise evacuation including patients, however, Ton advised against this to prevent real panic. Instead, roughly one hour before the drill, the patients were notified of the pending drill and asked to participate if they were willing and able.

Raising the Alarm

At 10:10 am (20 minutes before scheduled visiting hours) a non-toxic CO2 machine started releasing smoke in an empty room of the male's ward. The alarm was raised by voice, yelling "Fire!" because there was no pull lever alarm system in place. There was a bell tower, however due to its frequent use, the senior staff believed it would not be taken seriously. Once the alarm was raised, the fire service was called. The CEO was informed of the "fire" by a staff member in person and he took over the role of Incident Commander (IC). He stayed stationed in his office and was given updates mostly via cellular phones. However, because his office was along the evacuation route, many hospital staff stopped to inform him of what was happening.

The Evacuation

The staff in the male ward started evacuating immediately. The medical personnel lead the patients to the nearest exit, the "Mariastraat-Johannstraat" exit. Visitors entering the hospital usually used this exit, however it had been locked to ensure that visitors were not able to enter the hospital during the fire drill. This caused congestion of patients, staff, and hospital beds. Staff and patients from other wards caught wind of the drill and began to gather in the halls to watch. Once those evacuating got to the appropriate exit, they realized that the door was not wide enough to accommodate the hospital beds. They were then forced to exit through the Accident and Emergency ward.

Once in the ambulatory parking lot, the hospital beds were placed close together to maximize the use of the available space. There was no room to move between patients. The patients' medical records were evacuated along with the patients. Two psychiatrists were present at the assembly point to assist patients in case of stress. There was no need to take patients' vital sign because they took the exercise in stride and a pleasant change of daily hospital routine!

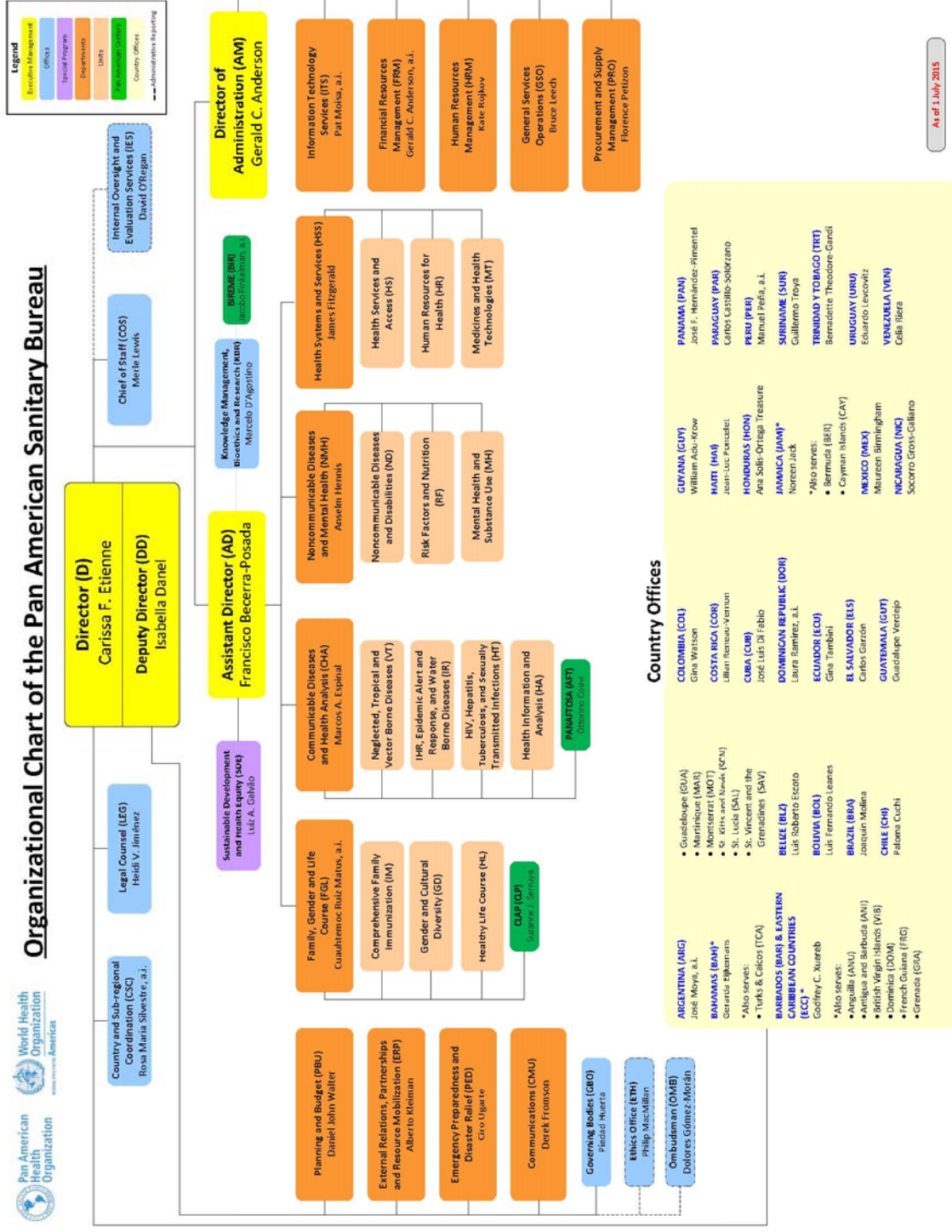
The fire department and police staff arrived together. The fire department inspected the premises and determined that it was safe to re-enter the ward. Upon the fire chief's go-ahead, the department staff began transporting patients back to the ward. During the drill, media personnel arrived and attempted to get onto the hospital grounds. There was one person designated to deal with the media and offered the media a press conference after the drill. More media personnel attended than expected and they began to argue with the police around the premises. However, all media personnel were kept off hospital grounds by the police until after the drill. There was some negative press in the days following regarding the conflict between the media and the police. Once the drill was complete, the Incident Commander went to the visitor waiting area, where the visitors had been re-directed to, to explain to all the visitors why they performed the drill and answer questions.

CONCLUSION

In the days following the drill, Ton went over the events that took place. While he thought that the drill went relatively well considering the lack of a pre-existing evacuation plan, he had some serious concerns about the safety of staff and patients had this been a real fire. Ton returned to his office in Barbados and looked over his notes. He needed to send his recommendations to

the health sector disaster coordinator (HSDC) in order for them to make improvements to the hospital response plan. The hospital would soon be re-assessed for the Hospital Safety Index and there was no time to waste. PAHO was eager to show DIPECHO that their money was being put to good use to increase the safety index and that the hospital would function better during emergencies.

EXHIBIT 1



Source: PAHO, 2015.

EXHIBIT 2

Caribbean Island Regional Hospital Response Plan Sections One and Three

**Note: Adrianus Vlugman has translated this from Dutch to English.

Section One: Coordination

General Incident Commander: In the event of a disaster, the CEO of the Hospital will be the Incident Commander in coordination and consultation with the medical and the nursing staff of the hospital.

Department Coordinators: Each department will have disaster/emergency/incident coordinators, ensuring that one coordinator is present during any shift (day and night). Names and phone numbers of department coordinators are known to the switchboard of the hospital as well as at the department coordinators themselves.

After reporting the emergency/disaster to the department, department coordinators are responsible for mobilizing department staff. The department coordinator determines who performs the mobilization call (see departmental Disaster/Emergency Plan). Communication between the Incident Commander and the various departments should be exclusively through the Department Coordinators or his/her Designate. Each department should have an agreed upon plan on the mobilization of the staff, including telephone cascade using landlines and/or cellphones. It is possible that in case of an emergency, the telephone communication center will be relocated to the A&E. In some cases it will be necessary to transfer employees and patients from one department to another. Instructions to this effect will take place only between the coordinators of these departments, following the instructions of the Incident Commander. Each department will have a plan for disaster/emergency notification and the division of related tasks.

Once a disaster is reported, an incident command center will be set up in the A&E. A person will be stationed here during a disaster/emergency who will be responsible for relaying messages to the coordination team.

Internal disaster/emergency: the notification of an internal disaster/emergency will be made directly to the Incident Coordinator of the hospital. The IC then relays the message to the other members of the coordination team. If the team is not yet present in the hospital, they will be called together as soon as possible and indicate the location of the Incident Command center.

The location of the disaster will be determined. The IC, the Fire Department and the Police will investigate and determine which departments should be evacuated and where patients should be transported. These decisions will be reported immediately to the department coordinators.

During the disaster/emergency there needs to be constant telephone communication between the Command center and a Department Coordinator at the location where victims will be received. The paging system of the hospital needs to be optimized.

Situations have to be controlled on the parking lot as well as inside and outside the hospital. The porters will ensure that all cars are parked military style. This is to prevent chaos and delays and ensure quick departures of vehicles and rapid clearance of the parking lot. It is necessary to increase awareness re: traffic and parking courtesy.

Communication with the National Disaster Centre (NCCR) needs to take place exclusively via the Coordination Center of the hospital.

Preparations for Triage

External disaster/emergency: disaster victims will arrive via the A&E entrance at Hartenstraat. Less serious patients will enter through the entrance at the Raadhuisstraat and are received in the canteen while materials and supplies from the men's department will be used.

Once a disaster/emergency has been reported it is important that these two access roads are cleared and a security system set up.

Where possible, patients who can walk will be discharged to create space. In case of doubt these patients can be temporarily housed in the canteen/physiotherapy room.

The walk-in clinic will be used to receive family members, where they will receive as much information as possible about the disaster/emergency. The walk-in clinic will be used to receive patients if the available space in the above mentioned location is too limited. Each Department Coordinator will appoint one person whose responsibility will be to keep written record of which patients left and all new patients entering the department. Personnel of the A&E, transportation, Security and Technical Services shall receive training on how to function in emergency situations

Section Three: Fire Prevention

For effective fire suppression, good preparation (readiness) and preventive measures are of paramount importance. Good support from the Fire Services will be required. Hospital staff should be instructed and become familiar in the use of a fire extinguisher. Regular fire drills have been held in collaboration with the fire department. Evacuation plans should be made with clearly identified emergency exits.

There must also be a map of the electrical and oxygen pipelines with a clear indication of the main switches. Each ward in the hospital must have a working fire extinguisher. On each department should be provided by at least one good working fire hose.

The departments at a greater risk of fire should have a smoke detector. In addition, these departments should be provided with warning/danger signs like: no smoking, no open flames, no cell phones, etc.

Each department will be provided with an evacuation plan, which should identify the procedures to be used in the case of a fire.

The employees of those departments that are more prone to fire, such as the pharmacy, operating theater kitchen, laboratory, medium care, delivery room, and A&E need to be extra motivated during the training sessions.

Procedures in case of Fire Alert

When the Fire Alert is received:

1. Inform the Department Coordinator;
2. Commence extinguishing the fire;
3. Subsequently call the fire service and the police;
4. Switch off electricity and oxygen supply (main switch);
5. Commence evacuation procedure and transfer patients to safety;
6. If possible keep all doors and windows closed; and
7. Transfer the victims of the fire to the A&E as soon as possible for medical treatment.

Other external disasters/emergencies that may affect the hospital may include high winds, wars, riots, etc.

Together with the various department heads specific plans for their department will be developed.

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INSTRUCTOR GUIDANCE

Hospitals Don't Burn: Caribbean Island Regional Hospital¹

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Marlene Janzen Le Ber, PhD (Assistant Professor, Brescia University College)

BACKGROUND

Adrianus “Ton” Vlugman, is a senior advisor at the Pan-American Health Organization (PAHO) positioned at the Office of Caribbean Program Coordination. On June 18, 2014, Ton travelled to the Caribbean Island Regional Hospital. The goal of his trip was to conduct a desktop simulation exercise on fire safety and review the emergency plan of the hospital. He also intended to aid in the preparation of an evacuation exercise and observe its execution in order to help staff reassess and develop their hospital response plan. This trip fell under the second phase of Safe Hospitals as funded by DIPECHO (Europe).

When Ton arrived at the hospital he was told that the senior hospital staff were planning a full surprise fire evacuation drill for the next day. The drill took place on the 19th of June in four of six male wards. This case reviews the blow-by-blow details of the fire evacuation drill as Ton decided what recommendations needed to be made to improve the hospital's response plan and future drills.

OBJECTIVES

1. To describe the key elements of disaster management plans for hospitals, health care centres, and public health centres.
2. To focus on the Public Health Preparedness and Response Core Competencies:
 - a. Model Leadership: to understand and assess how problems are solved under emergency conditions.
 - b. Communication and Information Management: to understand chain of command and how communications may be altered during emergency situation.
 - c. Planning and Improving Practice: to evaluate the current plan and make recommendations to improve it.
 - d. Protect Safety: to recognize and determine threats to patient and staff safety (e.g. surprise drill).

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3. To gain skills in critically evaluating a plan or program by utilizing available resources, peer interaction and brainstorming activities.

DISCUSSION QUESTIONS

1. What are the main concerns Ton, the PAHO advisor, may have with the drill? (Use the *Public Health Preparedness and Response Core Competency Model*.)
2. Based upon the sections of the hospital's response plan in the appendix, what areas of the drill followed, or did not follow, the plan?
3. What changes or additions should be made to the plan to make it both practical and safe?

KEYWORDS

Disaster preparedness; international; PAHO; safe hospitals.

CASE 4

Returning to Our Roots: Building Capacity in Public Health for Action on the Social Determinants of Health

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Kevin Churchill, MPH (Manager, Health Promotion, Lambton Public Health)
Lloy Wylie, PhD (Assistant Professor, Western University)

BACKGROUND

“Public health professionals practice at that intersection where societal attitudes, governmental policies, and people’s lives meet. Such privilege creates a moral imperative to work to change social conditions contributing to poor health.”
– Adeline Falk Raphael

Canadians are healthier than ever before, and live longer. But improvements in health are not distributed evenly between population groups. Not only is this a Canadian phenomenon, but disparities in health are growing around the world.

In fact, studies show that only 25% of our health is determined by health care and 15% by our genetics. The remaining 60% is determined by factors outside the traditional health care system, such as our income and social status, education, employment and working conditions, social support networks, social and physical environments, and culture (Canadian Medical Association, 2012).

These factors are called the social determinants of health (SDOH). When they are distributed in ways that are unfair, unjust, or avoidable, they are termed health inequities. Health inequities act as risk conditions that disproportionately affect certain populations, creating situations where they may be:

- Unable to read
- Unable to afford the basic necessities
- Working a low-paying job with precarious hours, or are unemployed
- Living in sub-standard conditions
- Drinking poor quality water
- Suffering from high stress
- Being discriminated against based on culture or ethnic background
- Living far from a grocery store
- Feeling isolated in their own community

However, these determinants can also be protective when everyone is given fair opportunities to access them. The SDOH cut across the purview of many sectors, such as education, health,

and socio-economic and public policy. Therefore, understanding roles and responsibilities for health equity action remains a challenge.

HEALTH EQUITY ACTION IN CANADA

Since the advent of the Ottawa Charter for Health Promotion in 1986, reducing health inequities has been an ethical, social, and economic imperative for many countries worldwide (Whitehead & Dahlgren, 2006; Crombie, Irvine, Elliot, & Wallace, 2005; Commission on the Social Determinants of Health, 2008). However, within the Canadian public health sector, difficulty translating health equity rhetoric into action has been notable, despite the critical role public health organizations play in reducing health inequities (National Collaborating Centre for Determinants of Health, 2014).

The National Collaborating Centre for Determinants of Health (NCCDH) conducted an environmental scan in 2014 of public health sector practices, barriers, and opportunities to advance health equity in Canada. The scan discovered that professionals working at all levels of the public health system want more evidence to guide public health practice, especially regarding how to effectively reduce health inequities.

To date, many public health actions have been undertaken in order to reduce health inequities. These efforts include those within the traditional realm of the health sector, such as identifying those experiencing health inequities, enhancing provision of services to priority populations by reducing barriers to access and tailoring services, or those outside the traditional realm of the health sector, such as partnering with other sectors, forming coalitions, undertaking community development, and advocating for improved living conditions.

While some progress has been made, SDOH proponents argue that public health is well-positioned to do more, given their ability to mediate the relationship between the political and institutional systems that create health inequities, and their potential to build the capacity required to act on them.

While we have seen an increased commitment in dedicated organizational structures and processes in place for health equity across Canada, “the momentum has not yet resulted in significant, concrete actions to reduce health inequities” (NCCDH, 2014). Without these actions, many public health champions voiced concern that public health interest in health equity may become a passing fad.

Therefore, the challenge is no longer collecting evidence, but translating that evidence into concrete action.

This challenge points to a strong need for the renewal of public health efforts, including a clearer direction for action to promote health equity. Such efforts include:

- Improving the understanding of the contextual influences that promote the uptake of health equity as a priority in the health system;
- Expanding the engagement of public health with other sectors to reduce health inequities;
- Analysing the theoretical and practical utility of existing organizational structures, processes, outcomes and tools to promote health equity action;
- Enhancing the understanding of the ethical issues encountered by public health practitioners in their efforts to reduce health inequities and the process of managing

- those tensions (i.e. the tension created when health units who are funded by public sector resources are advocating for policy change); and
- Improving knowledge translation and exchange processes to strengthen and improve health sector innovation for reducing health inequities.

Ultimately, many in the field know that the SDOH are complex health issues that will require a stronger focus on identifying levels of influence for health equity action at the individual, organizational, and systems level. But someone has to take the lead, and who better to do so than public health.

THE ONTARIO SDOH NURSE INITIATIVE

On August 16th, 2012, Louisa Giovanni received a call from Diane, the supervisor of Health Promotion at the Lakeshore Public Health Department (LPHD). Diane gave her the great news that she would be one of two nurses hired to build capacity in the organization to address the social determinants of health (SDOH). Her position would begin at the end of October.

This position was part of the Ministry of Health and Long-Term Care's 9000 Nurses Initiative, where 72 nurses (two per health unit) would be given the title of full-time SDOH Public Health Nurse. The Ministry did not set standards for what this position would look like. It was up to each individual health unit to decide how the roles would unfold. Some of the other nurses had been hired six months ago, but everyone was required to provide a report on their activities by January 2013, giving Louisa only two months to show impact.

What was she going to do in such a short period of time, to address a complex issue, where interventions to address the SDOH often take years? Where could she start to make an impact on how the organization would address the SDOH? Where would she begin to look for advice?

At the time Louisa was hired, LPHD had a part-time Medical Officer of Health. LPHD's Board of Health, who essentially governed the programs and services delivered by the organization, was integrated with the local Municipality. Therefore, unlike some other independent health units in Ontario, any decisions made had to go through the Board of Health.

At the staff level, it quickly became clear that different departments operated in isolation, limiting their opportunities to collaborate with each other. Louisa also noticed that some departments seemed very cohesive, had great operational plans in place, and were highly skilled. Other departments appeared stressed, and had limited time to do anything other than front-line work with clients.

On Louisa's first day, many people were welcoming and did their best to introduce what their role in the organization was. As the day went on, many colleagues asked Louisa what her role would be, and what value her position would bring to the organization. Louisa attempted to suggest that she would work as a consultant within the organization to build capacity for action on the SDOH. However, many staff said they all worked on the SDOH in their own ways, and offered many examples. Some examples accurately reflected action on the SDOH, while others showed that many staff didn't have a clear understanding of what the SDOH were in the first place. She began to wonder how she could add value to their work, especially those who thought they were already doing enough.

SITUATIONAL ASSESSMENT

Louisa decided to meet with managers from the different departments to get a sense of the current level of capacity for equity action. While most claimed their programs were designed with the SDOH in mind, many were doing more downstream activities that impacted individual clients, rather than population groups. When she asked why the organization wasn't advocating for more upstream policy changes that impact health outcomes across the population; managers and staff were quick to point out the limitations of having a municipal Board of Health.

Many managers recognized that while public health advocacy is an important population health approach, there are various challenges faced, especially when the issues are complex (i.e. the determinants of health) and may relate to policies that are the responsibility of sectors other than health.

Some examples of challenges they described included:

- The political nature of fostering systemic change;
- The tension advocacy creates as LPHD was mostly funded by public sector resources;
- Limitations of advocacy efforts due to boundaries of professional roles (i.e. government employees), employer policy, or limited access to resources for advocacy activities; and
- The belief that public health should remain a value-free, mainly scientific activity. As a result, many feel that health equity is a philosophical principal - similar to social justice - that is heavily based on the values and ideology of individuals, organizations, and systems within any given society.

After talking to staff and management at the LPHD, Louisa was no further ahead. She decided to meet with key stakeholders within the community who were already working on the SDOH, such as the Poverty Reduction Network and the Community Homelessness Initiative Network. These coalitions were comprised of stakeholders from various sectors, including health, economics, education, and social services, which made them well positioned to influence policy choices that impacted vulnerable populations. However, once the meetings ended, very little was being done to work together. Most members just went back to their organizations and continued with their everyday activities.

Finally, Louisa decided to talk to some of the other SDOH nurses across the province. This group was unfolding to become a great source of networking and a community of practice for health equity. The group as a whole was beginning to discover that all health units had varying levels of capacity, inconsistent Board of Health structures, yet similar challenges. Overall, most nurses were encountering the same issues, but agreed upon one primary goal: to identify how to move health equity rhetoric into action.

Many of the nurses tried to link the need for equity action with organizational standards and competencies. Louisa decided to start with the Ontario Public Health Standards and Core Competencies for Public Health to get a sense of the organizational standards in place to identify the SDOH and promote action on health equity issues.

Louisa quickly identified the many opportunities and challenges the two core documents presented in setting the context for health equity action in public health.

1. The Ontario Public Health Standards (Ministry of Health and Long-Term Care, 2014)

In 2008, the Ontario Public Health Standards (OPHS) were created to guide the local planning and delivery of public health programs and services. They set the minimum requirements for fundamental public health programs and services targeting the prevention of disease, health promotion, health protection, and community health surveillance legislated for Ontario Boards of Health, pursuant to section 7 of the *Health Protection and Promotion Act*, R.S.O. 1990, c.H.7.

The OPHS state that "boards of health shall not only examine the accessibility of programs and services to address barriers (e.g. physical, social, geographic, cultural, or economic), but also assess, plan, deliver, manage, and evaluate programs to reduce inequities in health, while at the same time maximizing the health gain for the whole population" (p. 21).

Therefore, the OPHS (2014) are a practical agenda for addressing health inequities across all programs and services in public health. Specifically, the OPHS state that "addressing determinants of health and reducing health inequities are fundamental to the work of public health in Ontario" (p. 4), and public health interventions shall acknowledge and aim to reduce existing health inequalities.

Action on health inequities are stated to be operationalized predominantly through the work on priority populations, defined as "those populations that are at risk and for whom public health interventions may be reasonably considered to have a substantial impact at the population level" (p. 4). Priority populations may be identified by surveillance, epidemiological, or other research studies, including community and stakeholder consultations.

Finally, the equity foundations in the OPHS outline principles that public health practitioners are required to follow, including:

- Need: use epidemiology and other methods of gathering information to identify priority populations.
- Impact: examine accessibility of the existing programs and reduce barriers; plan, deliver, manage, and evaluate the programs to reduce inequities in health.
- Capacity: allocate resources to address health inequities.
- Partnership and Collaboration: share knowledge and use partnerships and collaboration to engage the community.

While the equity foundations in the OPHS outline principles that public health practitioners must follow to reduce inequities in health, little guidance is given regarding interventions or pathways that are known to work. This lack of clarity in how to reduce health inequities leaves Boards of Health with varying interpretations of the where and to what extent action is required to reduce health inequities through the standards.

2. The Core Competencies for Public Health (Public Health Agency of Canada, 2008)

Not only do the public health standards specifically mandate that public health practitioners work towards the SDOH, but the Core Competencies for Public Health have focused on them as well.

The Core Competencies explicitly state that "public health is fundamentally concerned with action and advocacy to address the full range of potentially modifiable determinants of health – not only those which are related to the actions of individuals, such as health behaviours and lifestyles, but also factors such as income and social status, education, employment and working conditions, access to appropriate health services, and the physical environment. These, in combination, create different living conditions which impact on health" (p. 10).

Overall, there are 36 Core Competency statements introduced by the identification of shared attitudes and values of public health practitioners, which specifically describe the context within which the competencies are practiced. These attitudes and values contain significant and explicit content about the determinants of health. Examples of competency statements include "a commitment to equity, social justice, and sustainable development," "respect for diversity, self-determination, empowerment, and community participation," and "these values are rooted in an understanding of the broad determinants of health" (p. 3).

Despite the expressed importance of health equity, the set of attitudes and values is written as a preamble to the Core Competencies, not as specific competencies that are expected in public health practice. Following the preamble, the 36 competencies are arranged under seven categories. Out of these seven, five contain implicit information related to the determinants of health. Ultimately, a great need exists to develop Core Competencies more specific to health equity and the social determinants of health.

The newly developed Pan-Canadian Health Promoter Competencies published in 2014 may provide a foundational description of the competencies required to act on the SDOH in order to reduce health inequities that could be adapted for various disciplines within public health (Pan Canadian Network for Health Promotion Competences, 2014). For example, under the first competency of demonstrating knowledge and skills necessary for health promotion practice, health promoters are required to "apply a population health promotion approach, including health and health equity, to the analysis of health issues" (p. 1). With more explicit language, practitioners have a core document that can be leveraged to support their roles in health equity action.

Overall, Louisa quickly realized that there appeared to be a lack of clear, consistent direction on how to take action on health inequities. More importantly, there appeared to be a limited focus on measuring and defining organizational capacity for health equity action, where most efforts focused on the characteristics of the programs and services the health unit delivered, rather than the capacities needed to deliver the programs and services in the first place.

SETTING THE CONTEXT FOR CHANGE: AN OPPORTUNITY FOR EQUITY ACTION AT THE LPHD

After assessing the opportunities to gain momentum on health equity both within LPHD and externally, a crucial change within the LPHD occurred. A new Medical Officer of Health (MOH), Dr. Raj Subramaniya, was hired, which led to new and significant opportunities, including the need for a strategic plan. Louisa was quick to suggest that equity become embedded in the mission, vision, and values of the new strategic plan. If she could get Dr. Subramaniya to commit to this, many organizational structures would have to follow in order to achieve action on health equity at the LPHD. When Louisa approached Dr. Subramaniya, he was excited about her suggestion, and asked that she take on the task of outlining the various elements needed to build capacity for equity action at LPHD.

Louisa decided to take on a grounded theory approach to inform the need, challenges, and opportunities for health equity action, as well as construct a conceptual framework. Guided by her experiences and observations, Louisa conducted:

- A review of both grey and peer-reviewed literature; and
- Key informant consultations with LPHD senior managers and public health nurses working in positions dedicated to health equity across Ontario to explore the logical implications of the framework in practice and to validate and inform needed changes.

The literature review revealed that while organizational capacity was recognized as a critical determinant of system performance, capacity assessment was often neglected in favour of program development and performance, or evaluated within very narrow perspectives in public health. This was problematic because focusing on performance alone ignores other important elements of capacity that contribute to the ability to reduce inequities, such as the optimal configuration of resources associated with effective and efficient performance (Meyer, Davis, & Mays, 2012).

The literature suggested that public health performance *relative* to the capacity of the system or organization was a more useful concept to guide public health practitioners. This may enable public health practitioners to ask how well they are doing (process/performance), given what they had to work with (capacity) (Handler, Issel, & Turnock, 2001; Freudenberg, 2004; Israel et. al., 2010).

Therefore, capacity for equity action means having the knowledge, skills, commitment, and resources at the individual, organizational, and wider systems level to improve practice and lead to the reduction of health inequities.

Ultimately, in order to assess performance relative to the capacity of an organization to take action on health inequities, a great need existed to identify elements of capacity at three levels of influence (World Health Organization, 2010):

- **Individual-level**: can help understand the gaps in the skills and competencies of public health professionals that are required to uncover and analyze inequities.
- **Organizational-level**: can help organizations capture progress toward health equity objectives.
- **System-level**: can help monitor community action on the broader conditions that impact health equity.

Louisa, along with the other 71 nurses across Ontario, initially focused efforts on understanding what these capacity elements entailed, and spent most of their time sharing stories and solutions for how they attempted to build capacity for equity action.

CONTRIBUTION OF THE ONTARIO SDOH NURSE INITIATIVE

In two short years, the SDOH nurses became well known in Ontario, and their work became an influential contributor to public health capacity for equity action. The initiative led to the establishment of organizational processes, structures, and communities of practice for health equity (NCCDH, 2014). Having this commitment so far had been attributed to increased capacity for public health action at the organizational and municipal level; however, the level of commitment varied heavily between organizations due to several reported challenges. While each health unit was required to have a Board of Health that monitored all operations within the unit, and remained accountable to the community and the Ministry of Health and Long-Term Care, the governance structures could vary. With all 36 Boards of Health structures being unique, some argued that the capacity to take action on health equity was uneven, with some structures facilitating this capacity more than others.

Many began to recognize the need to level and scale up existing actions taking place among the “early adopters”, i.e. the organizations already engaged in health equity action.

What the SDOH nurses needed was a framework that would facilitate a greater understanding of the context, dynamics, and capacities within which public health organizations worked, in order to guide efforts towards reducing health inequities.

The framework could then be used to assist practitioners, managers, and decision-makers within public health organizations in assessing the critical elements for building health equity capacity, and identifying those areas that need strengthening or further development.

The literature suggests that organizational capacity frameworks have the potential to impact every aspect of how an organization operates. A framework would allow an organization to look at the multiple levels of influence on their capacity, including the individual, organizational, and systemic levels. Its application may affect how needs are assessed at the program level, thus influencing how programs are planned, implemented, and evaluated. At the organizational level, such a framework could affect the priority setting process, how partnerships are developed, and how leadership is enacted at the systems level (NCCDH, 2013).

It can also serve as a useful planning tool for consultants, evaluators, directors, and managers responsible for developing capacity for equity action.

Overall, Louisa hoped that the creation and adoption of a framework and recommendations may provide public health organizations with a strategic direction for health equity.

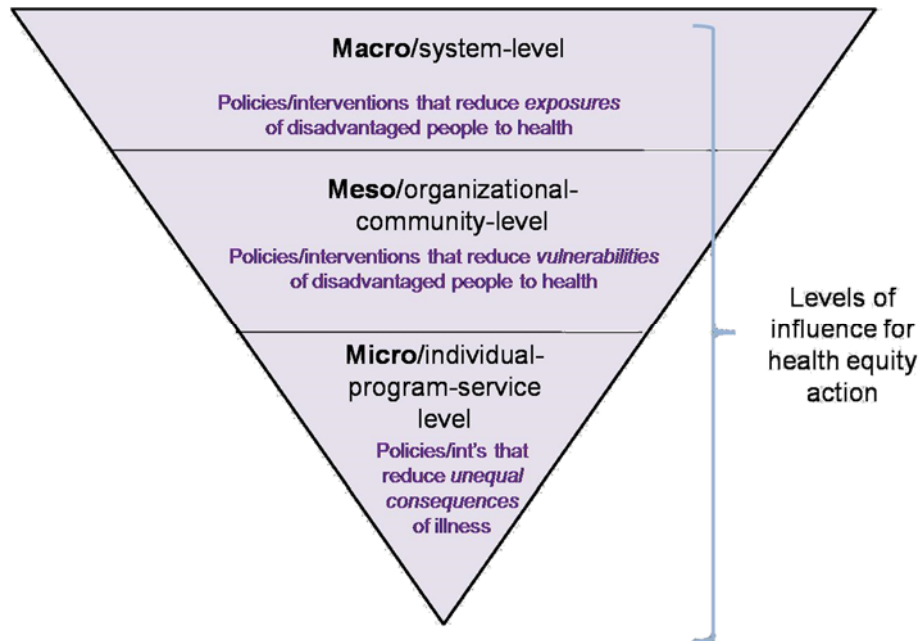
What the SDOH nurse initiative demonstrated was that public health practitioners were well positioned to mediate the relationships between structures that create health inequities, and the organizational and individual capacity required to reduce health inequities. Therefore, public health policies and interventions could be aimed at three different levels of influence: micro (individual), meso (organizational), and macro (systems) (see Exhibit 1).

The biggest challenge Louisa and the SDOH nurses faced now was what was required to build organizational capacity for equity action? How could they influence health outcomes for

**Returning to Our Roots: Building Capacity in Public Health
for Action on the Social Determinants of Health**

community members so that they were more equitable? What were the specific elements that were needed at each level of influence?

EXHIBIT 1
Levels of Influence for Health Equity Action



Source: Adapted from Solar & Irwin, 2010.

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INSTRUCTOR GUIDANCE

Returning to Our Roots: Building Capacity in Public Health for Action on the Social Determinants of Health

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BACKGROUND

Canadians are healthier than ever before, and live longer. But improvements in health are not distributed evenly between population groups. In fact, studies show that only 25% of our health is determined by health care and 15% by our genetics. The remaining 60% is determined by factors outside the traditional health care system, such as our income and social status, education, employment and working conditions, social support networks, social and physical environments, and culture. These factors are called the social determinants of health (SDOH). When these conditions are distributed in ways that are unfair, unjust, or avoidable, they are termed health inequities. These determinants can also be protective when everyone is given fair opportunities to access them. Because the SDOH cut across the purview of many sectors, such as education, health, socio-economic and public policy, understanding roles and responsibilities for health equity action remains a challenge. Within the Canadian public sector, difficulty translating health equity rhetoric into action has been noted despite the critical role public health organizations play in reducing health inequities. This case explores the development of organizational capacity to address the social determinants of health in a public health unit.

OBJECTIVES

1. Examine ways to develop core competencies more specific to health equity and the social determinants of health.
2. Explore elements of organizational capacity, and use them to move health equity rhetoric into action.
3. Explore ways to assess existing programs using an equity lens.
4. Explore the process of developing and getting buy-in for a health equity framework.

DISCUSSION QUESTIONS

1. What is required to build organizational capacity for equity action?
2. How can staff influence health outcomes for community members so that they are more equitable?
3. What are the specific elements that are needed at each level of influence?

KEYWORDS

Health equity; social determinants of health; conceptual frameworks; nursing leadership; organizational capacity building; grounded theory.

CASE 5

Let's Agree To Agree: Management Techniques in Calibrating Oral Health Screening Systems¹

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BACKGROUND

In 2014, Lisa Montebello, a Registered Dental Hygienist and Master of Public Health candidate at the Interfaculty Program in Public Health, Western University, was working during her practicum with Dr. Mark Gracey, Oral Health Manager of the Middlesex-London Health Unit (MLHU), in London, Ontario, Canada. Her objective was to formulate a clinical calibration assessment and a recommendation report. Clinical calibration is a comparison of agreement between clinicians, or against a verified standard, to achieve a clinical gold standard. In this case, the agreement between clinicians related to the presence or absence of urgent or non-urgent cavities, and also whether or not two or more cavities were present. Also, Dr. Gracey was responsible for following the Ontario Public Health Standards (OPHS) protocols for ensuring that all Grade 2 children in the London area were receiving equitable access to oral health care services through oral health screenings. There were over 120 schools with five Registered Dental Hygienists (RDHs), along with seven Dental Assistants (DAs) on the preventive Oral Health Team providing this service. After a calibration slide review session the year before, it was found that the RDHs were rating the oral health care needs of children inconsistently, posing a dilemma for both Dr. Gracey and Lisa, as vulnerable children with urgent dental care needs may have been missed as a result. There was also no standardized recommended statistical analysis in place to analyze the data from the calibration session. Lisa needed to come up with a best practice guideline for clinical calibration, including statistical analysis recommendations, for the MLHU to ensure that no child would be overlooked due to inconsistent measurement outputs. Lisa had just eight weeks to observe and assess the entire current calibration system in place, and to formulate a report for the oral health team at the MLHU.

OPHS MANDATE

According to the Ontario Public Health Standards (OPHS) document, which is published regularly by the Minister of Health and Long-Term Care under the authority of the Health Protection and Promotion Act (HPPA), protocols are set out to standardize the oral screening and surveillance programs carried out within the Province of Ontario (Ministry of Health and Long-Term Care, 2013; Ministry of Health Promotion, 2010). Information collected includes the number of teeth decayed (d or D), missing (M), filled (F), as well as any child who is in need of urgent care (U) or non-urgent care (NU) (see Exhibit 1). The data gathered during the process is then entered into the Ministry of Health Promotion's Oral Health Information Support System

¹ The case description, while based on a real experience, is adapted for learning purposes.

(OHISS) (MOHLTC, 2013). OPHS requires that all Grade 2 students in the province are screened, and the school's intensity level is then dictated using the screening results of the Grade 2 population (MOHLTC, 2013). This is done by calculating the number of students who had two or more caries ($d+D \geq 2$) present, which is then divided by the total number of Grade 2 students who were screened (MOHLTC, 2013). According to OPHS, schools that are high intensity have ($d+D \geq 2$) which falls at 14% or more, and medium intensity schools have a result of 9.5-14% (MOHLTC, 2013). Depending on the screening results, protocols are then set forth with further screening, for example, of junior kindergarten (JK), senior kindergarten (SK), and grades 4, 6, and 8 students in the schools deemed as high risk (MOHLTC, 2013).

This protocol is important to ensure children who are at high risk of dental caries have their needs met. Although most families are insured for dental care through private insurance, children of families who do not have dental coverage may then be eligible for a number of programs within Ontario such as the Children In Need of Treatment (CINOT) program, which provides preventive, surgical, and restorative treatment (MOHP, 2010). In addition, it is important that RDHs working in public health units are well calibrated in their screening methods to ensure that no child in need is overlooked and goes without necessary treatment.

MLHU HISTORY

There are 36 public health units in Ontario (see Exhibit 2; MOHLTC, 2014). The MLHU is located in London, Ontario, and serves both city and rural regions. The screening program is implemented in over 120 elementary schools within the service region. Presently, the MLHU preventive oral health team members who oversee the school-based screening program consists of a dental consultant, an oral health manager, 5 RDHs, and 5 DAs. Although the oral health manager and dental consultant with the MLHU have backgrounds in dentistry, this is not the case in all health units. Often in those units, registered nurses take on the position of oral health manager. Exhibit 3 describes the general health unit job descriptions of key players at the MLHU.

In 2004, a dental benchmark research project was carried out by an Ontario public health unit in participation with nine other Ontario public health units (Beynon, Sangster-Bouck, Sanderson, He, & Lueske, 2004). Results of the project showed that calibration training was provided by nine out of the ten participating public health units. This training included clinical (hands-on) calibration sessions, or calibration using slides of varying degrees of dental cavities, as well as a review in policies and procedures (Beynon et. al., 2004). The oral health screening system is essential for increasing equitable access to dental care for vulnerable children (Beynon et. al., 2004). In the benchmark report, procedural variation across health units was noted. These included variables such as dental instruments and equipment used, including the examining lights (Beynon et. al., 2004). Historically, no research has been done in the MLHU on the calibration of the current oral health screening system, which includes the screeners, the environment, and statistical analysis of the clinical calibration session.

CURRENT CALIBRATION PROCEDURES AT MLHU

Each September, in Toronto, Ontario, the Ontario Association of Public Health Dentistry (OAPHD) conducts a non-mandatory calibration slide review session for dental professionals. During this session, dental professionals are shown a series of slides depicting non-urgent and urgent cavity cases with related questions. They then use "clicker" devices to select an answer, and the cumulative results are shown on the screen with percentages of each selection displayed. The session leader then gives an explanation of the answer. There is no formal post-question group discussion to allow for a consensus to be reached.

In 2013, the MLHU Oral Health Department conducted an in-house calibration session using slides as well. During this session, slides were shown, and answers were then written on paper and submitted. The data was then analyzed using percent agreement which was measured against the gold standard examiner who, in this case, was the dental consultant. In relation to statistical analysis of calibration for the assessment of dental caries, Lisa knew the literature was quite limited. Aside from the informal analysis performed the previous year, she was not sure if there was a best practice guideline in this particular area of interest, and she was eager to find out.

FIELD OBSERVATIONS

By her second day at the MLHU, Lisa knew she wanted to learn more about the screening system, not only through observation, but also by gathering information from the RDHs and DAs themselves. Since she did not have the time to conduct a formal survey, Lisa decided she would take the time to travel with the RDHs and DAs to and from the schools, to ask questions and get feedback from the oral health team members. Immediately, Lisa found the team members felt very positive about the calibration project and actively wanted to contribute. Each member had valuable input into the process and ideas about what could be improved. Lisa observed the environment in which they screened, noted the way the RDH and DA team conducted the screenings, and reviewed the screening system itself as set out by the OPHS.

Environment

The environments in which the dental screenings were carried out varied substantially. The room used depended on availability that day, and school officials such as the principal or head administrative staff were responsible for assisting the RDHs and providing a room. Some examples of the screening rooms observed included a health room, a staff kitchen, a cafeteria, a kindergarten classroom that wasn't being used that day, and a resource room. The RDHs shared that sometimes they are placed on the stage in the gym.

With the variability in the types of rooms used, there was variance in the amount of illumination of each room. For example, the health or resource rooms tended to be spacious and well-lit with natural light from the windows. On the other hand, one kitchen used for the dental screening was dimly lit and quite narrow and crowded.

Another environmental factor was noise levels. In instances where the RDHs had been placed on a stage in a gym, the sound of bouncing balls or children playing was loud enough that some examiners or assistants were distracted. Rooms that were particularly noisy made it difficult for the Dental Assistant to hear what was being dictated in relation to number of cavities or degree of urgency. When full classes were brought down and the teacher did not stay to supervise, the kids would get a bit rambunctious and loud making it difficult for the RDH or Assistant to hear each other.

Standardized equipment was available and placed into five portable examiner bags. All RDHs had access to two rechargeable hand-held lights, a standing light, a portable chair, one laptop which was carried on-person at all times, sterilized sets of dental mirrors and explorers, hand sanitizers, and enzymatic spray.

The dental equipment was couriered when the screening school was located within the city limits of London. When the screening school was located in the county, the Dental Assistants

and Dental Hygienists were responsible for transporting the equipment themselves in their vehicles.

Screeners

The RDHs followed the same screening protocols. These included keeping the laptop with them at all times and following proper infection control procedures. RDHs differed in their preference, for example, in the number of children brought down to the screening area. Some preferred just five at a time, and others preferred the entire class brought down at once. Most often, it was up to the teacher of the class and what they preferred to do.

Lighting was another difference in screener preference that was noted. The majority of RDHs used the hand-held LED lights only, while others used the LED lights along with the standing dental light. Depending on the room being used, the standing light greatly enhanced the illumination available for screening procedures, as well as illumination of the oral cavity.

Screening System as set by OPHS

The Oral Health Team at the MLHU followed the protocols set out by the OPHS in regards to the screening system and data collection procedures. These protocols are mandated by the Ministry of Health and Long-Term Care and therefore must be followed and not altered (MOHLTC, 2013). The observed data collection, consistent reporting using OHISS, and screening procedures carried out, indicated that all RDHs followed these standards. Data collected and entered into OHISS included the number of decayed, missing, or filled teeth (DMFT or dmft), and whether no care was required (NCR). If caries were present, it was recorded as either the child needing urgent care (CUC) or non-urgent care (NU) (MOHLTC, 2013; MHP, 2009). For care required to be deemed urgent, the child must have met the Children In Need of Treatment (CINOT) eligibility criteria which includes any of the following: pain, infection, haemorrhage, trauma, pathology, large open caries, periodontal disease, crucial primary teeth, need for emergency care and essential (the condition would escalate shortly) (MOHLTC, 2009).

EMERGING THEMES

- The RDHs had little control over what room they were assigned. It depended on the availability of rooms on the day of screening.
- Most RDHs did not use the standing screening light, but rather the hand-held light. Reasons for this included children complaining that the light was in their eyes and the fact that the large light was cumbersome to transport to the county schools. Some RDHs expressed that they would be more likely to use the light if it was couriered to the county schools and present upon their arrival.
- The majority of RDHs felt that they wanted to expand the calibration session to include a group discussion immediately afterwards. This was noted as having a high level of importance.
- RDHs felt that sometimes it was very difficult to screen in areas that were cramped, dimly lit, or noisy.
- RDHs all expressed wanting to receive and discuss a general report of the calibration results.
- Many of the slides used in previous calibration sessions in Toronto were either too small or unclear, and did not include enough client history.
- The RDHs conveyed a positive attitude towards a hands-on calibration session and the calibration project in general.

Let's Agree To Agree: Management Techniques in Calibrating Oral Health Screening Systems

With the previously noted inconsistent examiner results, and variation in screening procedures, Lisa, who had been an RDH herself for the past 12 years, understood the importance of having agreement between clinicians. She had been involved in calibration training sessions with the local college where she had worked as a clinical instructor. Given Lisa's field observations, she had her work cut out for her. She wanted to make sure to incorporate everyone's input into her final recommendations. How should she go about doing this? What incentives could she recommend for the dental team to ensure participant buy-in? What were the repercussions of the dilemma at the MLHU? How would she determine the best statistical analysis to apply to the gathered data from the calibration session? She had many questions in relation on how to proceed.

EXHIBIT 1
Urgent and Non-Urgent Photo Samples

Urgent

Pain is present



Source: MLHU, 2015.

Non-Urgent

No pain or caries present, condition is dental fluorosis



Source: MLHU, 2015.

EXHIBIT 2
Map of Ontario Health Units Map



Source: Association of Local Public Health Agencies, n.d.

**EXHIBIT 3
General Health Unit Job Descriptions (Key Players)**

Dental Consultant (Public Health Dentist)

- Expertise of a Public Health Dentist Hired by a Public Health Unit

In many cases a Public Health Dentist will be designated as the manager of all of the dental programs and services for his or her health unit with budgetary and full human resource responsibility for the dental programs and services provided by the board of health. The Public Health Dentist may be on the Executive Committee or report directly to the Medical Officer of Health and may have managers reporting to him or her.

In other cases, a board of health may hire a dedicated Dental Consultant to perform some or all of the following activities, with additional roles added based on local need:

1. Employing dental epidemiology and emerging evidence in the literature to ensure that the health unit is conducting evidence-informed practice;
2. Responding to emerging dental issues (e.g., responding to public and professional enquiries regarding communal water fluoridation);
3. Participating in strategic planning activities for the department and the organization;
4. Monitoring dental budgets and providing advice to the Medical Officer of Health and/or Business Administrator on reasons for any budget variances;
5. Preparing board of health reports on oral health status as required;
6. Integrating dental program messaging into other program areas (e.g., Tobacco cessation, Healthy Babies Health Children (HBHC), pre-natal and parenting classes, well-baby visits, communications campaigns, etc.);
7. Conducting program planning, monitoring, and evaluation;
8. Interpreting and tracking trends in OHISS data (CINOT, CINOT Expansion, Screening, Surveillance) and other data;
9. Reviewing predetermination requests for the CINOT program and the CINOT Expansion, discussing results with the treating dentist as required;
10. Authorizing over-rides in OHISS for the CINOT program and the CINOT Expansion;
11. Providing review and approval or non-approval of claims that have not passed validation;
12. Maintaining a relationship with the local dental community;
13. Participating in Provincial committees regarding ongoing research and development of best practices and program development;
14. Providing advice about confidentiality of personal health information and sharing of information as it relates to the OHISS database and dental records;
15. Communicating with federal, provincial, municipal and other representatives on inter-jurisdictional health issues such as tripartite and other agreements to help ensure the best possible public health services to individuals residing in the health unit catchment area;
16. Ensuring dental programs meet basic public health criteria relating to needs assessment, surveillance, prevention, health promotion, health protection, and emergency preparedness;
17. Providing input into hiring, and ongoing performance management of dental staff, dental staff job descriptions, staff development, etc.;

Let's Agree To Agree: Management Techniques in Calibrating Oral Health Screening Systems

18. Ensuring that fluoride levels are monitored in areas where fluoride is added to drinking water in accordance with the *Protocol for the Monitoring of Community Water Fluoride Levels*;
19. Calibrating the screening teams annually and at other times as required;
20. Providing and supporting ongoing staff training and development as appropriate;
21. Ensuring that the contents and maintenance of the dental emergency kit (for dental clinics) is completed and staff is trained on appropriate usage; and,
22. Belonging to, and participating in, the Ontario Association of Public Health Dentistry (OAPHD) and other provincial associations as appropriate.

Source: OAPHD, 2012.

Oral Health Manager

Managerial Responsibilities Related to Staff Supervision

1. Operational planning, implementation and evaluation of the designated Ontario Public Health Programs and Health Unit Strategic Directions at the team level and/or agency level based upon best practices;
2. Promoting Health Unit programs and services outside the Health Unit; liaising with external stakeholders, community partners, etc. create and sustain meaningful community partnership to further program work;
3. Managing workload – dividing work according to skill sets, scheduling, holding regular meetings to confirm priorities and timelines, receiving reports on work done, discussing problems, giving feedback and support, reviewing and evaluating programs and services, setting new goals, and preparing board reports;
4. Supporting staff development and performance management – conducting regular performance appraisals of staff members, identifying professional development opportunities, determining learning needs, providing feedback, assisting staff in developing personal development and work goals;
5. Keeping all staff informed of what is happening in public health locally, provincially, nationally, and internationally and apprising staff of key local resources and supports;
6. Providing staff support – responding to staff concerns, resolving personnel issues, acting as a conduit for staff to address health unit-wide issues, and supporting staff in dealing with conflicts and concerns with external clients;
7. Reviewing and updating team and work procedures as changes occur – contributing to the development of new policies and procedures for the service area or organization and establishing mechanisms on his or her team for continuous monitoring of organizational processes;
8. Providing leadership in communication and managing change, keeping individuals and teams informed in a variety of ways (face-to-face individually or in teams, voicemail, email, notices, etc.), receiving communications from senior management and interpreting them for staff in their particular circumstances, updating staff on all matters outlined in #6 and #7 for new or transferred staff;
9. Overseeing staff changes – conducting final performance reviews and references, assigning temporary work arrangements, participating in the recruitment process including input into preferred qualifications, selection panel, interview, and other assessment tools;
10. Providing orientation and on-the-job training for new or transferred staff joining the team:
 - a. Application of Administrative Policies, Service Area policies and team policies, including Privacy and Confidentiality;
 - b. Orientation to public health for new staff;

Let's Agree To Agree: Management Techniques in Calibrating Oral Health Screening Systems

- c. Procedures associated with team and individual work;
 - d. Health and safety – identification of risks for staff members, instruction and documentation regarding safe practices to avoid or mitigate the risk and reduce potential harm, where to find information, Fire Safety procedures;
 - e. Ergonomics at work – workstation setup, safe lifting/carrying practices, equipment availability and use, where to find related information;
 - f. Incident reporting –procedures, including WSIB forms and the role of the Occupational Health and Safety Committee;
 - g. Customer service approach, including accessibility under AODA related to programs and services provided; and,
 - h. Records Management.
11. Creating and maintaining a positive team culture. In addition, orienting staff to culture of the service area and the Health Unit (Code of Conduct, Service Area Principles, professional practice guidelines, best practices);
 12. Taking responsibility for identifying and addressing disciplinary issues, communicating issues, progressive discipline in consultation with HR, follow-up with staff, documenting, and consulting with Director regarding discipline decision; and,
 13. Assisting in establishment of program budgets, approving expenditures and monitoring progress, ensuring programs stay within approved budget.

Source: MLHU Board of Health Report, 2012.

Dental Assistant

The Dental Assistant is responsible for contributing to the MLHU clinical and preventive dental health programs that are offered in the community.

Dental Assistant Duties

In Dental Services there is generally a Preventive Dental Team and a Clinic Team (Treatment). In some instances, some of the following duties may be performed primarily by one of these teams. However, the Dental Assistant may be directed to assist in either Team.

1. Providing all chairside and reception duties that may reasonably be expected of a Certified Dental Assistant;
2. Greeting patients upon arrival, obtaining medical and dental history, and ensuring proper documentation;
3. Creating a chart and entering all information on computer for the patient;
4. Preparing and submitting accounts for payment, assisting patients from other dental offices in completing proper forms, and explaining how CNOT, Healthy Smiles Ontario, Ontario Works referrals are carried out;
5. Scheduling appointments so that each day is productive and a variety of treatments are included in the day's activities;
6. Answering dental health inquiries from patients, students, individuals seeking information, dental offices in the community, and Health Unit staff;
7. Contacting families of identified individuals to notify them of dental conditions and confirming appointments with patients including recall and screening appointments;
8. Organizing referral appointments for patients to dental specialists' offices;
9. Ordering all supplies for the clinic, ensuring that sufficient supplies and instruments are on hand at all times, and restocking supplies when they arrive.

Let's Agree To Agree: Management Techniques in Calibrating Oral Health Screening Systems

10. Maintaining and servicing equipment including sterilizers, dental compressor and vacuum, x-ray developer, and dental carts, handling and disposing of contaminated dental sharps;
11. Working in an environment with a constant exposure to blood and saliva often with high speed intraoral devices producing aerosols;
12. Disinfecting, sterilizing, and cleaning equipment, instruments, work, and office areas according to universal procedures using appropriate disinfectants and sterilizing solutions;
13. Exposing and developing radiographs (x-rays);
14. Assisting Dentists and Dental Hygienists with patient care;
15. Providing preventive dental health instruction to groups and individuals;
16. Inputting and retrieving data to and from dental and other software packages;
17. Packing and transporting portable dental chair, instruments, teaching aids and handouts to and from schools and long-term care facilities and other work sites;
18. Setting up temporary dental clinics off-site using transported equipment;
19. Preparing lists and schedules of students or residents to be seen at the clinic;
20. Arranging with teachers and schools to send children at specific times for screening;
21. Recording pertinent data provided by Hygienist during screening procedures;
22. Disinfecting and packing instruments and taking down mobile clinics for return to head office;
23. Providing instruction to junior kindergarten, kindergarten, and all designated grade levels on dental health;
24. Organizing class lists, developing follow-up lists, and entering relevant data into computer and retrieving when necessary; and,
25. Managing young, uncooperative, and fearful clients who may also have limited language skills.

Source: MLHU, 2013.

Registered Dental Hygienist

Responsibilities include clinical duties for adults and children and provision of oral health assessment and oral health education programs in school classrooms and in the community.

RDH Duties

1. Conducting oral health assessment for school children and clinic clients;
2. Documenting existing conditions requiring treatment and contacting parents to inform them of needed treatment;
3. Providing oral health education and maintaining dental records;
4. Preparing examination sites by transporting equipment and supplies to and from sites;
5. Maintaining standards of practice, with particular attention to dental disinfection and sterilization procedures;
6. Participating in community dental education activities;
7. Providing adult services under Ontario Works (Smile Clean Program);
8. Providing all clinical services that a Dental Hygienist is legally permitted to carry out including providing topical fluorides, placement of sealants, dental prophylaxis, and scaling; and,
9. Answering dental health inquiries from a wide variety of sources.

Source: MLHU, 2013.

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INSTRUCTOR GUIDANCE

Let's Agree to Agree: Management Techniques in Calibrating Oral Health Screening Systems¹

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BACKGROUND

In 2014, Lisa Montebello, a Registered Dental Hygienist and Master of Public Health candidate at the Interfaculty program in Public Health, Western University, was working during her practicum with Dr. Mark Gracey, Oral Health Manager of the Middlesex-London Health Unit (MLHU), in London, Ontario, Canada. Her objective was to formulate a clinical calibration assessment and recommendation report. Clinical calibration is a comparison of agreement between clinicians, or against a verified standard, to achieve a clinical gold standard. Dr. Gracey was responsible for following the Ontario Public Health Standards (OPHS) protocols to ensure that all Grade 2 children in the Middlesex-London area were receiving equitable access to oral health care services through oral health screenings. There were over 120 schools with five registered dental hygienists (RDHs), along with five dental assistants (DAs) providing this service through the school screening program. After a calibration review slide session the year before, it was found that the RDHs were rating the oral health care needs of children inconsistently. This posed a dilemma for both Dr. Gracey and Lisa, as vulnerable children with urgent dental care needs may be missed as a result. There was also no standardized recommended statistical analysis in place at MLHU to analyze the data from the calibration sessions. Lisa needed to come up with a best practice guideline for clinical calibration, including statistical analysis recommendations, so that the MLHU could ensure that no child was overlooked due to inconsistent measurement outputs. Lisa had just 8 weeks to observe and assess the entire current calibration system in place, and to formulate a report for the oral health team at the MLHU.

OBJECTIVES

1. Effectively engage with stakeholders within oral health programs to determine differences in approaches to screening systems and any outside influences.
2. Assess current calibration methods and procedures used in school-based oral health screening programs, including the screeners, the procedure, and environment.
3. Develop a best practice guideline in a public health setting, such as a school-based oral health screening program.
4. Determine and analyze stakeholder values.
5. Adapt to challenges and motivate others.
6. Evaluate recommendation outcomes.

¹ The case description, while based on a real experience, is adapted for learning purposes.

DISCUSSION QUESTIONS

1. What are the dilemmas currently being faced by Lisa and Dr. Gracey of the MLHU? What are the repercussions of these dilemmas?
2. What steps could Dr. Gracey and Lisa take in approaching staff and determining why the analysis shows an inconsistency in the oral screening process?
3. Who are the key stakeholders in this case? What are the possible differing levels of interest or values of the stakeholders?
4. What process is required to determine best practices in clinician calibration for oral health providers?
5. What steps should be taken to implement the best practice recommendations?
6. How can you ensure that all stakeholder views are incorporated in deciding which changes to make in the calibration session?
7. What incentives could be given to employees to ensure “buy-in”?
8. What possible challenges might Dr. Gracey or Lisa face with implementing this project?
9. How would you evaluate the outcomes of the best practice guideline recommendations made by Lisa?

KEYWORDS

Oral health; screening; best-practice; guidelines.

CASE 6

**Reducing Poverty in Canada:
Public Policies & Population Health**

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INTRODUCTION

“Overcoming poverty is not a task of charity, it is an act of justice. Like Slavery and Apartheid, poverty is not natural. It is man-made and it can be overcome and eradicated by the actions of human beings. Sometimes it falls on a generation to be great. YOU can be that great generation. Let your greatness blossom.”

– Nelson Mandela

Walking around the downtown core of London, Ontario, Michelle often wondered how people, of all ages and ethnicities, living in such a privileged and developed nation filled with endless opportunities could end up on the streets, begging for money, emaciated and overcome by multiple addictive behaviours and chronic conditions. Time and time again she pondered about Canada, the beautiful and prosperous land she and her family had long prayed about and dreamt of immigrating to as a means to escape the political turmoil and instability of the Democratic Republic of the Congo (DRC). “How could this be?” she wondered. “What is the government’s response to such social and economic disparities?”

What was more alarming was her discovery of the fact that the issue of poverty (see Exhibit 1 for a definition of *poverty*) was nationwide, affecting over 3 million Canadians (Citizens for Public Justice, 2012; Statistics Canada, 2011). As a future public health professional and agent of change, Michelle embarked on a 10-week placement with the National Collaborating Centre for Healthy Public Policy in Montreal, Quebec (see Exhibit 2). She had the privilege of researching public policies (see Exhibit 1 for a definition of *public policy*) in the form of legislation, strategies, and action plans (see Exhibits 3 & 4) put in place by Canadian provinces and territories, with the exception of Alberta and British Columbia, in order to combat poverty and social exclusion (see Exhibit 1 for a definition of *social exclusion*).

In comparison to other modern industrialized nations or countries that have signed the Convention on the Organization for Economic Co-operation and Development (OECD) such as France, Germany, and the United Kingdom, poverty levels in Canada remained higher (Raphael, 2007; see Exhibit 5). The national cost of poverty was believed to surpass \$100 billion per year, or six per cent of the country’s gross domestic product (GDP), and had manifested through its impacts on the health care system, the legal and justice systems, the education system, and the country’s decreased economic productivity (Canadian Public Health Association, 2014). Due to an unequal distribution of resources and a higher proportion of

people working in low wage occupations, in Canada, population subgroups most affected by poverty were unattached adults, individuals with disabilities, women, children, those of Aboriginal descent, people of colour, single parents, and recent immigrants (Raphael, 2007; Canadian Centre for Policy Alternatives, 2011; CPJ, 2012; see Exhibit 6).

While collecting data on poverty reduction policies in Canada, Michelle was astonished to discover that among all the Canadian provinces and territories, British Columbia had the highest rate of poverty, accounting for twelve percent of its population or more than half a million people (CCPA, 2011; see Exhibit 7). Yet the province had no known plans, nor had it begun a public consultation process that would lead to the development and implementation of a poverty reduction policy.

POVERTY REDUCTION WITHIN THE INTERNATIONAL COMMUNITY: END POVERTY 2015 MILLENNIUM CAMPAIGN

Over the past decade, poverty reduction had been at the core of the global development challenge. Within the international development community, objectives set to reduce poverty served as not only the defining theme and overarching goal for the work undertaken by the most prominent aid organizations, but also as a source of motivation. At the wake of the millennium, Member States of the United Nations (UN) adopted the United Nations Millennium Declaration, thereby committing to the global partnership outlined in the blueprint document of the Millennium Developmental Goals (MDG). Of the eight MDGs, the first one aimed at eradicating extreme poverty¹ and hunger by half between 1990 and 2015 (UN, 2013). Although this goal was met in 2010, with the largest reduction occurring in East Asia and the Pacific, and China in particular, approximately 1.2 billion of the world's population was still considered to be extremely poor (The World Bank, 2010; UN, 2013).

With the main goal to eradicate extreme poverty and hunger globally to less than 15 per cent by 2015², through social media outlets such as Twitter, Facebook, YouTube and Flickr, the United Nations Millennium Campaign (UNMC) titled *End Poverty 2015* functioned to spur action from Member States' leaders who had committed to the realization of the MDGs in their jurisdiction. The campaign rested on three objectives: the reduction of those living on less than \$1 per day and those living in hunger, as well as increased stable employment (UNMC, 2014). Since its inception, the campaign attained its objectives by reducing the proportion of those living on less than \$1.25 per day by 600 million and a reduction of 23% in the global poverty rate between 1990 and 2008. However, the burden of poverty remained high on the global scale and the campaign continued to strengthen its efforts in order to produce results surpassing set goals and objectives (UNMC, 2014).

POVERTY REDUCTION IN CANADA

Over twenty years ago, in 1989, the Canadian House of Commons unanimously resolved to employ measures through which poverty would first be eradicated in Canadian children by the year 2000, followed by a plan to end poverty for all citizens (Campaign 2000, 2013). However, such goals were not met as approximately 1 in 7 Canadian children continued to live in poverty. Subsequent to the global financial markets collapse in 2008, the country went into a recession, leaving hundreds of thousands of families dependent on Employment Insurance and Social Assistance in the midst of rising costs of living (CPJ, 2012).

¹ Extreme poverty was defined as living with an income equating to less than \$1.25 a day (The World Bank, 2010).

² As the initial 23 per cent target had already been reached prior to 2015.

As cited by CPJ (2012):

“Without an anti-poverty strategy, the progress that Canada has made will erode, diminishing the life chance and opportunities of the poor, and undercutting Canada’s future prosperity” (p.1).

As a Member State of the United Nations, since 2000, Canada committed to the eight MDGs, of which poverty reduction was the first. However, it appeared as though most of Canada’s efforts in accomplishing these goals were geared towards international assistance to developing countries. Meanwhile, 3.2 million Canadians faced hardships associated with poverty and 100,000 children in British Columbia lived in families with extremely low-income (CCPA, 2011). In January 2001, Canadian Prime Minister Jean Chrétien highlighted social development and social inclusion at the forefront of his government’s agenda (Canadian Council on Social Development, 2014). Specifically, he mentioned:

“We are determined to help families break out of the poverty trap. To reverse the cycle of dependency. To help parents realize their hopes and their dreams for their children. We cannot afford the costs, moral, human and economic, of child poverty. We must find new and better ways to promote opportunity and to ensure that the basic needs of all are met” (CCSD, 2014, para. 2).

Months after this declaration, the government’s goal of deficit reduction led to severe cuts to Employment Insurance, federal transfers to the provinces, the elimination of the Canada Assistance Plan, and cuts in welfare incomes, as well as affordable housing programs and community-based services and supports (CCSD, 2014). In his report on poverty reduction policies and programs in Canada, David Hay of the Canadian Council on Social Development noted that the Canadian federal government was the least engaged member in discussions about solutions to poverty (CCSD, 2009).

DEFINING POVERTY

Unlike “health”, the term “poverty” was not ascribed an internationally recognized definition, deeming it to be a complex, multifaceted issue. Officially, the Canadian government did not have a definition of poverty (CCSD, 2009). In and of itself, poverty was continuously framed as a complex issue, primarily due to the difficulty in framing it as a social phenomenon, the unclear cause and effect relationships it has with other sociocultural determinants of health, the uniqueness of the experience of poverty among individuals, and its evolution over time, providing no right or wrong set of solutions to overcome it and the lack of an absolute measure that can be used to measure the success of poverty reduction efforts (Vibrant Communities Canada, 2014).

That being said, the only available definition of poverty was Statistics Canada’s definition for low income Canadians as those “living in straitened circumstances” (CCSD, 2009, p. 2). Within the Canadian scientific community, individuals living on low incomes or in poverty were classified as those at the bottom 20 per cent of the distribution or below the Low Income Cut-Off (LICO), the Market Basket Measure (MBM), and the Low Income Measure (LIM), as defined by Statistics Canada (CCSD, 2009; Raphael, 2007; see Exhibit 8). Due to a lack of national consensus on definitions of low income, LICOs were often used in relation to average household spending levels, LIMs in relation to median household income, and MBMs in relation to the cost of indispensable or “essential” goods and services. It is worth noting that these poverty measures were highly dependent on consumption levels, levels of income, and the costs of goods and

services. Particularly, LICO's were annually indexed to the consumer price index (CCSD, 2009), which Statistics Canada published per province monthly³.

Low Income Cut-Off (LICO) *(before and after taxes)*

The most commonly used measure of poverty and source of poverty rates in Canada was the LICO, developed by J. Podoluk of Statistics Canada in 1968. This measure provided "an income threshold below which a family will likely devote a larger share of income to the necessities of food, shelter and clothing than an average family would" (Raphael, 2007, p. 39; see Exhibit 9). The LICO was also the most used measure as it considered both relative poverty⁴ and how much a family spends on basic needs (absolute poverty⁵).

Market Basket Measure (MBM)

As a relative measure of poverty, the MBM estimated the required income for a family to purchase needed goods and services such as food, shelter, clothing, and basic social needs, primordial to their survival. Due to differing economies across provinces and territories, these governments had set locally-specific necessary goods and services, based on which they identified an income line. Human Resources and Social Development Canada (HRSDC) viewed the MBM as "falling somewhere between a subsistence standard of living and a more generous social inclusion basket" (CCSD, 2009, p.2)

Low Income Measure (LIM)

The LIM was a measure of the relative poverty, mostly used by the international community in relation to indicators of health and educational outcomes (Social Planning Council of Winnipeg, 2012). It ascertained income levels either before or after taxes necessary for families of certain sizes. When a family's income was less than the cut off amount, then they were determined to be living in poverty. As described by the CCSD (2009), the LIM "explicitly defines low income as being much worse off than average, and is calculated at one-half the median income of an equivalent household" (p.2).

SOCIAL INEQUALITY & SOCIAL EXCLUSION

The higher incidence of poverty among certain groups in comparison to others in such a developed country can be explained using two areas of study. The first is social inequality, which refers to "long lasting differences in power and resources among individuals or groups of people that influence the quality of their lives" (Raphael, 2007, p. 86). This social paradigm was first introduced by Karl Marx (1818-1883), who evaluated the formation and distribution of economic resources in capitalist societies among those of different social classes. Another proponent of exploratory frameworks on social inequality is Max Weber, who not only highlighted the importance of social class and economic processes, but the mechanisms through which power and influence are unequally distributed in society, ultimately leading to social inequality (Raphael, 2007).

The translation of such inequalities into the experience of poverty is explained by social exclusion, which is defined as "a multidimensional process, in which various forms of exclusion are combined: participation in decision-making and political processes, access to employment

³ See <http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/cpis01a-eng.htm>.

⁴ Relative poverty relates to individuals' inability to carry out or participate in expected activities of a modern industrialized society such as accessing food, clothing, involvement in leisure or occupational activities, and participation in decision-making, civil, social and cultural life (Raphael, 2007).

⁵ Absolute poverty relates to a lack of basic human needs such as food, shelter, and education.

and material resources, and integration into common cultural processes. When combined they create acute forms of exclusion that find a spatial representation in particular neighborhoods” (Raphael, 2007, p. 86). Social exclusion had recently emerged as a primary concern within the public policy community and is centered on “outcomes of the differential access to resources (Raphael, 2007, p. 86-87). Social exclusion, also experienced by many citizens of India classified within the caste system, interacts with other determinants of health, producing poor health and lower quality of life (Ingole, 2014).

MEASURING INEQUALITY

Internationally, the World Bank attributed a Gini index or coefficient to countries, measuring “the extent to which the distribution of income (or consumption) among individuals or households within a country deviates from a perfectly equal distribution” (Raphael, 2007, p. 52). Cumulative percentages of total income versus the number of people receiving this income are plotted using a Lorenz curve. The Gini index⁶ is represented by the area between the Lorenz curve and a hypothetical line of absolute equality and is attributed a number between 0 (representing perfect equality) and 1.00 (representing perfect inequality). One of the arguments around the Gini-coefficient is that it is not cumulative of all population sub-groups within a society, such that “the total Gini of a society is not equal to the sum of the Ginis for its sub-groups” (The World Bank, 2011, para. 6). Similarly, when fluctuations in income distribution occur, the Gini-coefficient is also impacted irrespective of whether this occurs solely among the rich or the poor, or between the rich and the poor.

THE STRONGEST SOCIAL DETERMINANTS OF HEALTH

The World Health Organization (WHO) defined the social determinants of health as “‘the conditions in which people are born, grow, live, work and age’, as shaped by families and communities and by the distribution of money, power, and resources at global, national, and local levels and affected by policy choices at each of these levels” (Viner et. al., 2012, p. 1641) (see Exhibit 10). Viner et. al. (2012) recognized that national wealth, income inequality, and access to education constitute the strongest *structural determinants of health*. *Proximal or intermediate determinants of health* can be classified as circumstances of daily life, quality of family relationships and peer relationships, availability of housing, food, and recreation.

The experience of poverty could not be isolated, as it was intricately linked to individuals’ experiences with many other social determinants of health such as their early child development, educational attainment, employment, and access to health services. Poverty was known to have a myriad of ill-health effects, leaving children as the most vulnerable members of society. The inter-generational transmission of income and wealth asserted that children brought up by parents with higher income, wealth, and educational attainment were more likely to display higher cognitive functioning, educational achievement as well as a higher income and wealth (Raphael, 2007). When living within an optimum family income level, a child’s development was better supported, as they were more likely to be exposed to more material and social resources and to live in a neighbourhood characterizing positive social and physical environments (Raphael, 2007).

In the Findings from Canada’s National Longitudinal Survey, it was reported that “Canadian children whose family income is less than \$25,000 have a 47% greater chance of experiencing cognitive difficulties in school; a 45% greater chance of behavior problems in school; and a 41%

⁶ The World Bank sometimes expresses the Gini index as a percentage of the maximum area under the hypothetical equality line ranging from 1 to 100.

greater chance of scoring high on an overall vulnerability index than other children” (Raphael, 2007, p. 123).

In Canada, income disparities have been widening between urban and rural areas, certain groups, and between the very affluent and the poor (Lemstra, Neudorf, & Opondo, 2006; CPJ, 2012). Such disparities have left families living in poverty to suffer from social exclusion and a limited access to healthy foods, good housing, healthy neighbourhoods, and quality schools (Seguin et. al., 2012).

LINKING POVERTY TO HEALTH

Research has shown that the causes of poverty are comprised of a complex mix of factors at both the structural or institutional and individual level. Structurally, the social assistance system, skills and credential recognition, and cultural barriers are identified as risk factors; whereas a lack of skill-set, education, and literacy level identify as causes at the individual level (Raphael, 2007). An analysis of data obtained from the National Population Health Survey revealed that 73 percent of Canadians within the highest income brackets reported being in excellent health, in comparison to the 47 percent of Canadians with the lowest incomes who rated their health as high (Laurie, 2008).

Internationally, there existed a clear consensus concerning the ill-health effects of material and social deprivation. Poverty has continuously been framed as the best predictor of individuals’ health and quality of life (see Exhibit 1 for a definition), affecting behavioural risk factors such as nutrition, physical activity, and tobacco and alcohol use (Raphael 2007).

Individual Approaches

Numerous elected officials, health care and public health officials failed to recognize that poverty is indeed a health issue, as health issues associated with those living in poverty are often attributed to their risk behaviours. On the other hand, health care and public health officials often modulated the importance of poverty as a public health issue due to their fear of menacing governments who control their status and funding. The individual perspective asserts that individual biomedical risk factors such as hypertension, excess weight, cholesterol, and behavioural risk factors such as lack of physical exercise, type of diet, and tobacco or alcohol use are the major cause of the poor health conditions experienced by people living in poverty. This approach further affirms that to promote health among those living in poverty, these risk factors must be modified either by medical interventions or by changes made by the individuals leading them to make healthier choices.

Travers (1996) states:

“Individualism assumes that the current social system provides sufficient and equal opportunity for individuals to move within the social system according to their abilities. Within this ideological construct, poverty results from the individual’s failure to seize the opportunity or to work sufficiently hard within the current social structure; it is not a reflection of inadequacies and inequities within that social order” (p. 551).

Material and Social Deprivation

Deprivation is defined as “a state of observable and demonstrable disadvantage relative to the local community or the wider society or nation to which the individual, family or group belongs” (Townsend, 1987, p. 125). Material deprivation refers to scarcity of

goods and conveniences within a modernized environment and social deprivation is associated with individuals' inability to form meaningful relationships within family, the workplace, and the community (Raphael, 2007). Exhibit 11 shows a model depicting the relationship between social structures and health status in terms of well-being, morbidity, and mortality, affected by positive and negative material factors. This model, however, does not account for the interaction of the determinants of health and their correlation with health outcomes. Conditions of work and the state of social environments are framed by the existing social structure. The degree of power one has and their ability to influence societal structures are determined by their conditions of work and their wages such as those of lower paying jobs have less political influence and receive little government attention because of their lower class and status. The highlighted psychological factors and health behaviours also affect the work and social environments, including the social structure. Those who may be experiencing high levels of stress due to their experience of living in poverty are more likely to experience unpleasant work and social environments, inhibiting their coping and managing skills to a great extent (Raphael, 2007).

National Anti-poverty and Income Security Policies in Canada

The Constitution Act, 1982⁷, section 36, addresses the federal and provincial governments' commitment to "promoting equal opportunities for the well-being of Canadians" and "providing essential public services of reasonable quality to all Canadians." Existing federal policies and programs aimed at reducing poverty and supporting low-income families are geared towards providing benefits for children and families, seniors, and employment. These include seniors' benefits (e.g. pensions), child and family benefits, social assistance programs, employment-related benefits (e.g., employment insurance, maternal/paternal leave, sickness, disability and injury benefits), minimum wage regulations, employment training, community economic development, early childhood care and education, and home and nurse visiting (CCSD, 2009).

Over the last three decades, trends based on the before-tax LICO have fluctuated between 15 to 20 percent and those based on the after-tax LICO fluctuated between 10 and 15 per cent, signifying a decrease in levels of poverty (see Exhibit 8). However, such fluctuations have been majorly attributed to changes in the business cycle, such as employment rates, as well as changes in levels of taxes and income transfer programs such as pensions and child and family benefits (CCSD, 2009).

PLAN OF ACTION

Despite the existence of these national programs for reducing poverty and supporting low-income families, the proportion of Canadians living in low income situations remained high (see Exhibit 5). After retrieving all the existing poverty reduction legislation, strategies and action plans in Canada (see Exhibit 3 & 4), Michelle employed a validation process with stakeholders within responsible government ministries to ensure that her synthesis adequately represented the provincial policies (see Exhibit 12 for the validation questionnaire distributed). Not all the policies in Canada can be said to contain internationally recognized categories that can ensure the success of poverty reduction strategies (see Exhibit 13). In the case of Saskatchewan, the government preferred using the term "approach" rather than "strategy" in referring to its poverty reduction efforts, recognizing that these efforts possess some of the qualities of a formal strategy (e.g. guiding values, objectives). When referring to Saskatchewan's actions, the guiding

⁷ *Constitution Act, 1982*, being Schedule B to the *Canada Act 1982* (UK), 1982, c 11, s 36.

document should be referred to as a poverty reduction policy or a policy reduction approach.

Regarding provinces that had neither launched legislation nor a strategy, government representatives were contacted to inquire on the next steps that are anticipated. In Alberta, extensive consultation processes had taken place and the department of Human Services expected to present a policy formulation to government in the fall of 2014. In BC, two bills (Bill M216 and Bill S216) had been proposed but neither were approved.

POVERTY IN BRITISH COLUMBIA

As of 2011, the overall rate of poverty and the child poverty rates in BC based on the LICO before tax were estimated at 15.6% and 18.6% respectively, being the highest rates in Canada (Canada Without Poverty, 2011). Particularly, between 2010 and 2011, the poverty rate among female-led single parent families increased from 20.1 to 49.8 percent. Recently, a coalition of 400 members and 400 organizations, consisting of community and non-profit groups, faith groups, health organizations, First Nations and Aboriginal organizations, businesses, labour organizations, and social policy groups, was developed in order to create a unified voice advocating for a poverty reduction plan in BC. Aside from being one of the wealthiest provinces in the country having the highest rate of poverty, it was believed that BC needed a poverty reduction plan because the situation had remained unchanged for the past eight years in the midst of rising living costs, posing threats to population health and the well-being of children, with increasing inequality, housing challenges, and crime.

As in many parts of Canada, most of those living in poverty in BC lacked access to supplementary insurance through their place of work and thus, were unable to access and afford private health care costs. For those already living in poverty and suffering from a chronic illness, access to services such as dental and vision care, and rehabilitation services such as physiotherapy, played a fundamental role in the management of their conditions and the prevention of further deterioration. Numerous studies have also shown that those living in poverty are more likely to use public health care resources. In BC, “the poorest 20 percent, or ‘quintile,’ of families used a greater share of health care resources than any other group on the income ladder” (CCPA, 2011, p. 6). The CCPA had estimated that “if poverty reduction initiatives reduced health care use for families in the poorest 20 per cent to that of the next quintile, it would save BC’s public health care system 6.7 per cent of total spending each year” or “an equivalent of \$1.2 billion in annual provincial health care spending” (CCPA, 2011, p. 7).

HEALTHY PUBLIC POLICY

In his 1974 report, the Honourable Marc Lalonde affirmed recognition by the provincial Governments of the importance of physical and mental wellbeing for a quality of life aspired to by Canadians. However, he further acknowledged that “the health care system is only one of many ways of maintaining and improving health” (Lalonde, 1974, p. 5). Raising the general standard of living was identified as an important factor for increasing the “number of illness-free days in the lives of Canadians” (Lalonde, 1974, p. 5).

A decade later, the Ottawa Charter for Health Promotion established *Building Healthy Public Policy* as its first priority area for Health Promotion Action, with the overall goal to “achieve Health for All by the year 2000 and beyond” (WHO, 2010). The WHO report highlighted that “health promotion policy requires the identification of obstacles to the adoption of healthy public policies in non-health sectors, and ways of removing them” (p. 3). By definition, public policy refers to “a course of action or inaction chosen by public authorities to address a given problem or interrelated set of problems” (Raphael, 2007, p. 24). Healthy public policy refers to public policy capable of fostering supportive environments, and enabling individuals to lead healthy

lives (Green & Tones, 2010). In essence, decision makers in both the public and private sectors were tasked with the implementation of policies and practices characterized by a “commitment to social equity, recognition of the important influence of economic, social, and physical environments on health, facilitation of public participation, and cooperation between health and other sectors of government” (Green & Tones, 2010, p. 254).

STRATEGIES FOR REDUCING POVERTY & SOCIAL EXCLUSION

Due to the complex and deeply rooted nature of poverty and social exclusion, developing solutions was an equally complex task, requiring multiple and well-developed policies and program interventions. The New Policy Institute and the Poverty Alliance (MacInnes, Bushe, Kelly, & McHardy, 2014), reported on several reasons why strategies and action plans addressing poverty reduction and social inclusion were extremely helpful as they:

- Highlight existing initiatives, exposing gaps and providing future direction for action;
- Serve as an education tool to raise awareness of poverty and social exclusion’s complex nature and why prioritizing its elimination is beneficial to the community at large;
- Demonstrate government commitment to the issue of poverty and social exclusion as they aim to make it a priority;
- Offer the opportunity to associate national or provincial targets to local activity, as well as facilitate co-ordination and consensus building among internal and external stakeholders; and
- Enable governments to assess their progress and identify areas of improvement.

DEVELOPING A STRATEGY FOR BC

Upon completion of her studies, Michelle came across a job posting in the policy branch of the BC Ministry of Social Development and Social Innovation, which had recently unveiled a ten-year accessibility strategy, targeted at individuals living with disabilities. With the knowledge she possessed on poverty reduction policies in Canada, especially with her experience at the NCCHPP, the Deputy Minister in charge requested that Michelle lay out a poverty reduction strategy for BC. The Deputy Minister stated that this task was of great priority as “if there is no long-term vision, no plan, no one accountable for carrying out the plan, no resources assigned and no acceptable measure of result, BC will continue to be mired in poverty for generations”. Within a limited time period, she had to develop a plan ensuring a sustained decrease in the high rate of poverty in BC, contributing to economic, social, and health development of the province.

Seeing the work done by the BC Poverty Reduction Coalition and other organizations in advocating for government support in the creation and implementation of a provincial poverty reduction plan in BC as a first step, Michelle joined forces with them in developing the plan. Knowing all the health, social and economic benefits that could result from such a plan, and the great opportunity this presented, Michelle was deeply submerged in comparing Canadian provincial and territorial policies, as well as those developed in Sweden and the UK in order to develop a plan that would not only guarantee her employment, but also one that would become a reference for the rest of the country.

EXHIBIT 1
Glossary of Terms

Health

“Usually defined as the absence of disease. When used in this manner it is best described as health status. Defined broadly by the World Health Organization (WHO) as the ability to have and reach goals, meet personal needs, and cope with everyday life. The WHO argues that health requires the following prerequisites: peace, shelter, education, food, income, a sound environment, and social justice. While these definitions are primarily focused at the individual, quality of life is focused on the larger community and society” (Raphael 2007, p.24).

Poverty

Gordon & Townsend (2000) define poverty as “the condition whereby individuals, families, and groups lack the resources to obtain the type of diet, participate in the activities, and have the living conditions and amenities which are customary, or at least widely encouraged or approved, in the society to which they belong. Poverty can be considered in terms of absolute poverty, whereby individual and families do not have enough resources to keep “body and soul together”, or relative poverty, whereby they do not have the ability to participate in common activities of daily living” (Raphael 2007, p.24).

Public Policy

“A course of action or inaction chosen by public authorities to address a given problem or interrelated set of problems. Policy is a course of action that is anchored in a set of values regarding appropriate public goals and a set of beliefs about the best way of achieving those goals. The idea of public policy assumes that an issue is no longer a private affair.” (Raphael 2007, p.24).

Quality of Life

“A holistic construct that views individual and community human well-being in relation to immediate and more distant environments. It looks at both broad societal indicators and the lived experience of people. Concretely, quality of life is the extent to which individuals and communities are able to enjoy the important possibilities of life. Their ability to do so is influenced by public policies that develop and maintain a vibrant local economy; protect and enhance the natural and built environment; offer opportunities for the attainment of personal goals, hopes, and aspirations; promote a fair and equitable sharing of common resources; enable residents to meet their basic needs; and support social interaction and the inclusion of all residents in community life” (Raphael 2007, p.24).

Social Exclusion

“A multi-dimensional process, in which various forms of exclusion are combined: participation in decision-making and political processes, access to employment and material resources, and integration into common cultural processes. When combined they create acute forms of exclusion that find a spatial representation in particular neighbourhoods” (Raphael 2007, p.86).

Welfare State

“Governmental structures that assure the components of citizenship: meeting basic needs, providing resources for participation in society, and minimizing forces that systematically exclude citizens from these activities” (Raphael 2007, p.24).

EXHIBIT 2

The National Collaborating Centre for Healthy Public Policy

In the year 2005-2006, the Canadian government opened a funding portfolio for six national collaborating centres for Public Health focusing on different priority areas in public health and located in distinctive regions across Canada. These centres work to increase the use of scientific knowledge within Canadian public health practices and policies, through activities centered on the identification of knowledge gaps and building sustainable networks with researchers, practitioners and policy makers.

In the context of the National Collaborating Centre for Healthy Public Policy NCCHPP, which is hosted by the Institut National de Santé Publique du Québec (INSPQ), public policy is defined as “a strategic action led by a public authority in order to limit or increase the presence of certain phenomena within the population”. Milio (2001, p. 622) further suggests that healthy public policy improves the conditions under which people live: secure, safe, adequate and sustainable livelihoods, lifestyles, and environments, including housing, education, nutrition, information exchange, child care, transportation, and necessary community and personal social and health services.

Organizational goal: to reach various public health actors interested in promoting healthy public policies.

The centre operates under **two main objectives**:

1. Bridging gap between decision makers and public health actors.
2. Seeking to make resources and tools from political science, policy analysis, sociology and other social sciences available to public health actors in order to apply them to Canada's public health realities.

Source: NCCHPP, 2010.

EXHIBIT 3

Provincial & Territorial Legislation to Combat Poverty in Canada¹

Province/Territory	Name & Type of Policy	Date adopted	Public consultation/engagement process	Primary Objective
Quebec	<u>An Act to Combat Poverty and Social Exclusion (R.S.Q., c. L-7)</u>	December 13, 2002	Yes	“...[T]o guide the Government and Québec society as a whole towards a process of planning and implementing actions to combat poverty, prevent its causes, reduce its effects on individuals and families, counter social exclusion and strive towards a poverty-free Québec.”
Ontario	<u>Poverty Reduction Act (S.O. 2009, Ch. 10)</u>	May 6, 2009	Yes	“...[T]o establish mechanisms to support a sustained long-term reduction of poverty in Ontario.”
New Brunswick	<u>Economic and Social Inclusion Act (SNB 2010, c E-1.105)</u>	April 16, 2010	Yes	“...[B]y 2015, New Brunswick will have reduced income poverty by 25% and deep income poverty by 50%, and will have made significant progress in achieving sustained economic and social inclusion.”

¹ See http://www.ncchpp.ca/141/publications.ccnpps?id_article=279 for document published in 2009 by the NCCHPP. The updated version of this document has not yet been published.

Reducing Poverty in Canada: Public Policies & Population Health

Province/Territory	Name & Type of Policy	Date adopted	Public consultation/engagement process	Primary Objective
Manitoba	<u><i>The Poverty Reduction Strategy Act (C.C.S.M. c. P94.7)</i></u>	June 16, 2011	No	"...[A]ddress the various needs, including the need for quality, accessible education that develops knowledge and skills; training that prepares persons for employment; income supports opportunities; income supports for persons who are unable to fully participate in the labour market; affordable housing; supportive and safe communities; and supports for strong and healthy families."
Nunavut	<u><i>Collaboration for Poverty Reduction Act (Shu 2013, c 12)</i></u>	May 16, 2013	Yes (Public Engagement Process)	"...[T]he purpose of this Act is to affirm in law the commitment of the Government of Nunavut to participate as a partner with Nunavut Tunngavik Inc., Inuit organizations, other governments, non-government organizations and businesses on the Nunavut Roundtable for Poverty Reduction to implement The Makimaniq Plan and the five year poverty action plan in a manner consistent with Article 32 of the Nunavut Land Claims Agreement."

EXHIBIT 4 Poverty Reduction Policies (Strategies & Action Plans) across Canada, by Province and Territory²

Province/Territory	Policy	Date launched	Target	Areas of Intervention
Quebec	<u>The Will to Act, The Strength To Succeed, National Strategy to Combat Poverty and Social Exclusion</u>	August 2002	To progressively transform Quebec over a ten year period (by 2013) into one of the industrialized societies with the least poverty, according to recognized methods of international comparison.	<ul style="list-style-type: none"> • Early child development • Family programs • Training and employment • Housing • Income security • Social integration • Place-based initiatives
	<u>Quebec's Combat Against Poverty: Government Action Plan for Solidarity and Social Inclusion 2010-2015</u>	June 2010	To progressively provide all citizens with the conditions required for them to live with dignity and with a sufficient standard of living according to international standards, while respecting our society's ability to absorb the costs thereof.	<ul style="list-style-type: none"> • Early child development • Community empowerment • Housing • Family programs • Income security • Training and employment • Social integration • Place-based initiatives
Ontario	<u>Breaking the Cycle: Ontario's Poverty Reduction Strategy</u>	December 2008	To reduce the number of children living in poverty by 25 per cent over the next five years (2015).	<ul style="list-style-type: none"> • Early child development • Family programs • Housing • Training and employment • Review of social assistance

² See http://www.ncchpp.ca/141/publications.ccnpps?id_article=279 for document published in 2009 by the NCCHPP. The updated version of this document has not yet been published.

Reducing Poverty in Canada: Public Policies & Population Health

Province/Territory	Policy	Date launched	Target	Areas of Intervention
New Brunswick	<u>Overcoming Poverty Together: The New Brunswick Economic and Social Inclusion Plan</u>	November 13, 2009	To reduce income poverty by 25% and deep income poverty by 50% by 2015.	<ul style="list-style-type: none"> • Place-based initiatives • Social and economic inclusion • Social assistance • Transportation alternatives • Introduce early learning and childcare Act • Prescription drug program • Develop a comprehensive housing strategy • Social enterprise and community investment funds • Training, education and volunteer opportunities
	<u>Overcoming Poverty Together: The New Brunswick Economic and Social Inclusion Plan 2014-2019</u>	May 16, 2014	To reduce income poverty by 25% and deep income poverty by 50%.	<ul style="list-style-type: none"> • Community development, communication, Networking and volunteerism • Child & youth education • Adult education • Participation in labour market and business activity • Food security • Housing • Transportation
Newfoundland and Labrador	<u>Reducing Poverty: An Action Plan for Newfoundland and Labrador</u>	December 6, 2006	To transform Newfoundland and Labrador from the province with the most poverty to the one with	<ul style="list-style-type: none"> • Aboriginal programs • Justice system supports • Housing • Income security

Reducing Poverty in Canada: Public Policies & Population Health

Province/Territory	Policy	Date launched	Target	Areas of Intervention
			the least, in ten years.	<ul style="list-style-type: none"> • Early child development • Education
Nova Scotia	<u><i>Preventing Poverty, Promoting Prosperity. Nova Scotia's Poverty Reduction Strategy</i></u>	April 3, 2009	None identified	<ul style="list-style-type: none"> • Employment training programs • Review of Income Assistance program • Income security for families • Early child development • Service coordination • Advocate for national anti-poverty strategy and national housing strategy
Manitoba	<u><i>All Aboard: Manitoba's Poverty Reduction Strategy</i></u>	May 21, 2009	None identified	<ul style="list-style-type: none"> • Family programs • Housing • Training and employment • Income support • Service coordination
	<u><i>All Aboard: Manitoba's Poverty Reduction and Social Inclusion Strategy</i></u>	May 2012	None identified	<ul style="list-style-type: none"> • Early childhood development • Family programs • Housing • Training and employment • Place-based initiatives • Opportunities for youth

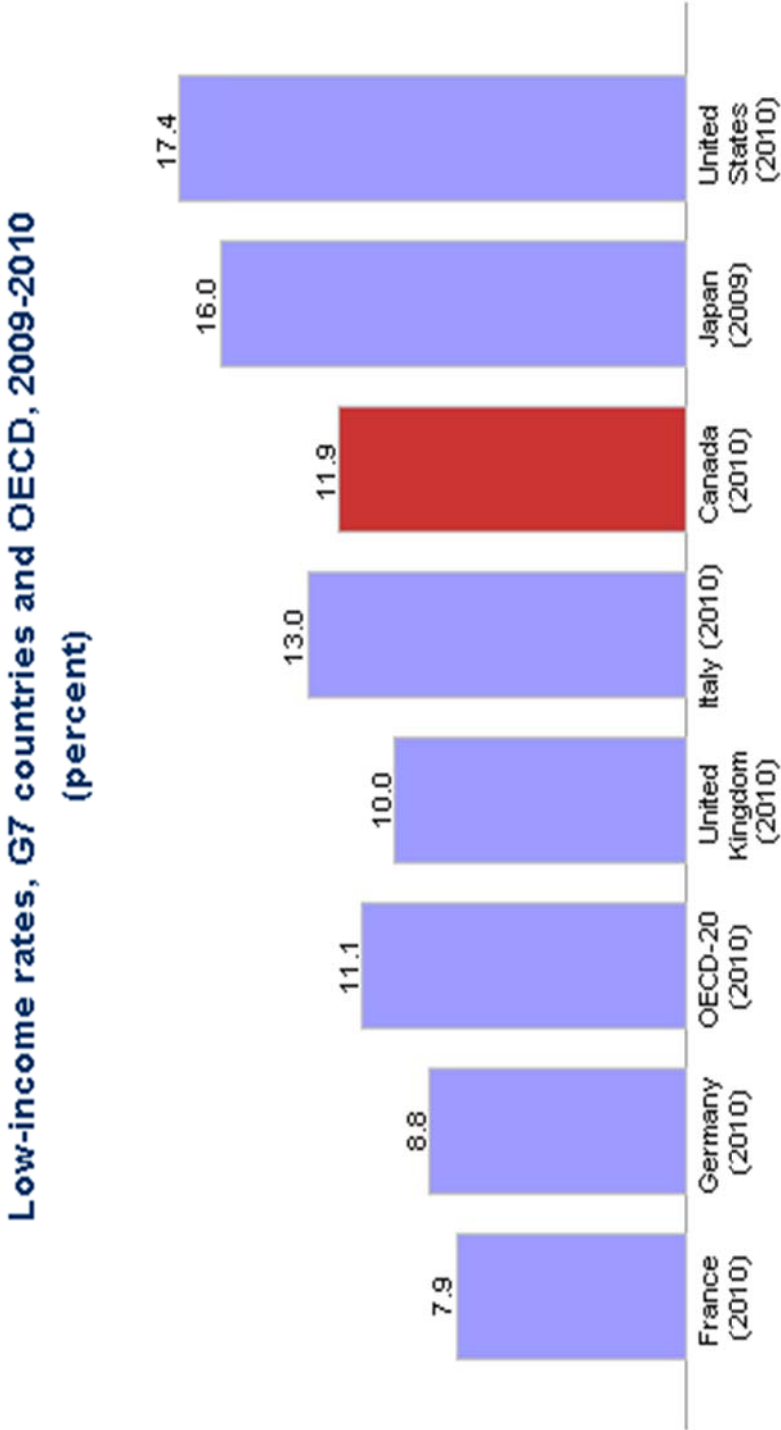
Reducing Poverty in Canada: Public Policies & Population Health

Province/Territory	Policy	Date launched	Target	Areas of Intervention
Nunavut	<u>The Makimanig Plan : A Shared Approach to Poverty Reduction</u>	November 30, 2011	None identified. However, the Nunavut Roundtable for Poverty Reduction identified their vision as "our land, Nunavut, and each of our communities, free of poverty.	<ul style="list-style-type: none"> • Collaboration and community participation • Health and wellbeing • Community and economic development • Education and skills development • Housing and income support • Food security • Childhood development • Parenting skills and family planning • Removal of the welfare wall
Prince Edward Island	<u>Social Action Plan to Reduce Poverty</u>	May 2012	Specific target not identified. However, "the Social Action Plan will work to strengthen our programs, sharpen our focus, and improve the way we provide services in order to reduce poverty in this province."	<ul style="list-style-type: none"> • Housing • Income support • Supports for persons with disability • Employment supports and services • Family supports and services • Seniors
Saskatchewan	<u>From Dependence to Independence: Actions and Investments for Saskatchewan's Most Vulnerable People</u>	Summer 2012	None identified.	<ul style="list-style-type: none"> • Housing and emergency shelters • Education and skills training • Early childhood development and childcare • Community inclusion

Reducing Poverty in Canada: Public Policies & Population Health

Province/Territory	Policy	Date launched	Target	Areas of Intervention
Yukon	<u><i>A Better Yukon for All : Government of Yukon's Social Inclusion and Poverty Reduction Strategy</i></u>	November 2012	To reduce the number of people who experience social exclusion and poverty, while improving the lives of people currently experiencing them.	<ul style="list-style-type: none"> • Sexual assault and family violence supports • Mental health and addictions programs • Services for children and youth with Autism Spectrum Disorder • Services for low-income neighbourhoods and communities
Northwest Territories	<u><i>Government of the Northwest Territories Anti-Poverty Action Plan: Building on the Strengths of Northerners</i></u>	February 2014	None identified.	<ul style="list-style-type: none"> • Early childhood development • Family programs & Food Security • Access to mental health services • Community capacity • Education and training • Housing & Community development • Social programs • Partnerships • Public safety

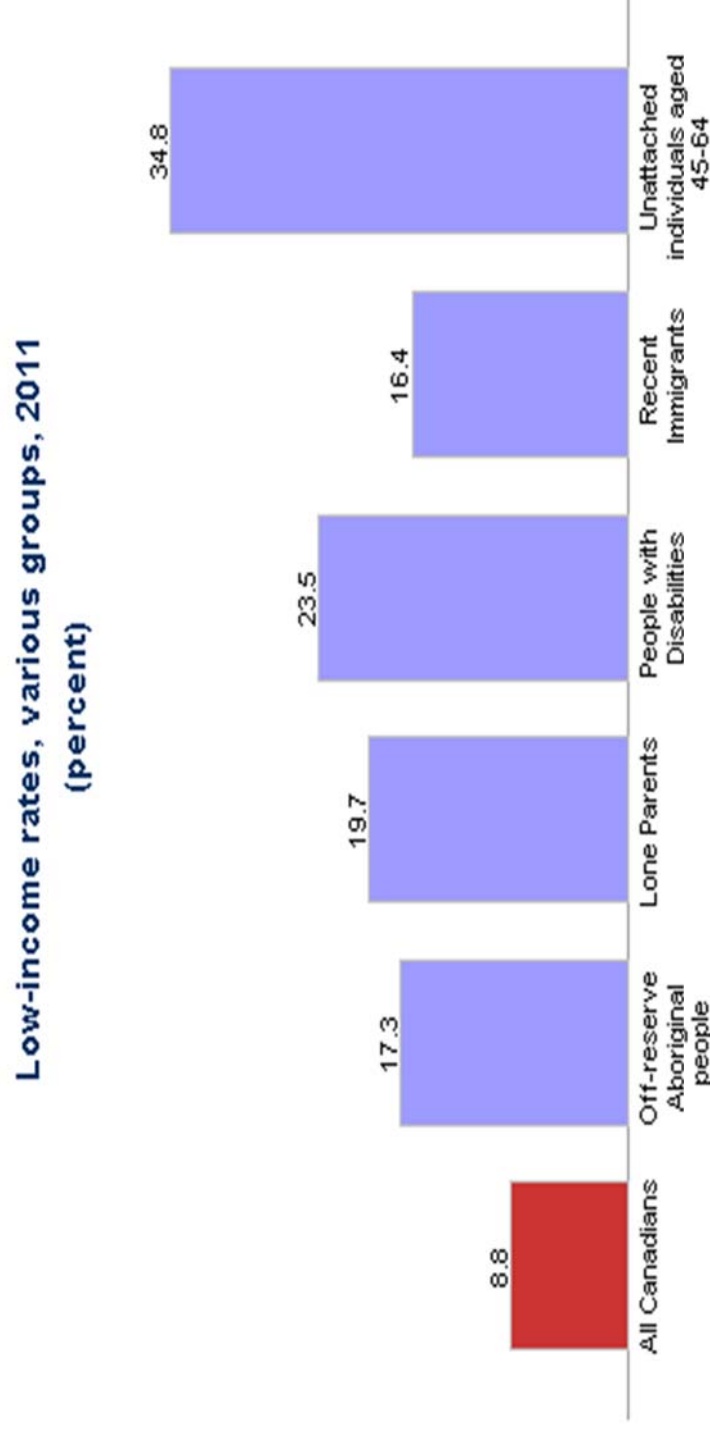
EXHIBIT 5
Low Income Rates within Industrialized Nations



Note: Based on an OECD measure similar to after-tax [LIM](#).

Source: OECD Income Distribution Database (via www.oecd.org/social/income-distribution-database.htm) [cited July 10, 2013].

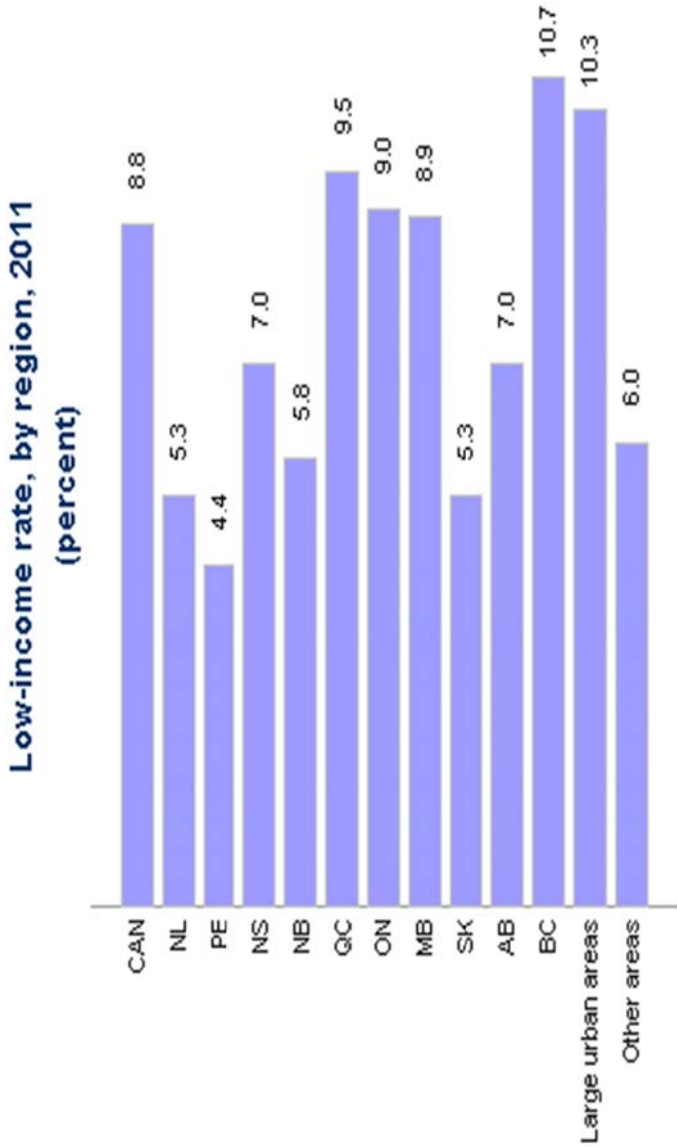
EXHIBIT 6
Population Subgroups Most Affected by Low Income



Note: Based on after-tax [LICOs](#).

Source: Statistics Canada calculations based on Statistics Canada. *Survey of Labour and Income Dynamics*. Ottawa: Statistics Canada, 2013.

EXHIBIT 7
Low Income Rates by Region



Note: Based on after-tax LICOs. The category "Large urban areas" includes the 20 largest Census Metropolitan Areas (CMAs). For the list of areas included in the category 'Large urban areas', see large urban areas. The category 'Other areas' includes all other urban areas as well as the rural communities in Canada.

Source: Statistics Canada. *Table 202-0802 - Persons in low income families, annual*, CANSIM (database).

EXHIBIT 8
Canadians Experiencing Low Income Between 1980 and 2006

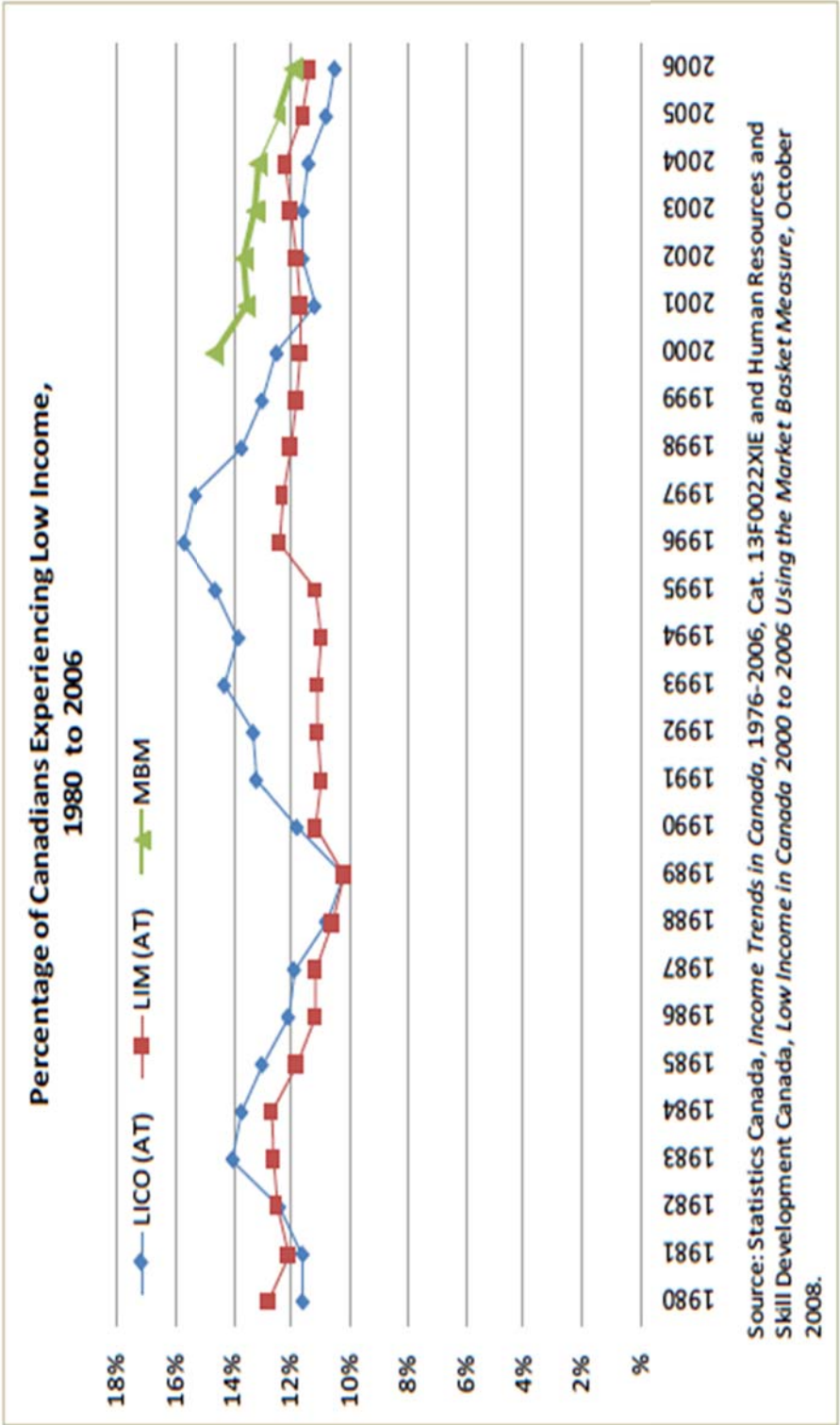


EXHIBIT 9
Trends in Low Income Cut-Offs Between 1976 and 2006

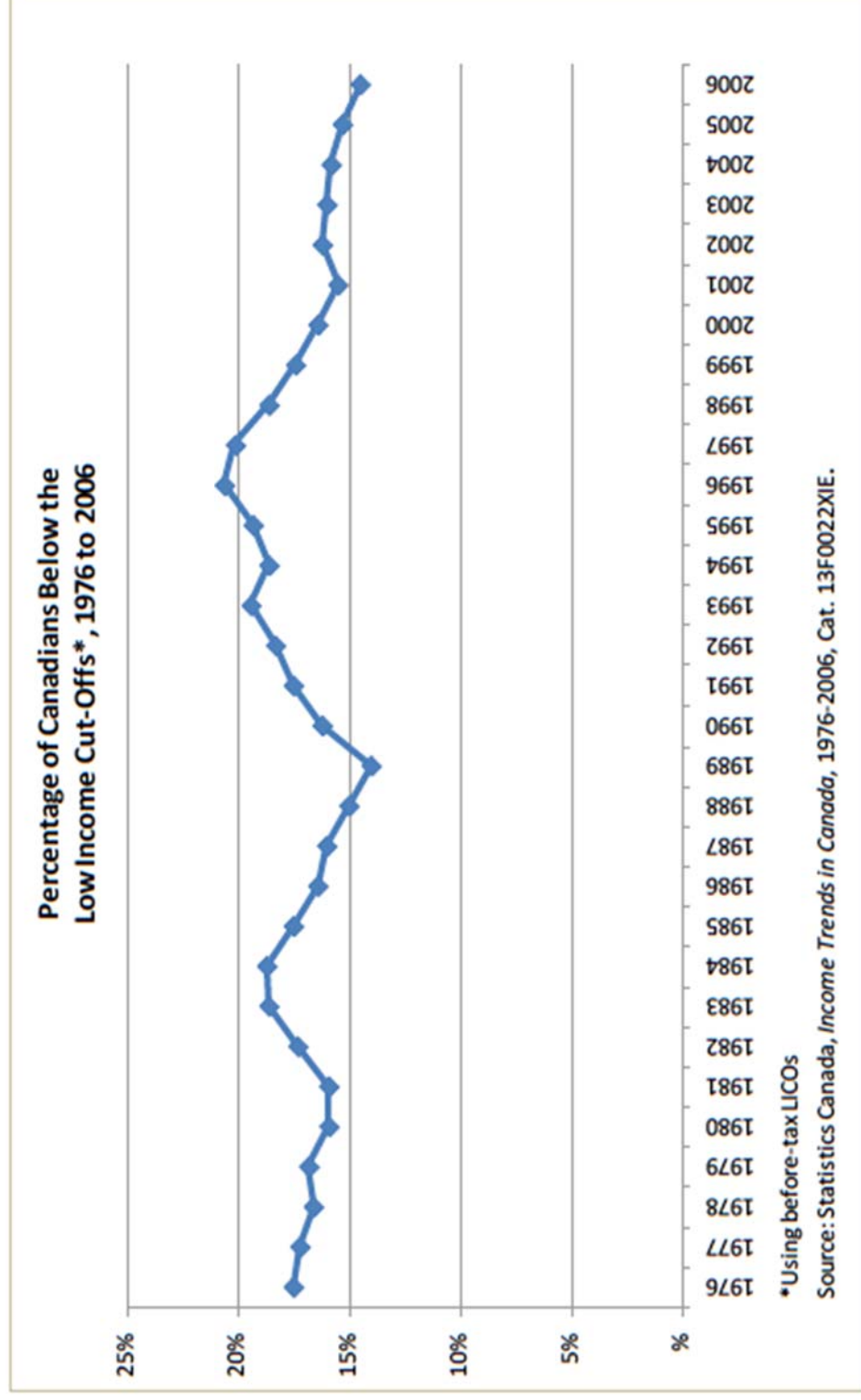


EXHIBIT 10
The Social Determinants of Health

Structural Determinants	Proximal/Intermediate Determinants
Income and Income Distribution	Early Childhood Development
Education	Food Security
Unemployment & Working Conditions	Social Exclusion
Social Safety Network	Aboriginal Status
Health Services	Gender
	Race
Physical Environment (Housing)	Disability

Source: Mikkonen & Raphael, 2010 (for a detailed explanation of each determinant see Association of Faculties of Medicine in Canada, n.d.).

EXHIBIT 11
Relationship Between Social Structures & Health Structures

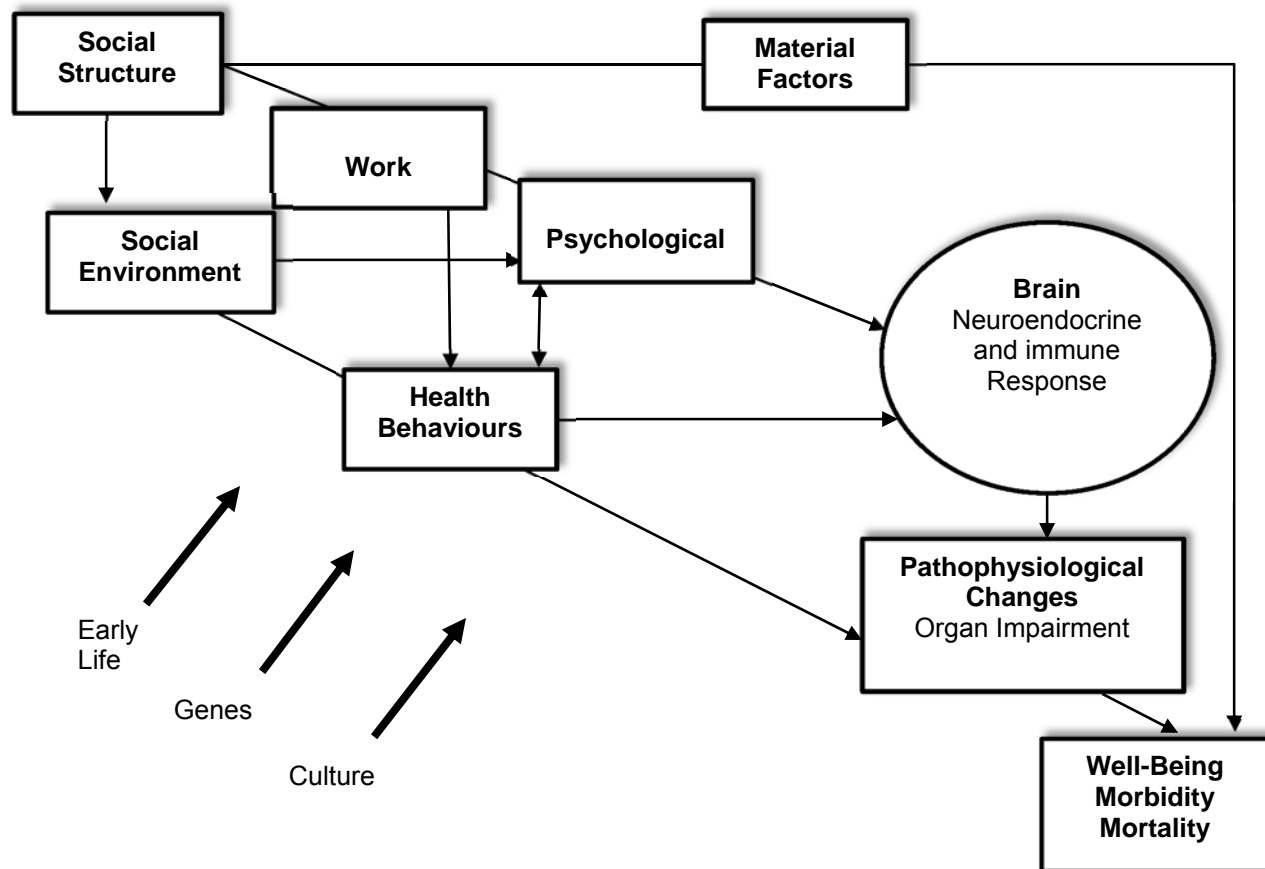


Figure shows how the organization of society influences the living and working conditions we experience that then go onto shape health. These processes operate through material, psychosocial, and behavioural path-ways. At all stages of life, genetics, early life, and cultural factors are also strong influences upon health.

Source: Raphael, 2007, p.242 (by permission of Oxford University Press).

EXHIBIT 12
NCCHPP Validation Questionnaire



Centre de collaboration nationale
sur les politiques publiques et la santé

National Collaborating Centre
for Healthy Public Policy

Document: “Comprehensive policies to combat poverty across Canada, by province and territory”

1. Is the presented information complete?
2. Is there something missing from this document that should be added?
3. Are the relevant facts well-presented? Are they clear?
4. Are there any changes that you would suggest for further clarification/elaboration of the contents?
5. Are there other pertinent resources you would suggest the readers be guided to?

Thank You!

EXHIBIT 13

What Makes a Strategy More Likely to Succeed?

- ***Political commitment***
 - A high level of commitment from politicians and civil servants, providing impetus and leadership to the strategy.
- ***Responsibility and accountability***
 - Less successful strategies often have misconstrued terms of responsibility and accountability for delivery. The establishment targets and timelines provides evidence of such accountability.
- ***Links to economic policy***
 - Anti-poverty policies developed alongside an economic policy have more buy-in
- ***Institutional arrangements***
 - Establishing dedicated institutions or other systems of governance facilitates the development process, while offering security against changes in political leadership
- ***Co-ordination (the all government approach)***
 - Tackling multi-faceted issues such as poverty requires high levels of inter-governmental co-ordination
- ***Implementation***
 - A developed strategy must be put into practice, however there remains large gaps between what is set out in the plan and what is delivered, particularly when moving from the national/provincial scale to local delivery
- ***Involvement of external stakeholders***
 - External stakeholders are a vital source of information and assistance to be involved in the development and implementation of the strategy
- ***An effective monitoring and review system***
 - Performance monitoring is essential for maintaining momentum and ensuring government objectives are being met and are revised as needed. Evaluation of the plan also shows government accountability.

Source: MacInnes et. al., 2014.

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INSTRUCTOR GUIDANCE

Reducing Poverty in Canada: Public Policies & Population Health

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BACKGROUND

The case is aimed at providing students with an overview of the burden of poverty in Canada and the effects of poverty on the health of Canadians. It exposes students to the various definitions of poverty, as well as its measures, including the Gini index, which is an internationally recognized measure of income distribution used to assess overall inequity. While it is challenging to define poverty and identify its multifactorial root causes, the link between poverty and ill-health is stronger. The case exposes students to existing federal, provincial and territorial policies and plans aimed at reducing poverty and supporting low income families. It asks the student to focus on the development and implementation of an innovative poverty reduction plan in British Columbia, one of the Canadian provinces without a provincial poverty reduction strategy.

OBJECTIVES

1. Understand the various measures used to assess poverty.
2. Tease out the links and pathways between poverty and health.
3. Develop a poverty reduction strategy for British Columbia.

DISCUSSION QUESTIONS

1. How is poverty assessed?
 - a. What are the limitations of each method?
2. What are the links between poverty and health?
 - a. What are its direct and indirect effects?
 - b. How does one impact the other and vice-versa?
3. What key elements should a poverty reduction strategy for British Columbia contain?
4. What are the essential elements for a knowledge translation strategy for the implementation of this poverty reduction strategy for British Columbia?

KEYWORDS

Poverty – measurement; healthy public policy; knowledge translation; reduction strategy.

CASE 7

Integration of FP-MNCH Services to Accelerate Reduction of Maternal & Child Deaths: Bangladesh Experience¹

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BACKGROUND

“With the knowledge we now have, especially in the last few years, with the technologies we’ve created and with the rapid progress we’re seeing in places like Bangladesh, Ethiopia, and Rwanda, we know that we can do more to accelerate the global rate of reduction in child mortality dramatically.”

– Dr. Rajiv Shah, Administrator, United States Agency for International Development (USAID).
Briefing on *Global Child Survival Efforts: Every Child Deserves a Fifth Birthday*, Kaiser Family Foundation, April 23, 2012

Women and children are still dying in alarming numbers from preventable causes. Each year, 289,000 women (WHO, 2014) die from pregnancy-related causes and 6.6 million children die before their fifth birthdays – 44 percent of them in their first month of life. These statistics translate to 18,000 children under the age of five and 800 pregnant women or women in childbirth dying every day (UNICEF, 2013). The vast majority of maternal and child deaths are preventable. The disparity between rich and poor nations is still wide. A child born in a low-income country is approximately 18 times more likely to die before the age of five than a child born in a developed country. Over a lifetime, a woman’s risk of dying as a result of pregnancy and child-birth in a low-income country is over 40 times higher than in the United States. With a smart, focused, innovative approach, millions of mothers and their children can be saved, creating ripples of change that transform the future of families and their countries.

On June 25, 2014, the United States Agency for International Development (USAID) and the Governments of Ethiopia and India, in collaboration with United Nations International Children’s Emergency Fund (UNICEF) and the Bill & Melinda Gates Foundation, hosted a ministerial-level forum to celebrate the second anniversary of the *Child Survival Call to Action* and the launch of *Committing to Child Survival: A Promise Renewed*. Involving Ministers of Health from 24 countries, this high-level forum involved assessment of the challenges that remain in reducing preventable child and maternal deaths and identification of the steps needed to sustain momentum in the future.

Ending Preventable Child and Maternal Deaths (EPCMD) by 2035 is one of USAID’s top priority health initiatives. Currently, USAID invests 90 percent of its maternal and child resources in the

¹ The contents are the responsibility of authors and do not necessarily reflect the views of USAID or the United States Government. All information found herein is available in publicly accessible materials.

Integration of FP-MNCH Services to Accelerate Reduction of Maternal & Child Deaths: Bangladesh Experience

24 countries that account for 70 percent of maternal and child deaths in the developing world. During this time period, USAID will extend coverage of proven, high-impact interventions to the most vulnerable populations in these high-burden countries. The EPCMD goals aim to reduce child mortality to 20 or fewer deaths per 1,000 live births by 2035, and maternal mortality to 70 deaths or fewer per 100,000 (USAID, 2014).

As part of these efforts on EPCMD, USAID Administrator Shah requested staff working with priority countries to test and analyze best practices, and to roll them out in all 24 priority countries during 2014. Recently, a rapid assessment was conducted in five of the 24 priority countries to examine the alignment of USAID's health programs with EPCMD goals, and within the context of evidence-based, costed national plans. The assessments examined the association between USAID planning, resource allocation, execution, the broader donor landscape, the involvement of all country actors, and the potential of "lives saved". Based on the assessment report, Bangladesh was selected as a high-performing country for the following reasons:

- Bangladesh has already achieved Millennium Development Goals (MDG) 4² and is on track to reach MDG 5³. The country has made remarkable progress in reducing maternal, neonatal, and child deaths over the last 20 years;
- Country commitment and Government of Bangladesh leadership have been essential in USAID's efforts to improve maternal, neonatal, and child health, particularly in bringing proven interventions to scale, such as integrated Family Planning-Maternal, Neonatal, Child Health (FP-MNCH) services; and
- Bangladesh has been leveraging government and donor resources to accelerate efforts to end preventable child and maternal deaths (USAID, 2014).

Yasmin Ara, the Project Management Specialist who led the FP-MNCH activities in Bangladesh, was requested to travel to the neighbouring country of Pakistan to assist in their MNCH efforts. She was assigned to lead the overall assessment of the health sector to help the country formulate their strategy for achieving the EPCMD goals. After she arrived in Lahore, she prepared for her first meeting with the Ministry of Health. She remembered the hard work that she and her colleagues both at USAID and the Ministry of Health of Bangladesh did to improve maternal and child health status in Bangladesh. She reflected on the dedication of her team, whose relentless commitment ensured the positive changes in the sector.

It was a great reward for Yasmin Ara and her team that through their efforts, Bangladesh had already achieved MDG 4 and was on the verge of achieving MDG 5. The EPCMD Beta Test team applauded their work. Now, it was time for Yasmin Ara to share her experiences with Pakistan and help them in planning strategies to reduce maternal and child deaths. It was expected that the Bangladesh experience could identify best practices for countries to adapt as they reached the same level of performance. USAID was now planning to replicate the lessons learned and best practices from Bangladesh in countries that were facing ongoing challenges in meeting the goal of accelerating mortality reductions. The major driving force identified as the key to Bangladesh's success was the scaling-up of integrated FP-MNCH services to increase access and expand reach for the target populations.

² Reduce Child Mortality

³ Improve Maternal Health

BACKGROUND: BANGLADESH ACHIEVEMENTS

Bangladesh has made remarkable development progress over the last decade, with rapid increases in literacy and life expectancy at birth, expanded child immunization resulting in over 90% coverage, a continued decline in infant and child mortality, and a sharp decline of maternal mortality ratio (MMR) to 194 deaths per 100,000 live births (see Exhibit 1). The 2011 MDG Report rightly applauded Bangladesh's noteworthy progress in achieving MDGs 3, 4, and 5 (UN, 2013). In terms of health services delivery, antenatal care visits for pregnant women by medically trained providers increased from 33% in 1999-2000 to 55% in 2011, and deliveries performed by medically trained providers went from 12% to 32% during the same period. This increase in deliveries accompanied by skilled personnel was predominantly due to a rise in facility deliveries, which went from 8% to 29% from 1999-2011 (National Institute for Population Research and Training, 2011).

Bangladesh also demonstrated substantial progress in implementing an effective family planning program. Bangladesh is well known for its strong Government commitment and civil society support resulting in notable progress over the years in expanding and strengthening its National Family Planning (FP) Program. The Health, Population and Nutrition Sector Development Program Strategy (HPNSDP) 2011-2016 from the Ministry of Health and Family Welfare (MOHFW) clearly demonstrates this strong commitment to its strategies, program components and activities, and budget for the national family planning program. The decline in total fertility rate (TFR) and increase in contraceptive prevalence rate (CPR) is commendable. The reduction in the TFR from 6.3 births per woman in 1975 to 3.4 in 1994, and further decline to the current rate of 2.3 in 2011 (NIPORT, 2011) is expected to lead Bangladesh to reach the fertility level of 2.0 children per woman by 2016 (see Exhibit 2). The increase in skilled delivery, coupled with the reduction in fertility, has resulted in a 40% reduction in the MMR from 320 in 2001 to 194 in 2010 (NIPORT, 2011).

Gradual improvement in basic health and nutrition services also contributed to a substantial reduction of the under-five mortality rate (from 94 deaths per 1000 live births in 1999-2000 to 53 in 2011) (see Exhibit 3), an accomplishment for which Bangladesh received the United Nations MDG Award in 2010.

EVOLUTION AND GROWTH OF PRIMARY HEALTH CARE AS AN INTEGRATED HEALTH SYSTEM

In 1973, the executive board of the World Health Organization (WHO) recommended a strategy to respond to the need for basic health services. This strategy was the foundation for the Alma-Ata declaration on Primary Health Care in 1978. The declaration advanced from merely administrative coordination of health services to a health systems perspective, which emphasized the interrelationship of all the components of a system, including the individual, family, and community (WHO, 2008).

The main intended outcomes of integration listed by WHO are improved efficiency, increased quality of health services, and better health status overall. It is expected that a wider range of services can be offered through integration, thus reducing differences in access and utilization of health services between geographic and socio-economic groups, leading to greater equity (WHO, 1996). This increased convenience for health service users leads to their increased satisfaction. Satisfied clients are more likely to access services when in need, and adhere to treatment plans and preventive measures recommended by health care providers. Integrated services are more likely to improve health overall, while ensuring long-term sustainability than vertical programs (see Exhibit 4; WHO 1996). This integrated strategy informed the development of primary health care services in Bangladesh.

ADVANTAGES OF PROVIDING FP-MNCH TOGETHER

Integrating FP and MNCH services typically means offering women a broad set of family planning and maternal and child health services during the same appointment, at the same service delivery site, and from the same provider. WHO focuses on integrated health services as a way for people to “get the care they need, when they need it, in ways that are user-friendly, achieve the desired results, and provide value for money.” By accessing FP and MNCH services together, women are able to use their time efficiently and productively. The following are ways in which integrated FP-MNCH services improve maternal health status and reduce child mortality (Population Reference Bureau, 2011):

- *Lengthening the interval between pregnancies:* One rigorous study, based on over 1 million births, found that if all women waited 36 months after a live birth before becoming pregnant again, the deaths of an estimated 1.8 million children under 5 years of age would be prevented.
- *Reducing the number of high-risk pregnancies:* Helping women avoid pregnancies that occur too frequently, or too early or late in life, reduces deaths and disabilities among women and children, and saves health and social service expenditures.
- *Ensuring health services are offered in an efficient and cost-effective way:* Numerous costing studies have demonstrated that a single, multipurpose FP-MNCH visit can save the health system money by using common space, reducing staff costs, and lowering overhead. Broadening skills of personnel helps ease the shortage of health workers.
- *Improving women’s lives and satisfaction with services:* When women obtain different types of care in one visit, they reduce the travel time and expenses of multiple visits and have more time to be productive.

Some countries have found that the path to economic growth and development is enhanced by providing family planning (FP) together with maternal, newborn, and child health (MNCH) care. This integrated approach covers the spectrum of health services women seek for themselves (before, during, and after pregnancy) and for their children. Offering these services together is a cost-effective way to prevent unintended pregnancy while providing other needed health services for a large number of women, thereby contributing to a healthier population overall (Population Reference Bureau, 2011).

BANGLADESH GOVERNMENT’S EFFORT IN INTEGRATION OF SERVICES

The 2013 Lancet Series on Bangladesh identified factors for health sector successes in Bangladesh including engagement of various stakeholders (i.e. government and non-governmental organizations), and having women-focused, equity-oriented, and nationally targeted integrated programs. Among all other approaches, the Government of Bangladesh has prioritized the provision of integrated services to women and children (Chowdhury et al., 2013). The integration of services gained momentum in 1997 as a strategy for deriving greater impact from health resources and systems including cost-effective use of limited resources, streamlined care for patients, increased reach and efficiency of health programs and services, and improved funding for the health sector. Bangladesh offered integrated services to its citizens both through grass-roots level health clinics and employing female health workers trained in delivering integrated services at the household level.

In Bangladesh, integration is aimed at improving service in relation to efficiency and quality, thereby maximizing use of resources and opportunities. A primary health care unit in Bangladesh is expected to be able to: provide preventive care (using staff, procedures, and drugs); deliver vaccines (with effective cold chains, immunization schedules, and information

Integration of FP-MNCH Services to Accelerate Reduction of Maternal & Child Deaths: Bangladesh Experience

systems to ensure coverage); scale-up high-impact interventions (to reduce maternal and child deaths through pre-natal and post-natal services); and provide reproductive health services (requiring expertise in family planning methods, skills in advising people, treatment of sexually transmitted diseases, and provision of effective follow up). The primary health care services in Bangladesh, both preventive and curative, are delivered in a package called the “Essential Services Package (ESP)”. Strategies to promote integration include managing the services together to maximize efficiency, and delivering services together, to increase service access and quality.

The Bangladesh Government, as well as the country’s Non-Governmental Organization (NGO) sector, prioritized the availability of integrated services for women and children at all levels of the health system in order to achieve their primary goals in the health sector. Strategies that have allowed these sectors to develop integrated health services include planning and budgeting, organization of health services, staffing, training, supervision, and logistics.

Bangladesh’s Ministry of Health and Family Welfare (MOHFW) is responsible for the implementation, management, coordination, and regulation of national health and family planning related activities, programs, and policies. The Directorate General of Health Services (DGHS) and the Directorate General of Family Planning (DGFP) are the two main service-providing agencies, through which MOHFW implements its programs.

There have been several attempts to unify DGHS and DGFP to provide integrated services at the field level. While this unification has not occurred at the central level, functional integration has occurred at the field implementation level. At the central level, FP and general health commodities (i.e. vaccines, life-saving drugs, and contraceptives) are being managed by two different directorates. Management Information Systems (MIS) are also being used in a fragmented way, resulting in duplication in several respects. Under the Program Implementation Plan (PIP) of the MOHFW sector program (Health, Population, Nutrition Sector Development Program - HPNSDP), there are 32 separate Operational Plans (OP) of which two different OPs include Maternal Neonatal Child, Adolescent, and Reproductive Health (MNCARH) components under two different directorates. Service providers from two directorates are considered to be separate cadres and provide services from separate outlets affiliated with either DGFP or DGHS.

The Bangladesh government has established Community Clinics at the village level to extend primary health care to the doorstep of rural people all over Bangladesh. These community clinics (one per 6,000 population) provide integrated primary health care through a range of services including health education (on health, nutrition, and FP), health promotion, treatment of minor ailments, supply of FP commodities, first aid, ANC (Antenatal Care), PNC (Postnatal Care), and identification of emergency and complicated cases that will be transferred through an effective referral linkage with higher facilities (i.e., Union Health and Family Welfare Center [UH and FWC] and Upazila Health Complex [UHC]) for better management.

Though integration has not been fully accomplished at the central and policy level, at the field implementation level functionally integrated services are available to address the needs of the target population. A Family Welfare Visitor (FWV) provides a wide range of family planning and maternal health services from UH and FWC and a Sub-assistant Community Medical Officer (SACMO) provides child health services and treatment for common ailments. The Upazila Health Complexes (UHCs) and District Hospitals (DHs) offer a wide range of services in a more integrated fashion. Considering the structure and mode of service delivery on the ground, it can be stated that successful functional integration has been possible in Bangladesh despite the

Integration of FP-MNCH Services to Accelerate Reduction of Maternal & Child Deaths: Bangladesh Experience

structurally bifurcated directorates at the central level. This integration has ensured improved access, equity, and service effectiveness.

Moreover, the Bangladesh Government fosters a culture of partnership in achieving health sector goals. To complement the Bangladesh Government's primary health care programs, NGOs are invited to participate in service delivery. By virtue of more decentralized policy and planning practices of NGOs, it is easier for them to design and implement integrated services. More recently, the private sector has also been an active partner in the health sector. Both NGOs and the private sector benefit from autonomy within a regulatory framework set by the government.

USAID'S RESPONSE TO BANGLADESH'S HEALTH SECTOR PRIORITIES

Evolution of an Integrated Service Delivery Project: Smiling Sun Network

Historically, USAID has provided financial and technical support to NGOs in the health sector to complement the Bangladesh Government's overall plan and to participate in health programming. As a part of the agreement with the Bangladesh Government, USAID launched two NGO-supported projects: the Rural Service Delivery Project (RSDP) and the Urban Family Health Partnership (UFHP) in 1997. The primary purpose of these projects was to improve the service delivery of health and population programs by providing integrated services with a client-centered approach. In an effort to better integrate and manage the health and population services provided by NGOs, the NGO Service Delivery Project (NSDP) was created in 2002 by uniting RSDP and UFHP. Subsequent to NSDP, USAID launched the Bangladesh Smiling Sun Franchise Program (SSFP) in 2007, which collaborated with a network of 26 NGOs to provide high-quality health services. In 2012, the current service delivery project (NGO Health Service Delivery Program) was launched continuing the objective of making integrated services available through 334 static clinics widely known as Smiling Sun clinics and 10,000 satellite sessions in all 64 districts.

For the past 17 years, the USAID Bangladesh Mission (USAID/B) has contributed to the largest investment in the health sector by responding to the Government of Bangladesh's (GOB) priorities. The package of services that has been provided through the network of Smiling Sun clinics is GOB's "Essential Services Package (ESP)." While designing these projects, USAID/B ensured that the clinics served as one-stop service centers offering a continuum of care. Every effort has been employed to popularize these clinics for getting services for all family members. USAID/B worked to ensure that high impact interventions are delivered through an integrated service delivery model. Subsequent evaluation reports of these projects revealed that service contacts continuously increased from 1997 to 2011. Unlike the GOB, the project is using a unified Management Information System and central procurement to ensure all commodities are available at the service delivery points.

Evaluation reports from the service delivery projects have covered almost all of the key outcome areas, especially coverage and access, service use and uptake, and equity. Evaluations have been designed based on the projects' specific objectives, thus, some outcomes regarding integrated service perspectives were not measured. For almost all services, uptake has increased over time, as has the range of services offered by those clinics. Family planning service has always been a priority for Smiling Sun clinics (Lance, Angeles, & Kamal, 2012). Different components of maternal health services, child health services, and communicable diseases have been added with time. For example, ANC and PNC were major services available from Smiling Sun clinics from 1997, but Emergency Obstetric Care (EmOC) was added in response to client needs; currently 56 clinics have been providing EmOC services in

Integration of FP-MNCH Services to Accelerate Reduction of Maternal & Child Deaths: Bangladesh Experience

the Smiling Sun clinics network. Doctors and Paramedics are the service providers at the static and satellite clinic level. Community Service Providers (CSPs) provide non-clinical family planning services and commodities, as well as Community-Integrated Management of Childhood Illness (C-IMCI) for children at their homes. Responding to the cultural preference of women wanting to deliver at home, Smiling Sun clinics also designed a community skilled birth attendants program to ensure skilled attendance at home births. The project has always taken a client-centered approach to ensure client satisfaction and better reach.

Other unique approaches that the project followed are engagement of the private sector, identification and prioritization of population sub-groups from lower quintiles to address equity issues, setting-up a rigorous quality assurance process, and an inclusive monitoring and evaluation system.

MaMoni: Integrated Safe Motherhood, Infant Care, and Nutrition Project

The MaMoni project was implemented from 2009 to 2013 through the Maternal and Child Health Integrated Program (MCHIP). The design of the project was based on the findings and experiences from a randomized controlled trial known as Projahnmo (2001-2006) and ACCESS (2006-2009). MaMoni aimed to increase the use of high-impact maternal and newborn health (MNH) behaviours, including family planning, and to strengthen the Ministry of Health and Family Welfare (MOH and FW) systems to provide quality FP-MNCH services. The project worked in two under-performing districts in Bangladesh. With the progression of the project, many components have been added to integrate services to meet client needs. During the Projahnmo project period, the only focus was on newborn health, while the ACCESS phase included FP and MNCH components. The current phase of the project, launched in 2012, named MaMoni-Health Systems Strengthening (HSS), includes HSS components with service delivery options and scaling-up evidence-based interventions such as Antenatal Corticosteroids (ACS), Chlorhexidine (CHX), antibiotics to manage newborn infection, MagSo4, Misoprostol, etc. MaMoni also successfully implemented task shifting and customized district planning in the Government of Bangladesh's service delivery centers.

The overall objective of MaMoni is “increased and sustained practice of high impact maternal and neonatal behaviors and use of services during the antenatal, childbirth, and postnatal periods, including increased use of modern family planning methods.” During the planning and implementation phases, MaMoni focused on both technical integration and functional integration among existing structures (see Exhibit 5).

For the technical integration, the project focused on continuum of care. As soon as a pregnancy was identified in the community, the mother was entitled and enrolled for all FPMNCH-N interventions as per her pregnancy and post-pregnancy health needs, until the child's first birthday (see Exhibit 6).

The achievements of the project were demonstrated by increased use of antenatal care (ANC), deliveries with a skilled birth attendant, referrals for complications, PNC, and FP, including long-acting and permanent methods (LAPM). The evaluation results showed that:

- Deliveries in the upgraded Family Welfare Centers have significantly increased, as evidenced by more than 50% of all the deliveries in the seven unions being attended by skilled attendants and the majority of deliveries taking place at upgraded facilities. In addition, private Community Skilled Birth Attendants conducted 38% of all the deliveries in the very remote areas where no other trained providers were available;

Integration of FP-MNCH Services to Accelerate Reduction of Maternal & Child Deaths: Bangladesh Experience

- MaMoni developed an extensive system for referral from the village to the District Hospitals (DH). As a result, there has been a six fold increase in maternal referrals to the DH as well as increased newborn referrals; and
- There has been a modest increase in use of injectables. LAPM uptake has been sporadic, due to a reliance on availability of trained service providers, but the average monthly case-load has increased.

The data indicate that MaMoni has been very successful, resulting in significant increases in the use of key MNCH services and exceeding many projected targets (USAID, 2013).

An Operations Research: Healthy Fertility Study (HFS)

USAID/B launched a program of “operations research to address unmet need for contraception in the postpartum period in Sylhet District, Bangladesh” in 2007, also known as the “Healthy Fertility Study (HFS)”. The study developed and tested an integrated FP-MNCH service delivery approach in the rural settings of Bangladesh. It also assessed the strengths and limitations of integrating FP into an ongoing community-based MNH care program.

Under the study, the effectiveness of FP-MNCH integration was assessed in three critical ways: 1) use of contraceptives; 2) impact on birth spacing behaviours; and 3) impact of HFS activities on newborn care practices. The study enrolled 4,505 pregnant women and followed them for 36 months post-partum. The study findings demonstrated effectiveness of the interventions in following ways:

- **Contraceptive Use**
HFS activities were associated with a 27% increase in contraceptive uptake in the intervention arm from 18% at baseline to 45% at 36 months postpartum.
- **Birth-to-pregnancy Intervals**
During the 36 months of postpartum observation, HFS activities were associated with a 21% reduction in the cumulative probability of postpartum pregnancy after the delivery of the index child. Findings indicate that by 36 months postpartum, 47% of women in the intervention area became pregnant compared to 56% in the control area. In addition to significant declines in pregnancy incidence, the hazards of shorter birth intervals were reduced by 21%.
- **Health Impact**
A major concern of an integrated health program is that the process may overload the health workers with added tasks that may compromise the performance of health workers and thus adversely affect the main program. As part of the efforts to evaluate the adverse effects of integration, data analyses sought to determine the differences in neonatal and infant mortality rates. The neonatal mortality rates (deaths within 28 days of birth per 1,000 live births) were not significantly different by study arm (37 per 1,000 live births in the intervention area versus 35 in the control area) and as such, no adverse consequences on health impact were observed. The study also examined the positive impact of FP integration with the MNCH program by the difference in pre-term and Low Birth Weight (LBW) of subsequent births. Findings suggested that odds of preterm birth outcomes were 20% lower in the intervention area compared to the control area, but the finding was marginally significant. Among contraceptive methods, Lactational Amenorrhoea Method (LAM) was an important method of contraception at three and six months postpartum in the

Integration of FP-MNCH Services to Accelerate Reduction of Maternal & Child Deaths: Bangladesh Experience

intervention area. Breastfeeding practices were improved because of the introduction of LAM.

- **Feasibility**

Study findings suggest that the integration of FP services into a community-based MNH service delivery platform is feasible and effective without undermining or reducing coverage of MNH interventions. The overall coverage remained high in both intervention and control areas, exceeding 70% for the majority of visits. Finally, coverage for the additional HFS postpartum visits at months two or three and four or five was 63% and 73%, respectively.

The findings of this operations research demonstrated that integration of services is possible even at the community level and that integrated services ensure broader and positive health outcomes (USAID, 2012). These findings have been used in designing other projects under the Office of Population, Health, Nutrition and Education portfolio.

Overall Achievements of USAID-Funded (Exhibit 7) Integrated Projects

Evaluations were conducted for all phases of the Smiling Sun project and MaMoni. The results demonstrated that the projects were successful in:

- Expanding access to and coverage of services per client contact;
- Increasing use of services and improved behavioural outcomes;
- Decreasing costs per visit or per service, and increased cost-effectiveness;
- Guaranteeing more timely and improved quality and continuity of services delivered, resulting in better patient care;
- Ensuring more family-centered care responsive to multiple client needs leading to greater provider and client satisfaction with services;
- Confirming more efficient use of existing resources by reducing fragmentation and duplication; and
- Ensuring improved equity and increased sustainability of effects through improved health system strengthening.

LESSONS LEARNED FROM INTEGRATION IN USAID-SUPPORTED PROJECTS IN BANGLADESH

These lessons are pulled from decades of experience in implementing integrated service delivery projects in Bangladesh as well as evaluations and project reports:

- **Country Ownership and Government's Endorsement:** Despite a huge population to serve with limited resources, the Bangladesh Government remained focused on ensuring health services are available for all. The GOB put tremendous effort into establishing a network of service delivery outlets for both urban and rural areas. Historically, the GOB worked very closely with development partners while designing and implementing health strategies. The GOB recognized and valued the contributions that the NGO and private sector made to achieve overall health goals. In the five-year sector development program (2011-2016), the GOB clearly identified the contributions of NGOs and the private sector, including in the annual program reviews (Government of the People's Republic of Bangladesh, 2011). Through documented strategic directions, guidelines, and accountability for reporting, the GOB helps NGOs and the private sector excel in their performance. USAID-supported NGO programs were not an exception (HPNSDP and Annual Program Review (APR)).

Integration of FP-MNCH Services to Accelerate Reduction of Maternal & Child Deaths: Bangladesh Experience

- **Partnership and Coordination:** There is a strong partnership within the development community in Bangladesh, fully committed to supporting the MOHFW's health development programs that focus on goals, including the health-related MDGs. In line with the "Paris Declaration on Aid Effectiveness, 2005", efforts are being made in the country to harmonize donor support and its alignment with national plans and strategies. Coordination mechanisms, such as the Local Consultative Group (LCG) and the HPNPSP Consortium, as well as specific Steering Committees in some areas, are in place to improve aid effectiveness. The assistance from the development partners over the last decade has consistently been in the range of 30% to 40% of the health, nutrition, and population sector expenditure. USAID invests in the Bangladesh Health Sector Program through Development Objective Agreement (DOAG) and a Single Donor Trust Fund and plays a leadership role in LCG.

Effective coordination and collaboration was fostered among Governments and the private sectors. USAID/B has maintained a stable relationship with the GoB and through its projects has coordinated with the private sector. The Smiling Sun network created partnerships with pharmaceutical companies, cell phone companies, banks, and many others to expand their services to the hard-to-reach population. The MaMoni project partnered with private sector agencies like Unilever, Laredal Foundation, Venture Strategies Innovation (VSI), Korean Broadcasting Agency, and other donor and professional associations, to maximize the output of the project.

- **Leadership and Policy Support:** The Government of Bangladesh has been an active partner in planning and implementing USAID/B's development programs. USAID's new Country Development Cooperation Strategy (CDCS) for Bangladesh follows in the tradition of partnership. Over the next five years, USAID will support the GOB's plans to transform its economy to achieve Bangladesh's ambitious vision of becoming a middle income country by 2021. The results framework of Development Objective 3 (DO3) reflects the logical relationship of USAID/B's efforts to increase access to quality health services while strengthening health systems. DO3's development hypothesis is: If all Bangladeshis have access to quality health services at an affordable cost and are aware of the benefits of using these services, they will use these services, leading to improved health outcomes. Strengthened health systems are integral to ensuring access to quality and sustainable service provision. USAID/BCDCS is based on Government of Bangladesh designed national plans, including the Sixth Five-Year Plan for 2011–2015.
- **Continuity:** A tradition of follow-up activities have been observed over the past few decades for USAID/B. Projects were closely followed-up and monitored for effective implementation and achievement of desired goals. Whenever follow-up projects were designed, gaps were scrutinized and a critical analysis of challenges faced by the predecessor project was conducted. USAID/B was also always responsive to the host government's direction and needs. As examples, the mission's current service delivery and health systems strengthening projects evolved from separate initiatives into integrated service delivery projects.
- **Availability of Funds:** The Health Population and Nutrition Sector Development Program (HPNSDP) has been initiated by the Ministry of Health and Family Welfare (MOHFW), Government of Bangladesh for a period of five years, from July 2011 to June 2016. The total estimated budget for the sector program is \$7.7 billion, with the Government's contribution at 76% and the Development Partner's contribution at 24%. The GOB's commitment to improve the health status of the citizens is clearly reflected in the budget. In terms of USAID-

Integration of FP-MNCH Services to Accelerate Reduction of Maternal & Child Deaths: Bangladesh Experience

supported projects, historically both MCH (Maternal and Child Health) and FPRH funds were available and have increased for Bangladesh over the past two decades.

- **Continuum of Care:** USAID-funded projects in Bangladesh always focused on ensuring the continuum of care for the targeted population to ensure better health outcomes. Continuum of care is ensured through service delivery for mothers and children from pre-pregnancy to delivery, the immediate postnatal period, and childhood. Services are provided for families and communities, through outpatient services, clinics and other health facilities. MaMoni's integrated model (Exhibit 6) is completely aligned with the WHO model of integration (Exhibit 8).
- **Local Adaptation of Integration Model:** Integration has been defined as “the organization, coordination, and management of multiple activities and resources to ensure the delivery of more efficient and coherent services in relation to cost, output, impact, and use (acceptability)” (USAID, n.d.). While designing and implementing project activities, several adjustments have been made in USAID-funded projects to comply with country policy and to satisfy local needs. The flexibility supported the achievement of better results from the integrated projects. In the Smiling Sun network, services were added over time, (e.g. maternal health, child health, and communicable disease services with family planning) to make it more integrated. Through changes made in different phases of the MaMoni and HSS project, the project's current evolution supports FP-MNCH-N (Nutrition) services delivered in primary health care centers. Findings and lessons learned from Healthy Fertility Study (HFS) were adopted both by Smiling Sun network and MaMoni projects.
- **Data-based Decision Making:** USAID/B carefully examined results of impact evaluation prior to project design, recognizing its integral part of the planning process. Concrete efforts are taken by projects to strengthen the Health Management Information System (HMIS) and build capacity of the MOHFW managers to ensure the availability and analytics use of real time data in planning. The mission has a monitoring and evaluation advisor dedicated to the Office of Population, Health, Nutrition and Education, who has fostered the capacity of project managers to ensure data quality and use for decision-making. Demographic Health Surveys have been conducted regularly in intervals of three years, which served as the basis of project planning and prioritization.

The 24 EPCMD priority countries can also advance support for FP-MNCH integration by considering the following aspects:

- Evidence suggests that offering FP and MNCH services together saves money and can address health needs. With the aim of providing integrated services, countries need to support additional training for workers and volunteers, as well as adapt health facilities to provide services in an integrated fashion.
- Assessment of current systems is another essential element of providing integrated services. Shifting to integrated services requires careful planning and assessment of the costs and other resources such as changes in policies, training, supervision, management, logistics, and management information systems.
- In terms of scarcity of service providers, especially in rural and hard-to-reach areas, task shifting can help achieve the project goals of making services accessible to the target population.
- It was evident that working with the private sector and NGOs to expand access to health services was successful in different countries, including in Bangladesh.

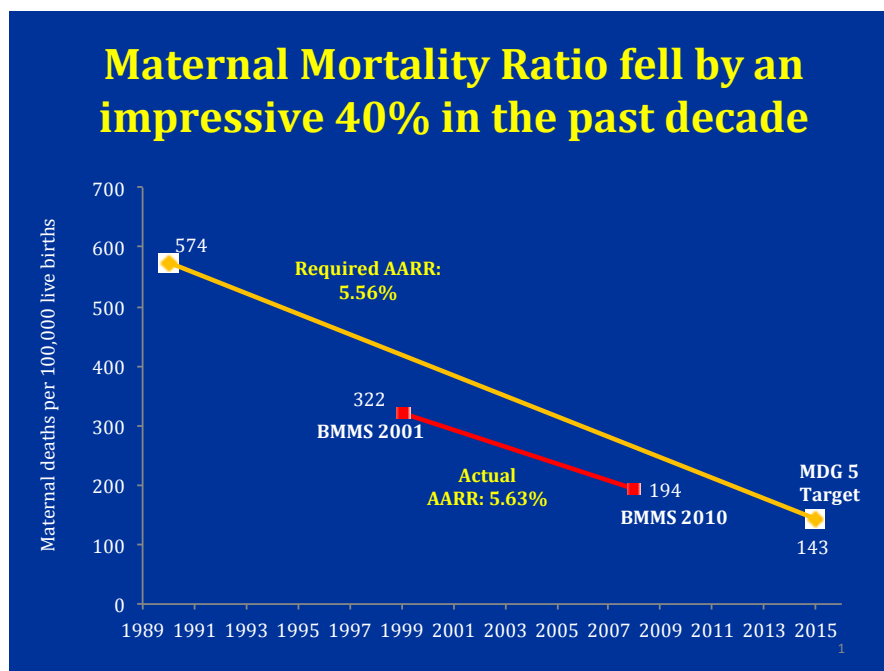
Integration of FP-MNCH Services to Accelerate Reduction of Maternal & Child Deaths: Bangladesh Experience

- Globally, women and children from lower wealth quintiles are less likely to access services compared to their wealthier counterparts. Integrated programs need to be designed to address cost barriers to ensure equity.
- Integrated projects require appropriate indicators for tracking implementation and evaluating the impacts of integrated services.

To achieve EPCMD goals, one strategy that countries can follow based on the Bangladesh example is to implement integrated services to reach women and children. In that case, countries need to ask the following key questions for designing effective models of integrated services:

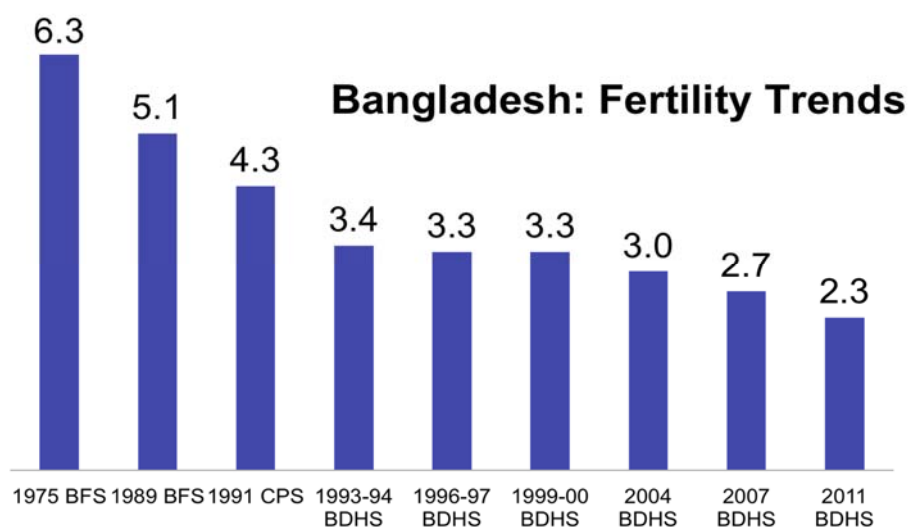
- To what extent is a supportive policy environment in place to facilitate integration?
- To what extent are programs being consolidated to achieve better outcomes at lower cost?
- To what extent are health system support strategies being managed to support integrated service delivery and healthy behaviours in the home?
- To what extent have services been integrated to expand access, improve quality, lower costs, and respond to client needs?
- To what extent are families adopting healthy behaviours to safeguard their well-being and improve their quality of life?

EXHIBIT 1
Maternal Mortality Reduction in Bangladesh



Data Source: NIPORT, 2010; graph created by author.

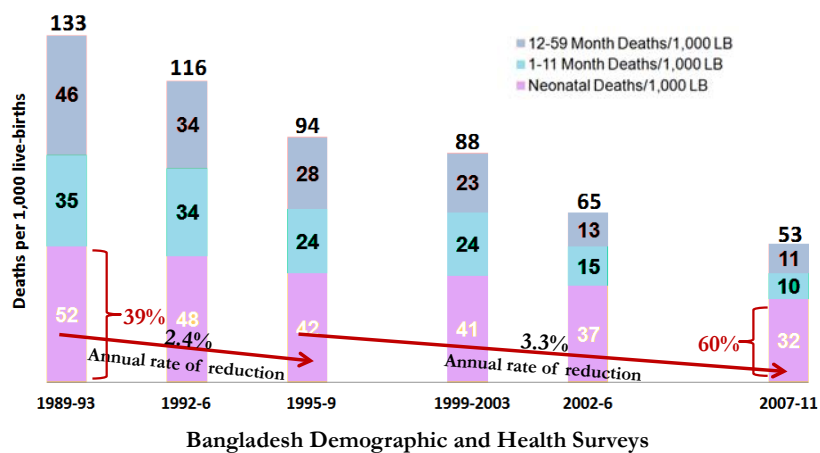
EXHIBIT 2
Fertility Trends in Bangladesh



Source: NIPORT, 2011, pg. 64.

EXHIBIT 3
Under-5 Mortality Rates, Bangladesh

Bangladesh on track to achieve MDG4
targets well before 2015



Data Source: NIPORT, 2011; graph created by author.

EXHIBIT 4

**Advantages and Disadvantages of Integrated Health Services
WHO Technical Report on Integration of Health Care Delivery, 1996**

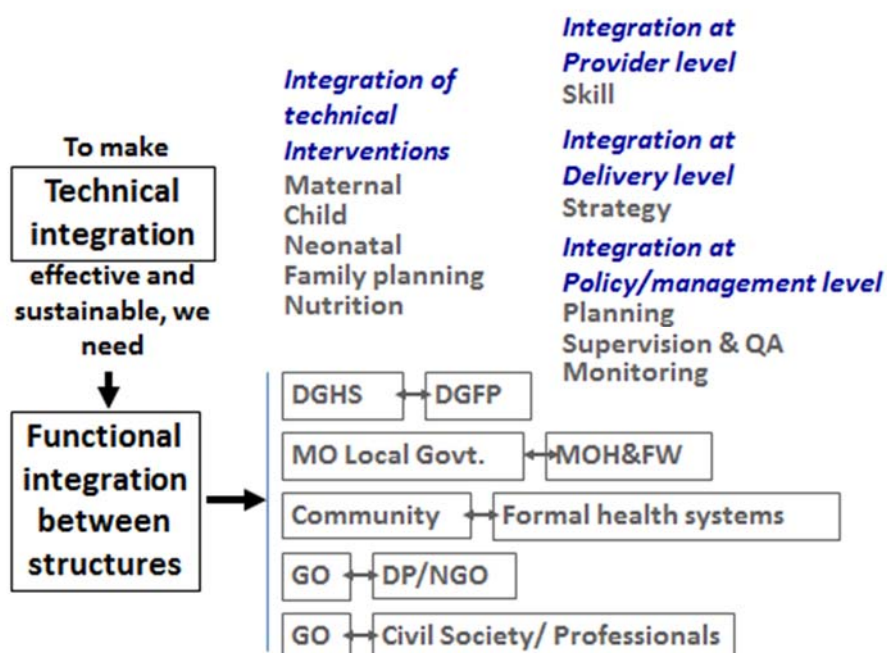
Advantages	Disadvantages
<ul style="list-style-type: none">• Allows delivery of a range of services selected to suit national health policies and local needs• Incorporates inputs from different components of health systems and thus reflects the multidimensional concept of health.• Has the capacity to take on new activities and react to disasters.• Allows multi-purpose use of resources, such as personnel and allows more outputs to be achieved for a given input.• Allows planning and management of health services according to local circumstances with appropriate political, intersectoral and community involvement.• Makes it easier to respond to user needs, which saves time, and encourages personalized service and continuity of care and thus increases convenience and user satisfaction.• Allows a more holistic approach to health, centred on the health needs of individuals and communities.	<ul style="list-style-type: none">• May fail to set appropriate priorities.• May fail to adopt a programming approach, with clearly defined objectives, targets, operational planning and monitoring by outputs/outcomes.• May fail to achieve the levels of output and impact in key health care areas that would be reached by single-purpose programs.• May cause uncertainty and dissatisfaction among health service employees if adequate explanations and reassurances are not given.

Source: WHO, 1996, p. 6.

Integration of FP-MNCH Services to Accelerate Reduction of Maternal & Child Deaths: Bangladesh Experience

EXHIBIT 5

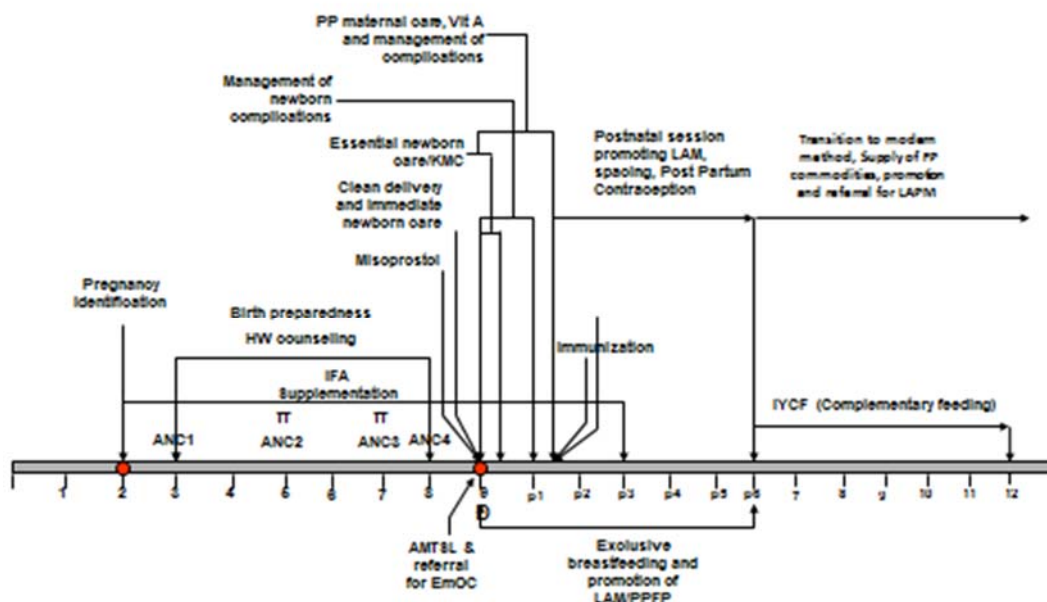
Functional and Technical Integration of Services in MaMoni Project Area



Source: USAID.

Integration of FP-MNCH Services to Accelerate Reduction of Maternal & Child Deaths: Bangladesh Experience

EXHIBIT 6 Continuum of Care Model in MaMoni Project



Source: USAID.

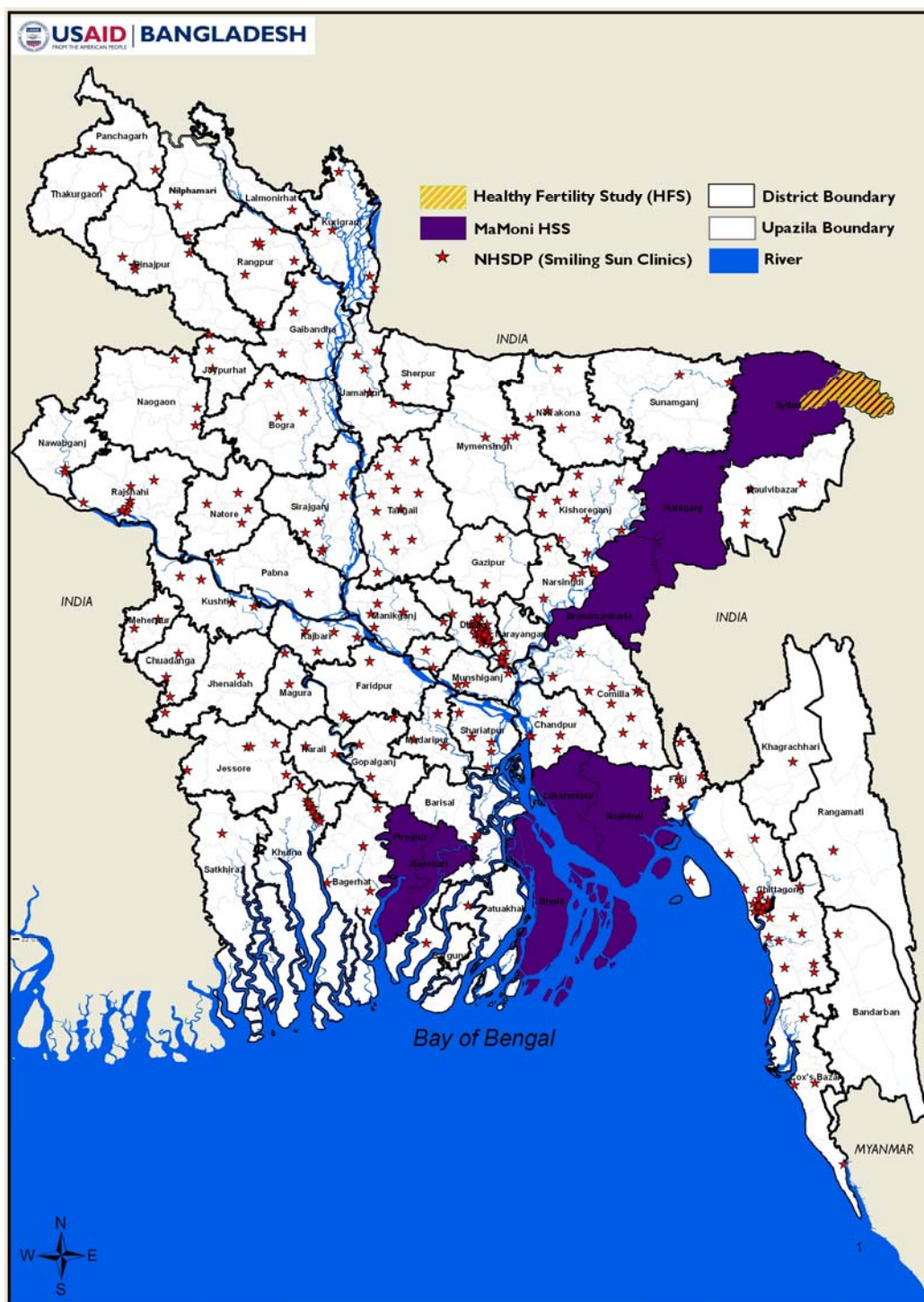
Essential Services Package (ESP)

Government of Bangladesh's ESP focused on primary care interventions which could most cost effectively reduce the burden of disease in Bangladesh, and included services in 4 main categories: child health, reproductive health, communicable disease control and limited curative care.

Offering those services meant that customers received all the services they need in one place, at a slightly reduced price, and helped the clinics become more sustainable.

Integration of FP-MNCH Services to Accelerate Reduction of Maternal & Child Deaths: Bangladesh Experience

EXHIBIT 7 USAID-Funded Projects (three major projects are shown in the map)



Source: USAID.

EXHIBIT 8
Continuum of Care Model



Source: WHO, 2011, p. 24.

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INSTRUCTOR GUIDANCE

Integration of FP-MNCH Services to Accelerate Reduction of Maternal and Child Deaths: Bangladesh Experience¹

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BACKGROUND

Women and children are still dying in alarming numbers from preventable causes. A child born in a low-income country is approximately 18 times more likely to die before the age of 5 than a child born in a developed country. Over a lifetime, a woman's risk of dying as a result of pregnancy and child-birth in a low-income country is over 40 times higher than in the United States. Ending Preventable Child and Maternal Deaths (EPCMD) by 2035 is one of United States Agency for International Development's (USAID) top priority health initiatives. Currently, USAID invests 90 percent of its maternal and child resources in the 24 countries that account for 70 percent of maternal and child deaths in the developing world. Bangladesh has made remarkable development progress over the last decade, achieving a sharp decline of maternal mortality ratio (MMR). This case examines the initiatives in Bangladesh to see how they can inform strategies for the other priority countries where USAID is making significant investments in maternal, newborn child health (MNCH).

OBJECTIVES

1. Explore models for integrated services in a resource poor country.
2. Assess MNCH strategies adopted in Bangladesh to inform initiatives in other nations.
3. Examine policy frameworks to identify support for integrated MNCH.

DISCUSSION QUESTIONS

1. To what extent is a supportive policy environment in place to facilitate integration?
2. To what extent are programs being consolidated to achieve better outcomes at lower cost?
3. To what extent are health system support strategies being managed to support integrated service delivery and healthy behaviors in the home?
4. To what extent have services been integrated to expand access, improve quality, lower costs, and respond to client needs?
5. To what extent are families adopting healthy behaviors to safeguard their well-being and improve their quality of life?

KEYWORDS

Bangladesh; maternal, newborn child health; family planning; service integration; Millennium development goals.

¹ The contents are the responsibility of authors and do not necessarily reflect the views of USAID or the United States Government. All information found herein is available in publicly accessible materials.

CASE 8

Mentor Mothers: Preventing Mother-To-Child Transmission of HIV/AIDS in Jinja

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BACKGROUND

Jinja's District Health Officer (DHO), sat at his desk staring at a report. He had just been given the quarterly district rates from the biostatistician. He didn't like what he was seeing. Although his district had spent a lot of time and resources working to increase the services for prevention of mother-to-child transmission (PMTCT) of HIV/AIDS, there were still mothers who were refusing treatment and children born to HIV positive mothers who were missing follow-up tests in order to ensure that they were HIV free. The Uganda Ministry of Health (MOH) was moving towards the elimination of mother-to-child transmission (EMTCT) of HIV/AIDS, with a target of achieving a less than 5% transmission rate among children born to HIV positive mothers. However, the district's transmission rate for the fiscal year 2013/2014 was at 15.7%. The DHO knew he needed a new strategy in order to reach the MOH's goal. As he looked up from the report, the DHO wondered what more could the Jinja District Health Department do to reduce the district's HIV transmission rates from mother to babies and move from prevention to the elimination of mother-to-child transmission of HIV/AIDS. Could mentor mothers, who had worked for other organizations, be used to create a positive behaviour change in mothers in this district with respect to uptake and adherence to treatment, and as a way to monitor those whose children hadn't had the appropriate follow-up tests?

UGANDA

Uganda is located within the East African area of Sub-Saharan Africa. It is a low-income country with a population of approximately 37.5 million people (United Nations, 2013). Uganda has a high annual population growth rate of 3.3% (World Bank, 2014), with the majority of its population living in rural areas. Of the Ugandan population, about 50% are under the age of 15 (see Exhibit 1 for a comparison of Uganda to Sub-Saharan Africa) (Ministry of Health, 2011).

Uganda became independent from the British colonialists in 1962. Civil unrest that began in the 1970's negatively impacted the overall health and health system of Ugandans. Since then, the country has been working hard to reconstruct its health system. In 1995, as a way to improve efficiency, the government decentralized health services to the districts (MOH, 2011). The districts play a large role in the delivery and management of health services in their areas. Health services are divided into four levels: national referral hospitals, regional referral hospitals, district hospitals, and health centres IV, III, II and I, which are non-structured and utilize village

health teams (VHT). Health centre IVs are responsible for planning, organizing, budgeting, and managing health services at the health sub-district level, as well as the lower level facility in each sub-district. This includes overseeing all preventative, curative, and rehabilitative health activities within the sub-district. Level III facilities deliver basic services relating to preventative and curative care. They also supervise the level II facilities in their jurisdiction. Level II facilities are typically the first point of contact for individuals into the health care system. These facilities provide mainly outpatient care, delivery services, and community outreach. Lastly, the VHTs help mobilize communities, whether it is for immunizations or identifying the community's health needs (MOH, 2010).

JINJA

Jinja district is located in Eastern Central Uganda, approximately 80 kms from the country's capital, Kampala, and is bordered by the districts of Mayuge to the east, Kamuli to the north, and Buikwe to the southwest. On the south side, Jinja district is bordered by Lake Victoria, a popular tourist spot known as the Source of the Nile (Exhibit 2). It is an old industrial town with a cosmopolitan population that migrated in the 1960's in search of employment. The population of Jinja is 514,300 (Jinja District Health, 2013) approximately 80% of which live in rural areas (Jinja District Health, 2012). The top five causes of morbidity in the outpatient department in the district for the 2013/2014 fiscal year were malaria, the common cold, intestinal worms, skin diseases, and eye infections.

The Jinja district health system is organized into five health sub-districts: Butembe, Jinja Municipality East, Jinja Municipality West, Kagoma, and Kiira. There are many NGOs, not-for-profit, and private organizations that partner with the district. Within the sub-districts there are 54 government, 15 NGOs or private not-for-profit organization, and five private health facilities (see Exhibit 3). NGOs partner with the district to provide health system strengthening and training for the staff within the level III and IV facilities as well as the members of the District Health Team (DHT). Although there are many initiatives that the different NGOs deal with, many have a particular interest in HIV/AIDS. These partners include the AIDS Information Centre, Clinton Health Access Initiative (CHAI), Restless Development, Family Life Education Program, Assist, Act4Africa, The Red Cross, Sustain, and The AIDS Support Organization (TASO).

TASO supports Uganda across 16 centres and is funded by The US President's Emergency Plan for AIDS Relief (PEPFAR). They are the largest supporter of the Jinja district in terms of HIV prevention strategies. Although TASO has its own clinic providing counseling, treatment, and support, it also assists the district with training and strengthening of health systems within level III and IV health facilities (TASO, 2014).

The Jinja District Health Department manages the health facilities within the sub-districts and consists of 11 individuals forming the DHT. The DHT's focus ranges from HIV/AIDS, malaria, tuberculosis (TB), health education, biostatistics, health inspections, records management, finance, and monitoring/evaluation. The DHT is responsible for:

- Providing technical support for the health sub-districts including planning and performance reviews;
- Surveillance and data collection;
- Control of epidemics;
- Health advocacy;
- Mobilization and allocation of resources for the health sector;

- Monitoring and evaluation of performance of the district health system; and
- Preparing the budget for the development plan for the district health department.

The district faces a number of issues that constrain its efforts. Staffing is perhaps the most pressing issue; there are not enough personnel present on a daily basis, whether nurses or administrative staff. Even with so few workers, at times they turn up late, leave early, or sometimes do not come in at all. This poor attendance could be attributed to poor motivation because compensation is not always timely. Motivation to work within the district's health facilities can be low when employees know they can make money by having a second job, which keeps them from the health facility. In addition, many of the health facilities have poor infrastructure and lack upkeep; funds are needed in order to better maintain the buildings. As well, many of the health facilities have inadequate medical supplies and drugs, which affect the quality of patient care at the health centres (Jinja District Health, 2012).

HIV/AIDS

HIV/AIDS in Sub-Saharan Africa has been a pressing issue for many years. Although there have been many breakthroughs in terms of prevention, treatment, and care this issue continues to affect those in developing countries such as Uganda. Since 1992, there has been a significant decrease in HIV rates. In 2002, HIV prevalence decreased from 18% to 6.2% (MOH, 2012b); however, the rate has stabilized recently, fluctuating between 6% and 7% (MOH, 2012b). As of 2011, Uganda's prevalence rate of HIV/AIDS was 7.3% (MOH, 2011) and Jinja district's prevalence rate for the 2013/2014 fiscal year was 4.4% (Jinja District Health, 2013). The district's transmission rate from mother to child was 15.7% for the fiscal year 2013/2014. HIV in Uganda is driven by many factors. At the macro level, structural and contextual factors play a role. At the micro level, social determinants of health, namely poverty, gender inequality, access to healthcare, and stigma, are significant issues affecting national HIV rates. Many women do not disclose their HIV status to their husbands or friends for fear of abandonment or social isolation. The driving factors become a barrier to the success of interventions in place to help prevent transmission (MOH, 2012b). The different facilities all work to prevent the transmission of HIV/AIDS; level III and IV facilities test, counsel, and treat patients, whereas level II facilities test and refer patients to the larger facilities for treatment and counseling if needed.

HIV Prevention Strategies

In Jinja there are many strategies that are being employed in order to prevent the spread of HIV. Behavioural change communication through partners, safe male circumcision (SMC), condom distribution, HIV counseling and testing (HCT), provision of antiretroviral drugs (ART) to over 50% of eligible clients, structural interventions (policies/procedures), and prevention of mother-to-child transmission (Option B+) are some of those strategies.

Prevention to Mother-to-Child Transmission of HIV

Mother-to-child, or vertical transmission of HIV, occurs when an HIV positive mother transmits HIV to her child during pregnancy, labour, delivery, or breastfeeding. When there are no interventions in place, the transmission rate can range from 15-45% (WHO, 2010). Prevention of mother-to-child transmission (PMTCT) is part of a global initiative to eradicate new pediatric HIV infections. Although there has been progress in the PMTCT services offered in low and middle-income countries, much effort is still needed. WHO estimated that in 2008, 430,000 children were infected with HIV with 90% of cases occurring from mother-to-child transmission. It is estimated that only 35% of HIV-exposed infants had the appropriate testing done within the first two months of their lives (WHO, 2014). The use of the PMTCT strategy has the potential to improve the lives of both mother and baby, reducing the risk of transmission to 5% or less. The

use of this approach is in line with Millennium Development Goals 4, 5 and 6: reduce child mortality, improve maternal health, and combat HIV/AIDS, malaria, and other diseases (WHO, 2010).

WHO 4-Pronged Approach to PMTCTHIV

In order to prevent the spread of HIV from mother to child, the WHO encourages the use of a 4-pronged, comprehensive approach. The four prongs of the strategy are: 1) prevent HIV in women of reproductive age; 2) prevent unintended pregnancy in women with HIV; 3) prevent HIV transmission from mother to child; and 4) provide ongoing care and support to mothers, their children, and families. The third intervention is especially important because it encompasses HIV transmission risk reduction during antenatal care, labour/delivery, and postnatal care (WHO, 2010).

Jinja's Approach to The WHO 4-Pronged

- **Prong 1: Prevent HIV in women of reproductive age**
In this first stage the district works hard to encourage HIV testing in women. Women are sent for testing through the outpatient clinic or antenatal care (ANC). If they are HIV-negative, they are counseled using the ABC strategy in order to ensure they remain so. The ABC strategy includes abstinence until a woman is married. If she is already married, counselors encourage the second strategy of being faithful. If the client does not believe she can be faithful, the health care workers encourage condom use, ensuring they are used every time a woman is involved in sexual practices. Behaviour change communications and SMC are other avenues that are used to prevent HIV in all clients, not just women of reproductive age.
- **Prong 2: Prevent unintended pregnancy in women with HIV**
In the second prong of the PMTCT approach, Jinja district promotes dual protection, which involves the use of modern family planning methods and the use of condoms. However, the uptake on oral contraceptives or the injectable option has not been significant in Jinja (Exhibit 4). If women do not want children at all, long-term devices such as implants may be used as methods of avoiding pregnancy.
- **Prong 3: Prevent HIV transmission from mother to child**
Antenatal care (ANC) is recommended for all women who are pregnant. WHO recommends at least four antenatal visits for expecting mothers. Many health issues such as HIV/AIDS can be prevented, detected, and/or treated during these visits. These visits can be used for vaccinations, screening/treatment for infections (HIV/AIDS), and identification of warning signs during pregnancy. Counseling should also be given at any ANC visit (The Partnership for Maternal, Newborn, and Child Health, 2006). In Jinja, the percentage of women accessing the first ANC visit is 105% (due to Jinja being a referral district) and the percentage of women attending all four ANC visits is 37% (S. Baluka, Personal Communication, July 16, 2014).

When a woman is identified in antenatal care as being HIV positive, she is immediately enrolled into the PMTCT program and started on Option B+. Option B+ is a recommendation for PMTCT and was derived from Malawi as it was an approach that fit everyone, compared to the previous Option A and B (Exhibit 5), which depended on an individual's CD4 count and clinical stage. Uganda initiated this initiative on September 12, 2012 and it was rolled out in the Jinja district shortly after. Option B+ recommends life-long triple ARVs for mothers who are infected with HIV regardless of CD4 count or clinical stage. Lifelong treatment avoids continuous stopping and starting of treatment. This allows resistance to develop and

provides a continued benefit to prevent the transmission of HIV to couples that are serodiscordant (a couple in which one partner is HIV-positive and one is HIV-negative) as well as the protection against transmission of future pregnancies (WHO, 2012). For infants, Option B+ recommends daily Niverapine (NVP) syrup from birth to age six weeks, regardless of the method the child is being fed. Along with Option B+, the client is counseled, a nutritional assessment is done on both the mother and baby, and psycho/social support groups are available for mothers to join (UNICEF, 2012).

In order to prevent transmission from mother to child, the child is enrolled into the Early Infant Diagnosis (EID) program. At birth, the baby is started on NVP syrup for the first six weeks of life. After six weeks, the child has his/her 1st Polymerase Chain Reaction (PCR) test done while also being started on cotrimoxazole. At the six-month mark the child starts on complimentary feeds using other milk or foods to supplement breast milk, as the mother's breast milk alone is not enough for the baby to grow. By not starting complementary feeds, the baby can become malnourished allowing for HIV to affect the child. After 12 months, the baby stops breastfeeding and has a second PCR test done six weeks later (13.5 months). Cotrimoxazole is continued until the second PCR results come back negative. After 18 months the child can be tested a final time using a rapid test. Once this test is complete and the child is confirmed to be negative, he/she can be discharged from the EID program. Although the tests are done at various intervals over the first year and a half of the child's life, he/she should still be brought in for monthly routine check-ups to ensure proper growth and appropriate nourishment. If the child is found to be HIV positive at any of the three stages he/she is immediately discharged from the program and started on antiretroviral therapy. The mother and baby are then transferred to the regular ART clinics.

- Prong 4: Provide ongoing care and support to mothers, their children, and families
The fourth and final prong encourages those women who have already identified as being HIV positive to continue in care and on ARVs for life. Ideally, anyone who is positive should visit the health facility once a month. Here, HIV-positive individuals may be linked to mentor mothers, linkage facilitators, and psycho/social support groups that are led by the health care workers. A crucial piece to this prong is the follow-up of mothers who fail to bring their children to the facility for continued monitoring of their HIV status. The personnel who follow up with mothers can also provide counseling on the importance of the continued care for their children.

MENTOR MOTHERS

Mothers 2 Mothers (m2m) is an organization that uses mentor mothers to create a positive change in behaviour. They train and employ HIV positive mothers to work within level III and IV health centres, providing added help to the healthcare team. m2m works in nine districts and 45 health centres throughout Uganda. However, due to funding limitations, m2m is not currently active in the Jinja district. The trained m2m mothers provide health education, follow up with clients who have missed appointments, and offer group and individual psycho/social support. The mothers are recruited from within the community. They are required to have disclosed their status to their partners and have a desire to help other mothers. The m2m mentor mother model has been successful (Exhibit 6) because compared to the facilities within Jinja District, there are not as many individuals lost to follow-up.

CHALLENGES

The Jinja District Health Team is working hard to ensure that the four aforementioned strategies are being met; however, this does come with its challenges. In many cases women are not using dual family planning. The uptake of oral contraceptives or the injectable option along with

condom use has been low. Many of the health facilities are extremely busy and do not always have time to offer services and counsel patients regarding family planning. Health care workers may have biases towards family planning, which can interfere with the appropriate delivery of counseling services. Other challenges include non-adherence, either in the form of mothers not adhering to treatment regimens or in the form of failing to follow-up with their babies for the necessary tests. Exhibit 7 shows the percent of loss to follow up at 11 facilities in Jinja District. Another challenge the district faces is with respect to the psycho/social support groups; many facilities are not able to run these groups and are therefore missing out on important opportunities to counsel and support HIV positive mothers and their families.

CONCLUSION

The District Health Officer knows that the issue of transmission from mother to baby needs to be tackled using a new strategy. Reducing Jinja's transmission rate from 15.7% to 5% is going to take a lot of hard work and commitment from the DHT as well as many stakeholders within the district. How can he go about implementing mentor mothers within the Jinja District to help change mothers' behaviours and reduce loss of follow-up in children?

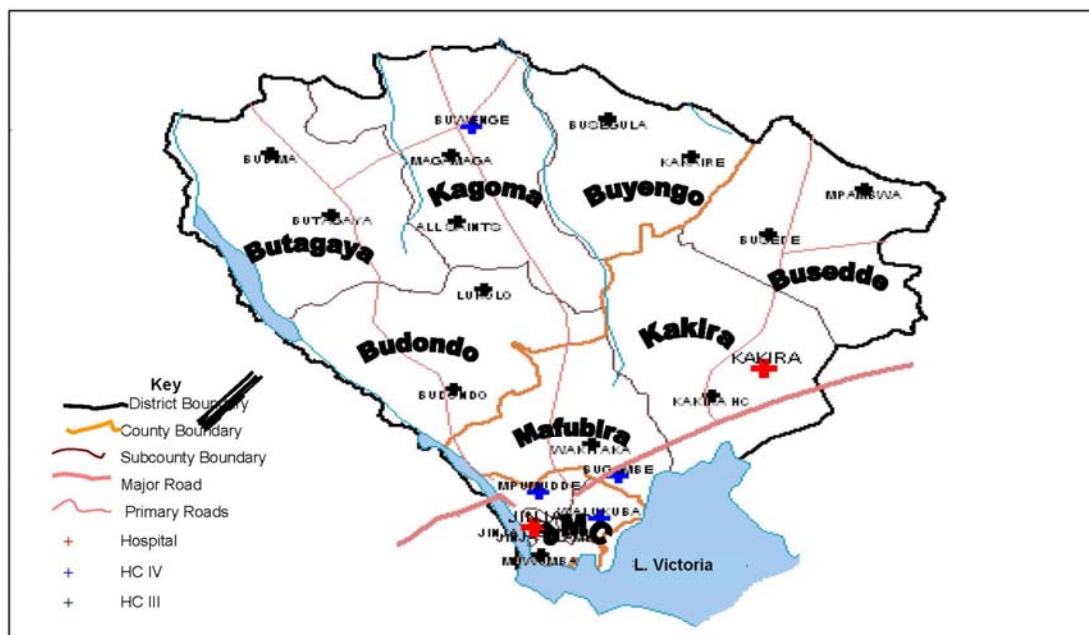
EXHIBIT 1
Selected Indicators for Uganda and Comparative Countries

Selected Indicators (Former Name)	Selected Indicators (Name in Database)	Uganda	Sub-Saharan African Countries' Average	Low-Income Countries' Average	Year of Data	Source of Data (Uganda/ Averages)
Total Population	Population, total	33,424,683*	17,598,890	22,750,325	2010	WDI 2011
Population Growth (Annual)	Population growth (annual %)	3.21	2.5	2.1	2010	WDI 2011
Rural Population	Rural population (% of total population)	86.7	62.57	71.72	2010	WDI 2011
Fertility Rate	Fertility rate, total (births per woman)	6.24	5	4.70*	2009	WDI 2011
Contraceptive Prevalence Rate	Contraceptive prevalence (% of women ages 15–49)	23.70**	20.97	33	2009	WDI 2011
Life Expectancy at Birth	Life expectancy at birth, total (years)	53.07	53.75	58.44	2009	WDI 2011
Under 5 Mortality Rate (per 1000 births)	Mortality rate, under-5 (per 1,000)	98.9	121.23	107.87	2010	WDI 2011
Maternal Mortality Rate (per 100,000 births)	Maternal mortality ratio (modeled estimate, per 100,000 live births)	430	640	590	2008	WDI 2011
Adult Literacy Rate	Literacy rate, adult total (% of people ages 15 and above)	73.21	N/A	N/A	2010	WDI 2011
Population with sustainable access to improved drinking water sources	Improved water source (% of population with access)	67	59.72	63.11	2008	WDI 2011
Population with access to improved sanitation facilities	Improved sanitation facilities (% of population with access)	48	31.36	35.47	2008	WDI 2011
Prevalence of underweight among children under 5	Malnutrition prevalence, weight for age (% of children under 5)	16.40**	24.57	28.33	2009	WDI 2011
Prevalence of HIV total (% of population aged 15–49)	Prevalence of HIV, total (% of population ages 15–49)	6.5	5.45	2.57	2009	WDI 2011

Source: Ministry of Health, Health Systems 20/20, and Makerere University School of Public Health, 2012.

EXHIBIT 2

Map of Jinja District Showing Health Facilities and Major Road Network



Source: Dyogo Nantamu (author), 2015.



Source: S. Nazarali (author), 2014.

EXHIBIT 3
List of Health Facilities in Jinja District

HSD	Sub-County/ Division	No	Facility	Level	Ownership
JME	Walukuba/Masese	1	Walukuba	HC IV	Gov
	Jinja Central	2	Jinja Central	HC III	Gov
	Walukuba/Masese	3	Jinja Main Prison	HC III	Gov
	Walukuba/Masese	4	Jinja Remand	HC III	Gov
	Walukuba/Masese	5	Kisima	HC II	Gov
	Walukuba/Masese	6	Masese Port	HC II	Gov
	Walukuba/Masese	7	Masese Danida	HC II	PNFP/NGO
	Walukuba/Masese	8	Masese 3	HC II	Gov
JMW	Mpumudde	9	Jinja Hosp	R.R.Hosp	Gov
	Mpumudde	10	Mpumudde	HC IV	Gov
	Mpumudde	11	Muwumba	HC III	Gov
	Mpumudde	12	Gaddafi	HC III	Gov
	Mpumudde	13	TASO-Jinja	Clinic	NGO
	Mpumudde	14	Family Hope Centre	Clinic	NGO
	Mpumudde	15	AIC-Jinja	Clinic	NGO
	Mpumudde	16	Jinja Police	HC III	Gov
	Mpumudde	17	Jinja Islamic	HC III	PNFP
	Mpumudde	18	crescent Medical Centre	HC III	Private/UMMB
	Mpumudde	19	Kimaka	HC II	Gov
	Mpumudde	20	Kimaka Senior Staff Coll	HC II	Gov
	Mpumudde	21	Al Shafa Modern Hosp	Hosp	Private
BUTEMBE	Bugembe TC	22	Bugembe	HC IV	Gov
	Bugembe TC	23	DAG	Clinic	Private
	Bugembe TC	24	AOET	HC III	NGO
	Mafubira	25	Wakitaka	HC III	Gov
	Mafubira	26	Aroma	HC III	PNFP
	Mafubira	27	St,Benedict	HC II	PNFP
	Mafubira	28	Mafubira	HC II	Gov
	Mafubira	29	Buwenda	HC II	Gov
	Mafubira	30	Lwanda	HC II	Gov
	Mafubira	31	Musima	HC II	Gov
	Mafubira	32	Almeca Medicare	Hosp	Private
	Kakira TC	33	Kakira Sugar LTD	Hospital	PNFP
	Kakira TC	34	Kakira	HC III	Gov
	Kakira TC	35	Wairaka	HC II	Gov
	Kakira TC	36	Kabembe	HC II	Gov
	Busedde	37	Busedde	HC III	Gov
	Busedde	38	Mpambwa	HC III	Gov
	Busedde	39	Nalinaibi	HC II	Gov
	Busedde	40	Nabitambala	HC II	Gov
	Busedde	41	Kisasi	HC II	Gov
	Busedde	42	Bwidhabwangu	HC II	FBO/PNFP

Mentor Mothers: Preventing Mother-To-Child Transmission of HIV/AIDS in Jinja

HSD	Sub-County/ Division	No	Facility	Level	Ownership
KIIRA	Budondo	43	Budondo	HC IV	Gov
	Budondo	44	Lukolo	HC III	Gov
	Budondo	45	Ivunamba	HC II	Gov
	Budondo	46	Nawangoma	HC II	Gov
	Budondo	47	Kyomya	HC II	Gov
	Budondo	48	Kibibi	HC II	Gov
	Budondo	49	Soft Power	Clinic	Private
	Butagaya	50	Butagaya	HC III	Gov
	Butagaya	51	Budima	HC III	Gov
	Butagaya	52	Wansimba	HC II	Gov
	Butagaya	53	Nawampandha	HC II	PNFP /FBO
	Butagaya	54	Bubugo	HC II	Gov
	Butagaya	55	Lumuli	HC II	Gov
	Butagaya	56	Namwendwa	HC II	
	Butagaya	57	Iwololo	HC II	PNFP/FBO
KAGOMA	Buwenge TC	58	Buwenge Medical Centre	Hospital	PNFP
	Buwenge TC	59	Buwenge	HC IV	Gov
	Buwenge TC	60	Bwase	HC II	Gov
	Buwenge TC	61	Bunawona	HC II	Gov
	Buwenge Rule	62	Magamaga	HC III	Gov
	Buwenge Rule	63	All-Saints	HC III	PNFP/FBO
	Buwenge Rule	64	Mutai	HC II	Gov
	Buwenge Rule	65	Kabaganda	HC II	Gov
	Buwenge Rule	66	Mpungwe	HC II	Gov
	Buwenge Rule	67	Kitanaba	HC II	Gov
	Buwenge Rule	68	Buwolero	HC II	Gov
	Buwenge Rule	69	Mawoito	HC II	Gov
	Buwenge Rule	70	Muguluka	HC II	PNFP/FBO
	Buyengo	71	Kakaire	HC III	Gov
	Buyengo	72	Busegula	HC II	Gov
	Buyengo	73	Nsozibbiri	HC II	Gov
	Buyengo	74	Kamiigo	HC II	Gov

Source: S. Baluka, Personal Communication, July 16, 2014.

EXHIBIT 4

Family Planning Methods (Jinja District 1-Jul-13 to 30-Jun-14)

Element	New Users	Revisits	Total
Oral FPM: Lo-Feminal users	110	96	206
Oral FPM: Microgynon users	1540	1499	3039
Oral FPM: Ovrette or Another POP users	150	95	245
Oral FPM: Other users	170	89	259
Female Condom FPM users	556	239	795
Male Condom FPM users	10142	64444	16586
IUD(copper) FPM users	1195	314	1509
Injectable FPM users	9293	14999	24292
Natural FPM users	186	88	274
Other Family Planning Method users	1599	564	2163

Source: Jinja District Health Report, 2014.

EXHIBIT 5

Table 1. Three options for PMTCT programmes

Woman receives:			
	Treatment (for CD4 count ≤350 cells/mm ³)	Prophylaxis (for CD4 count >350 cells/mm ³)	Infant receives:
Option A^a	Triple ARVs starting as soon as diagnosed, <i>continued for life</i>	<i>Antepartum:</i> AZT starting as early as 14 weeks gestation <i>Intrapartum:</i> at onset of labour, single-dose NVP and first dose of AZT/3TC <i>Postpartum:</i> daily AZT/3TC through 7 days postpartum	Daily NVP from birth until 1 week after cessation of all breastfeeding; or, if not breastfeeding or if mother is on treatment, through age 4–6 weeks
Option B^a	Same initial ARVs for both ^b :		Daily NVP or AZT from birth through age 4–6 weeks regardless of infant feeding method
	Triple ARVs starting as soon as diagnosed, <i>continued for life</i>	Triple ARVs starting as early as 14 weeks gestation and <i>continued intrapartum and through childbirth if not breastfeeding or until 1 week after cessation of all breastfeeding</i>	
Option B⁺	Same for treatment and prophylaxis ^b :		Daily NVP or AZT from birth through age 4–6 weeks regardless of infant feeding method
	Regardless of CD4 count, triple ARVs starting as soon as diagnosed, ^c <i>continued for life</i>		

Source: WHO, 2012.

EXHIBIT 6
Early Infant Diagnosis Report (First 3 Quarters)

Test Type	Percentage Completed
1 st PCR	97%
2 nd PCR	52%
Rapid Test	65%

Source: Personal Communication, Sarah Auma, Monitoring & Evaluation Coordinator, Mothers2Mothers.

EXHIBIT 7
Quality Assessment Data

Health Facility	Level	Loss to Follow Up
Busedde	III	76%
Mpambwa	III	75%
Budondo	IV	73%
Kakira	III	55%
Butagaya	III	50%
Jinja Central	III	50%
Bugembe	IV	47%
Kakira Hospital		45%
Buwenge	IV	32%
Mpumudde	IV	31%
Kakaire	III	29%

Source: Jinja District Health Report, 2014.

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INSTRUCTOR GUIDANCE

Mentor Mothers: Preventing Mother-To-Child Transmission of HIV/AIDS in Jinja

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BACKGROUND

Jinja district is working hard to prevent mother-to-child transmission (PMTCT) of HIV/AIDS and is using the WHO'S 4-prong approach. Uganda, as a country, has a goal of elimination of mother-to-child transmission (EMTCT) of HIV/AIDS. Jinja district needs to have a rate of mother-to-child transmission below 5% by 2015; the rate in 2014 was 15.7%. The district is facing numerous challenges including infants being lost to follow up, causing Dr. Nantamu (the District Health Officer) to examine alternate approaches such as the Mentor Mothers (m2m) program, to increase participation in the PMTCT services.

OBJECTIVES

1. Understand the WHO 4-pronged approach to PMTCT, and its application in a developing country.
2. Understand behaviour change theories and develop a health promotion plan.
3. Create a logic model and select appropriate outcome indicators.

DISCUSSION QUESTIONS

1. How is Jinja district doing with respect to implementing the WHO 4-prong approach?
 - a. Is the information and data provided in the Case sufficient to decide?
 - b. If not, what other pieces of information do you need?
 - c. What are the challenges of collecting/obtaining such data in a context such as Jinja?
2. What behavior change theory would you use as a foundation for your health promotion plan (i.e. implementing m2m)?
3. Develop a logic model and an implementation plan for m2m.
 - a. What outcome measures will you use to evaluate the plan?
 - b. What are some challenges in collecting such data?

KEYWORDS

HIV/AIDS; PMTCT; behavior change; logic model; evaluation.

CASE 9

Combating Food Borne Illnesses Through Safe Food Handling Practices in the United Nations/African Union Mission in Darfur (UNAMID), Sudan (A)

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INTRODUCTION

The Head of Field Medical Services (HFMS) of the United Nations/African Union Mission in Darfur (UNAMID), Sudan was woken up from sleep on November 16, 2010 by the ringing of the telephone. The unexpected call was from New York and was related to the recent statistics indicating a high incidence of gastro-enteritis emanating from UNAMID. The caller thought it would be a good idea to look at its etiology particularly as it related to water and food borne diseases. He directed the HFMS to investigate the recent upsurge in cases of food borne diseases; which had gone from an average of 8-10 cases per week normally to between 134-151 cases per week in the last three weeks. The HFMS who had over the past months been brainstorming about the issue decided to develop a strategic plan of action. This would entail developing a design to investigate the causes, effects, and impact of food borne diseases in UNAMID as well as implementing mitigating measures to curtail its spread.

FIRST STEPS

The HFMS, a seasoned physician and an astute administrator, was very worried. His extensive knowledge and experience in the management of field medical facilities in peacekeeping missions had triggered this anxiety. He knew the devastating impact that gastro-enteritis had on the individual, as well as organizational impacts in terms of human and material resources. Essentially, resources committed by the Medical Section to prevent an occurrence of this kind of would be wasted, should the situation escalate. He recalled that at different occasions he had expressed dissatisfaction with the state of hygiene and safety in some of the missions' cafeterias. In fact, before his last rest and recuperation/annual leave, he had resolved to tackle the problem headlong. The recent statistics substantiated his personal observations and resolve.

He met with Dr. Maurice Ezeoke, Director, UNAMID Level II Hospital, to share his vision and concerns regarding the recent development. After discussions, he charged Dr. Ezeoke to assemble and coordinate a team of experts to address the problem. They discussed the benefits of adherence by UNAMID's food vendors to food hygiene and safety norms as enshrined in the UN Guidelines for Food Safety Management in Peacekeeping Missions. In the HFMS directive to Dr. Ezeoke he outlined the following:

The risk factors for food borne illnesses are known; hence a comprehensive approach to mitigate the causative factors would not be too difficult to fashion out. It has been scientifically proven that food poisoning is caused by physical,

chemical, and microbial contaminants, and presence of allergens in food. Naturally one is concerned about sources of the food raw materials, food preparation techniques, food storage temperatures, servicing, personal hygiene and health status of food handlers, pest control, and hygiene of the food premises. The main task was to investigate this upsurge in food borne diseases and come up with sustainable mitigating measures aimed at reducing its risk factors.

Dr. Ezeoke knew the enormity of this additional task and the seeming urgency attached to it. The message was not lost on him in view of the fact that more than 70% of the “mission components” (individuals working for UNAMID) patronized the cafeterias. Within three days of being saddled with this responsibility, he had constituted a task force on UNAMID Food Hygiene and Safety. The task force members were Dr. Ezeoke himself, who was to act as team leader and coordinate all activities of the team, the Public Health Practitioner, the Food Quality Inspector, an Arabic speaking Medical Officer, and a representative from the Engineering and Environmental Protection Section (EEPS). Their mission was to develop a plan designed to investigate the source of food borne diseases and to mitigate the impact as well as curtail the spread of gastro-enteritis.

FOOD BORNE DISEASES

Food borne diseases constitute a global public health concern which often results in high morbidity and mortality if not promptly and properly handled (Open Lean, n.d.). In addition to a lack of potable water, poor personal hygiene, and poor environmental sanitation, consumption of contaminated foods had been attributed to being a major risk factor for its spread (Open Lean, n.d.). Statistics showed that diarrheal diseases with the attendant dehydration and high mortality rate in children less than 5 years, particularly in the developing countries, are its most common manifestation (Open Lean, n.d.).

CAUSES OF FOOD POISONING / FOOD HAZARDS

Food poisoning arises from the consumption of contaminated food. Food in this context includes ready-to-eat food such as cooked foods, fruits and vegetables that do not require further processing before consumption, as well as untreated water and beverages (Mayo Clinic, 2011). Contaminants can be by bacteria and/or by their toxins (Stevenson and Nash, 2011). It can also be by non-bacteria such as chemicals, metallic and physical contaminants, food allergens, mycotoxins, poisonous plants and fish (Stevenson & Nash, 2011). Contamination of food could occur at multiple points in the food chain: anywhere from the farm gate, handling, transportation, and food receiving and preparation, to storage and serving.

BACTERIA FOOD POISONING

Salmonella species, Staphylococcus aureus, and Clostridium species are some of the pathogenic bacteria that have been associated with food poisoning (see Exhibit 1). While the presence of these bacteria in foods do not necessarily cause noticeable changes in the physical appearance of food, they are, however, responsible for food borne illnesses (Stevenson & Nash, 2011).

Apart from bacteria and their toxins, other microorganisms associated with food borne illnesses or food poisoning are viruses and molds which are transmitted from person-to-person through food, air, and water (Center for Disease Control and Prevention, 2012). Food borne illness has also been associated with the contamination of foods with fomites – these are objects such as human hair, and skin: clothing, door handles, keys, etc. which serve as medium for transmissible microbes. Food borne disease symptoms may manifest within hours, days, or

weeks after the consumption of contaminated food. This is due to the fact that only a small population of pathogenic microbes is required in food and water to trigger disease conditions (Stevenson & Nash, 2011). Food poisoning is an expeditious disease condition which occurs soon after consumption of food that has been contaminated by pathogenic microorganisms and/or their toxins (Open Lean, n.d.).

NON-BACTERIA FOOD POISONING

Use of sub-standard food ingredients, non-adherence to safe food handling practices, lack of basic food preparation skills, and sabotage are some of the factors which have been attributed to non-bacterial food poisoning (Open Lean, n.d.; Stevenson & Nash, 2011). Nonbacterial food poisoning is classified as below:

- **Chemical food poisoning**

This occurs due to consumption of contaminated foods – mostly agricultural produce with residual agricultural inputs such as pesticides, insecticides, and herbicides; spillage of detergents, fumigants, and other cleaning materials into foods; presence of residual antibiotics in poultry and meat products; contamination of soil and water (surface and underground); disproportionate use of food additives, deliberate addition of chemicals into food, and utilization of substandard intermediate food raw materials during food preparation (Open Lean, n.d.). The symptoms of chemical poisoning are vomiting, diarrhea, nervous disorder, and joint pains (Stevenson & Nash, 2011), among others.

- **Metallic food poisoning**

Food poisoning from metallic sources may arise when acidic foods (within pH range 1-6) such as fruit juices are packaged in metallic materials such as tin, lead, copper, and zinc (Boychuk, 1977). The free radicals of these acidic foods and metals would interact to produce poisonous by-products which could make food unwholesome and subsequently constitute health problems when consumed (Boychuk, 1977). In addition to this, consumption of agricultural produce, fish (caught from polluted water), and animals which have absorbed metals during grazing could equally cause adverse health conditions (Boychuk, 1977).

- **Poisonous plants**

Consumption of plants such as leaves of bitter cassava variety, inappropriately processed beans, wild potato, poisonous mushrooms, and tomato leaves, among others, could result in food poisoning with abdominal pain, nausea, and vomiting symptoms (Stevenson & Nash, 2011).

- **Mycotoxins**

Storage of foods such as cereals, spices, herbs, nuts, and spices under inappropriate atmospheric conditions could trigger growth of molds on such foods. The presence of molds in foods leads to the production of mycotoxins and subsequent contamination of such foods. Consumption of contaminated foods with mycotoxins, a byproduct of *Aspergillus* and *Penicillin* species, could also lead to diarrhea and vomiting (Stevenson & Nash, 2011).

- **Physical contamination**

Physical contamination of foods could occur at multiple points during food handling: the farm gate, slaughtering, point of purchase, and processing stage: during storage,

packaging, and distribution as well as mishandling by the end user (University of Nebraska Cooperative Extension, 2005). Physical contamination of foods involves the introduction and presence in food of harmful extraneous materials which may trigger on-set of disease in the consumer (University of Nebraska Cooperative Extension, 2005). Some of the sources of physical contaminants in foods are stone, jewelries, hair, and fingernails. Others include: raw materials, packaging materials, processing equipment, pests, rodents, dirty environment, inappropriate construction of food premises, and defective production processes (University of Nebraska Cooperative Extension, 2005).

- **Allergen**

Variations in the human body chemistry are responsible for adverse immunological response when individuals consume certain constituents contained in foods (National Institute of Allergy and Infectious Diseases, 2010). Food items such as eggs, milk, fish, peanuts, soybeans, gluten, sesame seeds, and a host of others have been reported to cause allergic reactions such as nausea, skin flushing, diarrhea, vomiting, sore red itchy eyes, and running nose (Stevenson & Nash, 2011). It is noteworthy that diarrhea and vomiting are symptoms which are common to food allergy and food poisoning (National Institute of Allergy and Infectious Diseases, 2010).

- **Poisonous fish**

Consumption of toxic fish such as ciguatera and scombrototoxic which are reef-dwelling fish and dark fleshed fish respectively have been reported to cause diarrhea, vomiting, and respiratory problems (Stevenson and Nash, 2011).

Though pathogenic bacteria are responsible for most of the food borne illnesses, the presence of non-bacterial contaminants in foods also causes food poisoning.

DR. MAURICE EZEKE

Dr. Ezeoke graduated from the Nigerian Military School, Zaria in 1971. He headed to Ahmadu Bello University, Zaria to study Medicine and graduated in 1978. In late 1982, he proceeded to the University College Hospital (UCH), London, United Kingdom for his post-graduate studies in Surgery. During pursuit of his studies in the UK, he was at various times an anatomy demonstrator (from October 1982 to June 1983); honorary surgical registrar (between July 1983 and December 1984) at the UCH, London; honorary surgical registrar, Stoke Mandeville Hospital Aylesbury (January 1985 to September 1985); substantive surgical registrar UCH, London (September 1985 to December 1985); and senior house officer (SHO) Accident & Emergency, Chase Farm Hospital, Enfield, Middlesex, London and SHO Orthopedics, Central Middlesex Hospital London. He continued his career in the UK for two more years after his post graduate studies to gain experience as a surgeon. During this period, he held Locum Tenens appointments in St. James Hospital, Balham, London, St. Mary's Hospital and Queen Elizabeth Hospital, both in Portsmouth.

Dr. Ezeoke, a Fellow of the Royal College of Surgeons in Ireland, Fellow of the International College of Surgeons, and Fellow of West African College of Surgeons, returned to Nigeria and served the Nigerian Army in a variety of capacities. He was the Chief Medical Officer for the Economic Community of West Africa Monitoring Group (ECOMOG) Forces in Liberia between August 1990 and February 1991. Dr. Ezeoke rose to the rank of Brigadier General and Director, 68, Nigeria Army Reference Hospital Yaba (NARHY), Lagos before retiring in the year 2006

after a distinguished military career. He had several academic publications to his credit including “A study of Environmental Sanitation in Zaria City”.

Dr. Ezeoke joined the United Nations/African Union Hybrid Mission in Darfur (UNAMID) as the Director of the Level II Hospital in September 2008. By virtue of his appointment, he had oversight functions to ensure maintenance of hygiene, health and safety standards by the food vendors operating in UNAMID premises in Darfur region especially in El Fasher. In addition to his clinical and administrative functions, he had been very innovative and unrelenting in ensuring that the highest level of food safety was attained in the UN's most dynamic and complex peacekeeping operations in the world.

CRISIS IN SUDAN

Sudan is a North African Islamic state divided into western and eastern parts by the river Nile (Collins, 2008). It covers approximately 2,505,813 sq km and shares borders with Egypt in the north; Ethiopia, Red Sea, and Eritrea in the east; South Sudan in the south; Central African Republic in the southwest; and Chad and Libya in the west and northwest respectively (Sudan.net, 2011). It is made up of eighteen states from the following territories: Blue Nile, Darfur, Kassala, Khartoum, Kordofan, and Northern territory. Sudan has been engulfed in an unresolved political impasse between the northern and southern parts due to successive governments' exploitation of religious and ethnic diversities. This culminated in two civil wars between 1955 to 1972 and 1983 to 2005 respectively (Enough, 2014).

CONFLICT IN DARFUR

Darfur occupied the northwestern part of Sudan and was made up of the following regions: South, North, West, East, and Central with capitals in Nyala, El Fasher, El Geneina, Zalingei, and Al Dein respectively. The major contributory factors to the Darfur crises were: land ownership disputes between Sudanese Arabs (Elites in power) and Non-Arab Sudanese (Dafuris); ethnic cleansing; and the social movement for democracy. Systemic marginalization of the Darfuris by the Khartoum central government became a full blown dispute in the year 2003 when the non-Arab Darfuris under the auspices of Darfur Liberation Movement engaged the Government of Sudan (GoS) in armed hostilities due to perceived oppression, non-provision of physical infrastructures, and lack of political patronage (Enough, 2014).

The crises caused massive displacement of people from their native homes and subsequent concentration in Internally Displaced Peoples Camps (IDPs). The humanitarian crisis only worsened with the IDPs and defied all mediatory and political interventions. The African Union Mission in Sudan (AMIS) initially established and funded by the African Union (AU) failed to put the crises in check, a situation which attracted the attention of the global community and necessitated the establishment of the United Nations/African Union Hybrid Mission in Darfur (UNAMID), Sudan, jointly funded by the United Nations and the Africa Union.

PARTIES TO THE DARFUR CRISES

The parties to the Darfur crises were the Sudanese Government and its security outfits, including the military, police, and national security. These GoS institutions were supported by the Janjaweed (an Arab militia group with strong ties to the government) (African Union/United Nations Hybrid Operation in Darfur, 2014).

Sudanese Arabs from the northern part of the country constituted membership of the Janjaweed militia group while rebel groups such as SLA/WA, SLA/MM, and JEM drew their members from Fur, Zaghawa, and Masalit ethnic tribes who are non-Arab Muslims. It was estimated that

Combating Food Borne Illnesses Through Safe Food Handling Practices in the United Nations/African Union Mission in Darfur (UNAMID), Sudan (A)

thousands of peoples were killed and about 1.8 million were internally displaced (African Union/United Nations Hybrid in Darfur, 2014).

AFRICAN UNION – UNITED NATIONS HYBRID MISSION IN DARFUR (UNAMID)

In efforts to nip the crises in the bud, the United Nations Security Council passed Resolution 1769 on July 31, 2007 mandating the African Union – United Nations Hybrid Mission in Darfur (UNAMID) to take over from AMIS on or before the end of December, 2007.

According to UNAMID (2014), the mandate of UNAMID is to:

1. Protect civilians, its personnel, facilities, installations and equipment, and ensure the security and freedom of movement of its own personnel and humanitarian workers;
2. Support early and effective implementation of the Darfur Peace Agreement, prevent the disruption of its implementation and armed attacks, and protect civilians, without prejudice to the responsibility of the Government of Sudan; and
3. Facilitate humanitarian assistance to the massively displaced civilians. (African Union/United Nations Hybrid in Darfur, 2014).

UNITED NATIONS OPERATIONAL DEPLOYMENT CONCEPT

The Department of the Peacekeeping Operations (DPKO) of the United Nations operated the following three phases of deployment: Mission Start-up Phase; Mandate Implementation Phase; and Transition Phase. UNAMID was on the implementation phase at the time as all the “mission components” (individuals working for UNAMID) were operating at near full capacity.

COMPONENTS OF UNITED NATIONS MISSION

The UN mission components were uniformed (military and police) personnel and civilians. The UNAMID deployment at the time was made up of the following:

Mission Components	Strength (number of individuals)
Troops	14,390
Military Observers (MILOBs)	332
Police (Advisors and Formed Units)	3,272
Civilian International Staff	1054
Local Civilian Staff	2,941
United Nations Volunteers (UNV)	403

Source: African Union / United Nations Hybrid Operation in Darfur, 2014.

UNAMID STRUCTURE

The missions operated offices in the entire Darfur region. UNAMID deployed in sectors along regional lines. The mission’s headquarters was located in El Fasher, North Darfur. The Sectors and their respective headquarters were: Sector South (Nyala), Sector West (El Geneina), Sector Central (Zalingei) and Sector East (Al Dein) (see Exhibit 2). A number of military team sites and camps for Internally Displaced People (IDP) were established and controlled by each of the Sectors.

DARFUR SECURITY SITUATION

The United Nations Department of Safety and Security (UNDSS) classified the security levels in peacekeeping missions into six levels:

Combating Food Borne Illnesses Through Safe Food Handling Practices in the United Nations/African Union Mission in Darfur (UNAMID), Sudan (A)

- Level 1 – Minimal
- Level 2 – Low
- Level 3 – Moderate
- Level 4 – Substantial
- Level 5 – High
- Level 6 – Extreme

The security level in Darfur according to the UNDSS was Level 4 – Substantial (i.e. significant security mitigation measures, strict control of exposure, and restriction of movement of UNAMID staff members are in place). This implied that the activities of the UN agencies, UNAMID, and Non-Governmental Organizations (NGO) were restricted and could only be conducted with strict compliance with security advice from the UNDSS, missions' security adviser, and clearance from the Government of Sudan (GoS). There were sustained incidences of carjacking, abduction, rape, physical attack, banditry, and all sorts of criminality targeted at civilians as well as UN personnel throughout the entire Darfur region.

STAKEHOLDERS IN UNAMID CATERING SERVICES

Lack of access to food raw materials and absence of nutritious food items occasioned by the geographical location and dynamic security situation in Darfur made it practically impossible for staff members to meet their nutritional needs. The non-availability of safe and nutritious foods to staff members on UNAMID premises posed a very serious challenge to their dietary needs. Because of this lack of food raw materials, many staff members depended on the cafeterias for their daily need of food. To create a well-controlled system of catering services, UNAMID management instituted a competitive procurement process coordinated by the Procurement and Contract Management Sections to engage the services of three successful vendors for the provision of catering services based on some guidelines and controls.

In the light of the foregoing, the stakeholders in the UNAMID catering services were:

- **Facility Management Unit (FMU)/Engineering & Environmental Protection Section (EEPS)**
This section was the requisitioner for catering services, hence, it was directly involved in the procurement process leading to the selection of catering vendors; provided cafeteria facility and equipment to the service providers; and maintained the provisioned equipment and facilities;
- **Medical Section**
Conducted food hygiene and safety inspections of the mission's cafeteria to ensure compliance with safe food handling practices, trained food handlers in food handling practices in collaboration with the mission Quality Control Inspector, conducted medical examinations, and issued certificate of fitness to food handlers;
- **Quality Control Inspector (QCI)**
Conducted scheduled as well as unscheduled inspections of the mission's cafeteria and vendors' storage facilities to ensure that service providers strictly adhered to food health, hygiene, and safety standards in accordance with the dictates of the Principles of Hazard Analysis and Critical Control Points (HACCP) and Good Manufacturing Practices (GMP). The QCI in collaboration with the Public Health Unit of the Medical Section conducted periodic food safety training for food handlers;

- **Welfare Section**

This Section was responsible for the psychological wellbeing of staff members in peacekeeping operations and thus collaborated with the FMU to ensure delivery of efficient and effective catering services to staff members;

- **Procurement & Contract Management Sections**

Involved in the selection of vendors through a transparent and competitive bidding process and ensured strict compliance by the selected service providers to the provisions of the performing contracts; and

- **Food Vendors**

Selected through competitive procurement bidding process to provide catering services in the mission, headquarters, and the Sectors.

UNAMID FOOD VENDORS

The three selected indigenous food vendors operating in the mission's headquarters in El Fasher and the Sector headquarters in Nyala, Zalingei, El Geneina, and El Dein were:

1. Pancrop Commercial Co. Ltd;
2. Crimson Light Restaurant; and
3. Tajuj for Development & Investment Co. Ltd.

The catering contract between UNAMID and the food vendors was to operate functional catering services in UNAMID headquarters in El Fasher and the Sector headquarters and to also provide breakfast, lunch, and dinner on a daily basis.

UNAMID provided at no cost to the service providers a fully furnished one hundred man catering facility at each site comprised of the following kitchen equipment: rice boiler, grill, deep fryer, stove, refrigerators, refrigerated containers (for perishable food items), storage containers for dry food items, furniture, utilities (i.e. power and water), and a solid waste disposal plant. In addition, the service providers were at liberty to provide, at their own cost, other relevant equipment or services necessary for smooth operation and management of the facilities under the contracts.

CAUSES OF FOOD CONTAMINATION AT UNAMID

Previous cases of food borne diseases in the mission had been linked to microbiological, environmental, and behavioral factors. Some of the causes identified through direct observation were:

1. **Unsafe food handling by food handlers** – due to ignorance, improper handling of food materials occurred at the point of purchase and during transportation, preparation and service. Microbes were suspected of being introduced from raw meat, poultry, and seafood to high risk ready-to-eat protein containing foods such as milk and milk products, fruits and vegetables, and cooked ready-to-eat foods that required refrigeration at a temperature of 4 degrees.
2. **Poor personal hygiene by food handlers** – UNAMID catering service providers did not provide food handlers with protective equipment (hair restraint, hand gloves, and apron) and thus this increased the chances of introduction of microorganisms such as *Staphylococcus aureus* from the nose, skin, and hair into food by the food handlers.

3. **Equipment** – deep cleaning and disinfection of food preparation equipment, utensils, and food contact surfaces were done periodically rather than on a daily basis as required by the food vendors; hence, they served as a potential source of microbial food contamination.
4. **Poor air quality** – the heat extractor installed in UNAMID one hundred man catering facility was to aid the removal of steam, smell, and odor during food preparation but had malfunctioned. This was due to a lack of spare parts and infrequent servicing, and thereby caused retention of warm, damp, and still air in the kitchen. This situation encouraged the introduction of airborne microbes into raw and cooked foods in the kitchens with the attendant health implications when such infected foods were consumed.
5. **Dust/Sandstorm** – Darfur is located in the heart of the Sahara desert which is characterized by sand dunes with frequent sandstorms (haboob) that caused physical contamination of prepared and unprepared foods by sand.
6. **Unwashed fresh fruits and vegetables** – UNAMID food vendors did not wash procured fruits and vegetables thoroughly and repeatedly with potable water thereby causing retention of soil and bacteria on the outer layers of the fresh foods. When such fruits and vegetables were cut or peeled under ambient temperature, the microbes inherently present on the outer layers multiplied and caused food contamination.
7. **Presence of pests** – due to the warm temperature and poor environmental sanitation, there were a lot of flies in Darfur. Though UNAMID cafeterias and kitchens were fitted with electric insect killers, constant opening of the cafeteria doors and windows provided avenues for the infestation of the facilities by flies. These flies perched and inoculated prepared and raw foods, cooking utensils, and contact surfaces, with pathogenic microorganisms. Some of the facilities were also infested with cockroaches, rats, and weevils which transmit pathogenic microorganism easily.
8. **Poor waste collection and disposal** – food remnants were not promptly collected and disposed of by the food vendors in UNAMID premises. These improperly handled food remnants had been used in error in some instances, and attracted pests, rodents, cats, and dogs. All of these scenarios have been closely linked to food contamination. In addition, waste collection bins were not always washed (inside and outside), not fitted with garbage collection bags, and not covered, thereby exposing the contents to pests and rodent infestation.
9. **Location of lavatory close to the cafeteria facility** – in most UNAMID camps, washrooms were situated close to the cafeteria facilities, a situation which predisposed offensive odor and swarming of flies in and around the cafeteria facilities.
10. **Poor food preparation method** – the employees of UNAMID food vendors were mainly indigenous people who did not have any knowledge regarding the requirements for basic food hygiene, health, and safety standards. To compound the problem, the food handlers were not trained upon their engagement in catering

activities by their employers, hence, they had limited knowledge about safe food handling practices. They thus were regular sources of food contamination.

11. **Non-maintenance of ready-to-eat food at prescribed temperature** – ready-to-eat foods were recommended to be held between 5 degrees Celsius and 63 degrees Celsius to prevent the replication of vegetative spores of microbes contained in foods. However, UNAMID food vendors did not adhere to this recommendation. Prepared foods that were supposed to be kept on the hot food presenters maintained at 63 degrees were mostly left in the cooking pots to cool under ambient temperature. Fruits and vegetables for salad that were supposed to be refrigerated at 5 degrees were also left under ambient temperature. The implication for these ready-to-eat foods held outside the recommended temperatures was that microbes and their spores contained in the food would multiply and cause food spoilage.
12. **Poor food raw materials transportation and receiving** – delivery of raw meat, fish and poultry products, perishables (fruits and vegetables), bottled water and beverages to UNAMID kitchens was done with mini buses and trucks that did not have the facility to ensure cold chain delivery. The food items were piled up in layers regardless of whether they were raw, fresh, or dry. This situation caused heat buildup, incipient/latent damage in perishables, and ultimately resulted in an outset of enzymatic and microbial degradation of food constituents. Raw fish, meat, and poultry products transported under such conditions suffered similar fate and in most cases had very high microbial load, which resulted in food contamination. On delivery, raw food items that were supposed to be refrigerated or frozen were left at room temperature for hours before they were refrigerated or cooked, thereby resulting in contamination and, when prepared, defective and unwholesome food.
13. **Fumigation** – the food vendors rarely fumigated the cafeteria environment and thus, there was a heavy presence of pests (flies, ants, and cockroaches), rodents, cats, dogs, and other stray animals in and around the cafeteria premises.
14. **Irregular Cleaning** – the level of hygiene in the mission cafeterias was not particularly high. Some of the vendors did not engage in deep cleaning of the equipment and facilities and, thus, the kitchen floor, wall, contact surfaces, and the cafeteria environments were generally dirty in such cafeterias.
15. **Non-provision of changing room for food handlers** – food handlers in cafeterias that were not provided with changing rooms, kept their personal effects such as clothing and shoes in the food storage rooms. This practice had been linked to the contamination of raw and intermediate food raw materials with pathogenic microorganisms.

NEXT STEPS

Dr. Ezeoke constituted a task force on UNAMID Food Hygiene and Safety with the Public Health Practitioner, the Food Quality Inspector, an Arabic speaking Medical Officer, and a representative from the Engineering and Environmental Protection Section (EEPS) as its members. Their mission was to develop a plan designed to investigate the source of the current food borne diseases and to mitigate the impact as well as curtail the spread of gastro-enteritis. As the team leader and coordinator of all the task force's activities, where should Dr. Ezeoke begin? What were the root causes of this most recent outbreak and what were possible solutions?

**Combating Food Borne Illnesses Through Safe Food Handling Practices in the
United Nations/African Union Mission in Darfur (UNAMID), Sudan (A)**

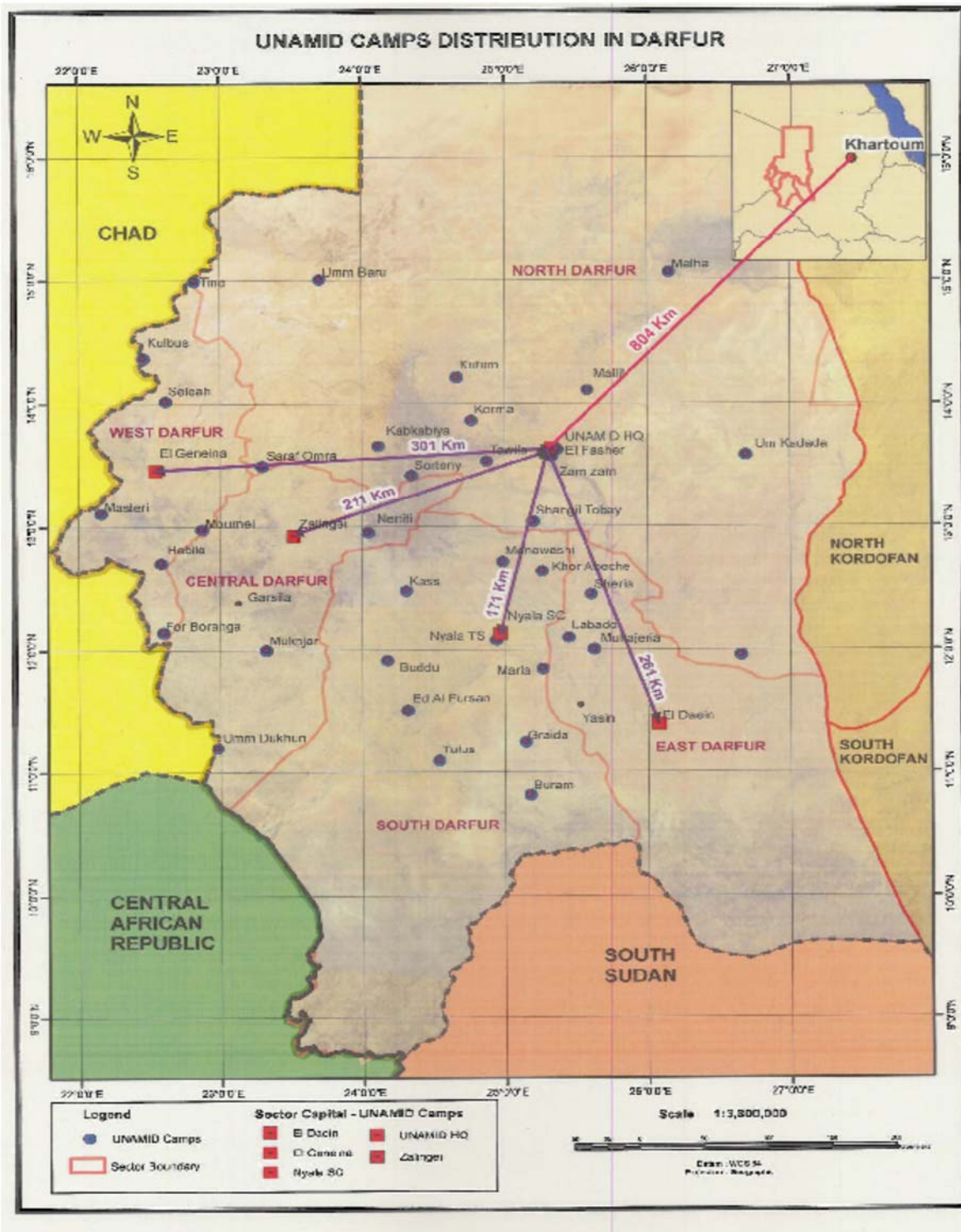
**EXHIBIT 1
Causative Organisms for Food Borne Diseases**

Causative organisms	Disease	Sources	Incubation period
Campylobacter jejuni (90% of cases) and Campylobacter coli (10% of cases)	Campylobacter enteritis	Animals, untreated water, raw meat, offal, poultry and untreated milk	1 -11 days Normally 2-5 days
Escherichia coli (E. coli 0157)	E. coli	Raw meat & milk; food, sewage, water, fruits and vegetables	1-6 days
Listeria monocytogenes	Listeriosis	Cooked/chilled products, fruits and vegetable salads, dairy products, soil, water, feces	3-70 days
Salmonella typhi and Salmonella paratyphi	Typhoid and Paratyphoid	Raw fruits and vegetables, raw milk, salad, contaminated water, feces of infected people and shell fish	7-21 days for both strains
Shigellasonnei	Bacillary dysentery	Raw fruits and vegetables, raw milk, salad, contaminated water, feces of infected people and shell fish	1-7 days 4 days most common
Norovirus	Viral gastroenteritis	Sewage-contaminated water, water-filtering shellfish, raw fruits and vegetables, person to person (fecal oral route)	1-2 days
Hepatovirus	Hepatitis A	Sewage-contaminated water, water-filtering shellfish, raw fruits and vegetables, person to person (fecal oral route)	10-50 days

Source: Stevenson & Nash, 2011.

Combating Food Borne Illnesses Through Safe Food Handling Practices in the United Nations/African Union Mission in Darfur (UNAMID), Sudan (A)

EXHIBIT 2



Source: UNAMID Geographic Information Systems (GIS) Unit.

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CASE 9

Combating Food Borne Illnesses Through Safe Food Handling Practices in the United Nations/African Union Mission in Darfur (UNAMID), Sudan (B)

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CHARTING A NEW COURSE

In view of the myriad of problems associated with the operations of UNAMID food vendors and the high prevalence of food borne illnesses, there was need to design non-medical interventions to mitigate the risk factors for food borne illnesses in the mission. When faced with a similar situation in the ECOMOG camp during the Liberia civil war in the early 90s, Dr. Ezeoke, a former ECOMOG Chief Medical Officer, had successfully managed the near crisis through non-medical interventions. His success was founded on the prompt identification of the risk factors and introduction of interventions to prevent an outbreak. He developed the concept of “Wholesome Food, Better Health and Business” which was an abridged version of the Food Safety Management System (FSMS) which itself was based on the seven principles of Hazard Analysis and Critical Control Points (HACCP) and Good Manufacturing Practices (GMP).

PROPOSED INTERVENTION

Dr. Ezeoke consulted with stakeholders in the UNAMID food catering contract with the view to charting a way forward. He coordinated a series of meetings with them during which he explained the concept of the “Wholesome Food, Better Health and Business”. He noted that this concept achieved resounding success when it was implemented during the ECOMOG days. Based on the identified risk factors for food borne illnesses in UNAMID and the peculiar nature of Darfur, he advocated for the adoption of the “Wholesome Food, Better Health and Business” concept.

CHANGE AGENTS

Dr. Ezeoke identified that in order to successfully reduce the risk factors for food borne illnesses he needed to introduce “Wholesome Food, Better Health and Business” in UNAMID cafeterias. He realized that to ensure successful adoption of the initiative, the mission would need to ensure proper training of staff members (who were remotely connected to the maintenance of hygiene, health, and safety standards in UNAMID cafeterias) in ISO 22000 (Food Safety Management System) to enable them to coordinate and drive the change. In light of the foregoing, Dr. Ezeoke recommended to the mission’s management that the Public Health Physician, Quality Assurance Inspector, and an Arabic speaking Medical Doctor should be sponsored to participate in the Chartered Institute of Environmental Health (CIEH), Level 3 Award Certification in Food Safety for Catering Supervision. The trio successfully completed the training, received their respective food safety certifications, commenced the training of food handlers in sequential groups, and conducted scheduled as well as unscheduled inspections of

the food vendors' facilities within the UNAMID camps. The aim was to observe compliance with the impacted knowledge on safe food handling practices.

WHOLESOME FOOD, BETTER HEALTH AND BUSINESS

This concept was designed to enable UNAMID catering vendors to adhere to the dictates of the Food Safety Management System (FSMS) through the application of safe food handling practices and record keeping. This was with the purpose of assisting the food vendors to operate within the stipulated food norms. The concept revolved around cleaning of food premises, proper cooking of food, storage of foods at low temperature (chilling), cleaning and disinfestation, maintenance of personal hygiene by food handlers, medical certification and training of food handlers, and effective supervision.

SAFE FOOD HANDLING PRACTICES

Due to the scope and nature of catering and retail businesses in a dynamic field environment the basic safe handling practices that were germane were as follows:

- a. **Cooking** – In addition to being a food preservation method, cooking improved food palatability and made food safe for consumption. Proper cooking of food ensured destruction of microorganisms and their spores. Monitoring and documentation could not be effectively carried out in catering as in typical HACCP systems where the use of calibrated thermometers was employed to measure the cooking temperature. Instead visual checks had to be carried out to ensure attainment of the desired result to ensure safe food.
- b. **Low temperature storage** – This was a food preservation technique aimed at rendering microorganisms and their spores contained in foods inactive through storage of foods at below 5 degrees Celsius. The ideal temperatures were as follows:
 - Refrigeration of perishable foods at temperatures between 1 and 4 degrees Celsius.
 - Chilling of raw meat, raw fish, and poultry products at temperatures between -1 and 1 degree Celsius.
 - Cooling of prepared hot food to 5 degrees Celsius with blast chiller prior to refrigeration to prevent replication of pathogenic microorganism.
 - Freezing of food at below 0 degree Celsius to reduce the quantity of moisture for microbial activity and to inhibit enzymatic activities.
- c. **Cleaning and disinfestation** – Cleaning of the food preparation premises was to be done with detergent and hot water to ensure effectiveness of the cleaning process. This included cleaning the kitchen walls, surfaces, and floor to remove dust, dirt, grease, and food leftovers. This was in addition to cleaning the cooking utensils, cafeteria environment, and storage facilities. Cleaning should also be complemented by disinfection with food grade chemicals to reduce microbial load in the food premises. Sanitizers (chemicals combining detergent and disinfectant activities) could equally be used.
- d. **Prevention of cross contamination** – Cross contamination of foods should be avoided through the following steps:
 - Prevention of contact between raw poultry products, meat and fish and ready-to-eat foods (cooked foods, salad, etc.) particularly in the cold storage facility.
 - Use of different kitchen equipment (knives, cutting boards, cooking utensils) to process and prepare raw poultry products, meat, and fish.

Combating Food Borne Illnesses Through Safe Food Handling Practices in the United Nations/African Union Mission in Darfur (UNAMID), Sudan (B)

- Prompt sorting, washing, and refrigeration of fresh fruits and vegetables for salad preparation.
 - Soaking cleaning cloths for food contact surface cleaning in sanitized water and washing thoroughly after each usage.
 - Prompt collection and disposal of food wastes.
- e. **Training of food handlers** – Training of food handlers on safe food handling practices should be carried out by the Public Health unit of the Level II hospital in the mission headquarters and the Sectors at least twice a year.
- f. **Medical certification of food handlers** – Medical fitness of food handlers should be tested by the Medical Section in all UNAMID premises and issuance of certificate of fitness to those who passed the tests. Those who failed the medical tests should be treated at any of the mission's health facilities and only be allowed to resume work once they passed another medical examination.
- g. **Maintenance of personal hygiene** – During food preparation, food handlers must be compelled to use protective equipment such as apron, hair restraint, and hand gloves to prevent introduction of microorganisms into foods. Supervisors were to ensure compliance by hourly visits and supervision.

CHALLENGES

Through direct observations of the cafeterias in the mission headquarters and the Sectors, the food safety team noted that less than 40% of the food handlers were complying fully with the dictates of the “Wholesome Food, Better Health and Business” initiative. They also observed that some had a lackadaisical approach to the concept while others did not even attempt to change from their usual unsafe food handling practices (see Exhibit 1).

Most of the food vendors and food handlers complained that the safe food handling practices they were being asked to practice were too stringent, complicated, and slowed down their operations. Citing a language barrier and low level of education of the food handlers, the vendors posited that the food handlers were finding it difficult to process and comprehend the food safety norms. In addition to this, the food handlers were reported not to be amenable to corrections due to local customs, traditional beliefs, and culture regarding food production.

Other major factors working against the success of the initiative were the dearth of manpower and the lack of spare parts by the Engineering and Environmental Protection Section (EEPS) to effectively replace or repair faulty catering equipment. The non-maintenance of infrastructures and the failure to collect and dispose of waste promptly played a complementary role.

A very potent factor for the near failure of the initiative in the mission was that, the three man food safety team was grossly inadequate to effectively cover all the cafeterias in the mission headquarters and the Sectors. Given the nature of the compulsory six weeks Rest and Recuperation (R&R) break for staff members, members of the food safety team had limited time to work together because of their R&R cycle.

The mission management provided the required support and encouragement for the successful implementation of the initiative. However, the reluctance of the food vendors and handlers to adhere to safe food handling practices and the inability of the mission to maintain the cafeteria infrastructure and equipment due to lack of manpower were the big hurdles Dr. Ezeoke and the “Change Agents” need to cross.

RESULTS

Available epidemiological statistics for the years 2010 to 2014 pointed to the fact that appreciable progress had not been made due to the low compliance level by the food vendors and handlers (see Exhibits 2-6). Dr. Ezeoke, however, observed that reported cases of food borne illnesses from UNAMID cafeterias whose food handlers complied partially with the dictates of the “Wholesome Food, Better Health and Business” initiative had been reduced considerably by up to 46% while incidences of food borne illnesses in those cafeterias whose food handlers were not complying were still very high.

DECISION

Leveraging the improved hygiene, health, and safety standards recorded in some of the UNAMID cafeterias, Dr. Ezeoke was convinced that for the initiative to take a firm root in the mission there was a need for management to strengthen the Public Health Unit of the Level II Hospital. This could be done through the recruitment of additional qualified inspectors to complement the efforts of the current food safety team. He was however, mindful of the current review of the mission’s civilian component to save costs. He realized that making recommendations to the management through the HFMS for the recruitment of additional qualified inspectors was seemingly insurmountable given the current downsizing by the mission; and yet he could not leave the food situation the way it was and not try to avert possible outbreak. This remained his major dilemma.

He was at a crossroad and scheduled a meeting with the HRMS to chart a way forward. What should he propose?

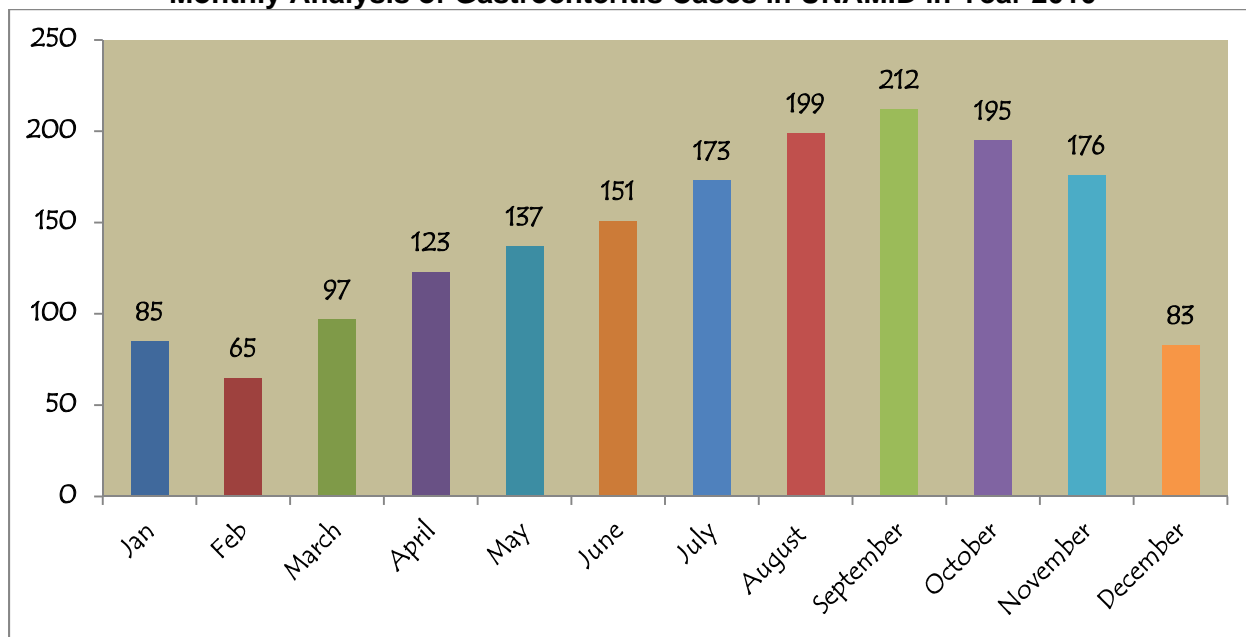
EXHIBIT 1
**Differences between Compliant and Non-Compliant Cafeterias
in Safe Food Handling Practices**

Non Compliance with Safe Food Handling Practices	Compliance with Safe Food Handling Practices
Dirty and unkempt cafeteria environment	Cleaned cafeteria environment
Waste collection bins without lids	Covered waste collection bins
Dirty waste bins	Cleaned waste collection bins
Dirty kitchen and equipment	Cleaned kitchen and equipment
Broken down equipment	Functional equipment
Poor air quality	Good air quality
Poor temperature control	Proper temperature control
Food handlers without protective clothing	Food handlers with protective clothing
Dirty and disorganized food storage room	Cleaned and properly arranged food storage room
Keeping of personal effects in food preparation area	Personal effects kept in provided personal lockers in changing room
Undisposed waste	Properly disposed waste
Presence of pests and rodents in and around the cafeterias	Absence of pests and rodents in and around the cafeterias
Keeping of raw meat, fish and meat products in the same cold storage facility with ready-to-eat foods	Keeping of raw meat, fish and meat products in a different cold storage facility than ready-to-eat foods
Sorting and washing of fresh fruits and vegetables	Properly sorted and washed fresh fruits and vegetables
Absence of wiping cloth soaked in sanitized water for cleaning of food contact surfaces	Presence of wiping cloth soaked in sanitized water for cleaning of food contact surfaces
Thawing of frozen raw meat, fish and meat products in cold stagnant water	Thawing of frozen raw meat, fish and meat products under warm running water
Dirty kitchen walls, floors and contact surfaces	Clean kitchen walls, floors, and contact surfaces
Food handlers preparing food with bare hands	Wearing of hand gloves by food handlers during food preparation
Food handlers with long and dirty nails	Food handlers with properly manicured nails
Food handlers with unkempt facial hair	Food handlers with properly trimmed facial face
Blocked grease traps and drainages.	Cleaned and properly maintained grease traps and drainages

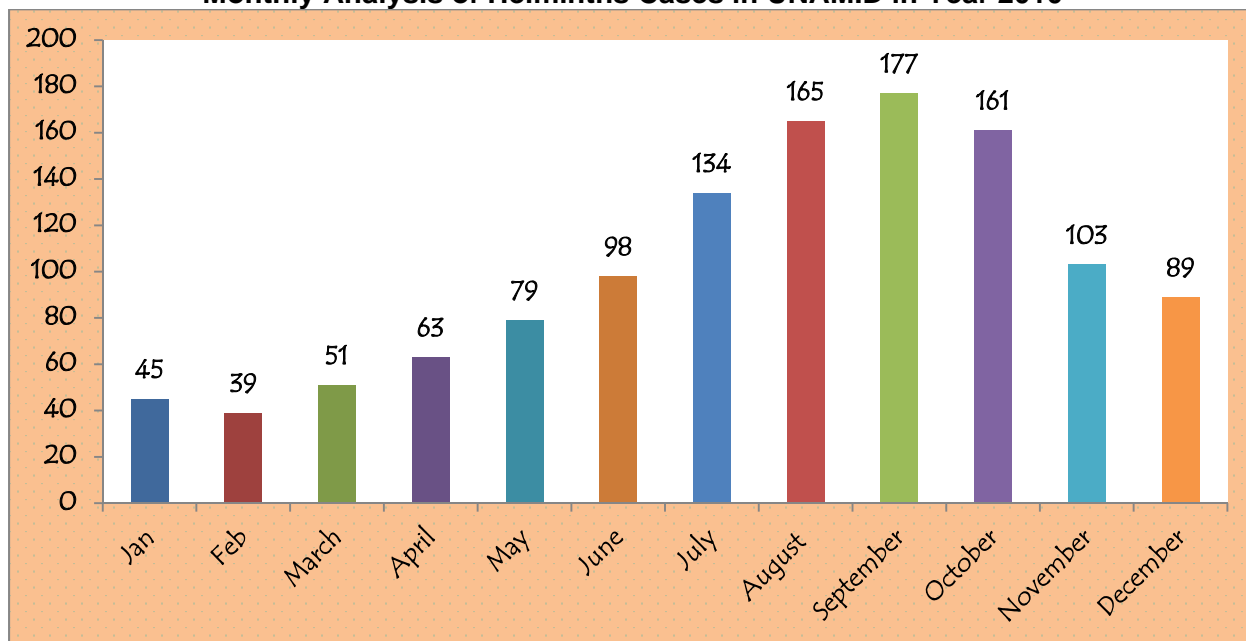
Source: Developed by author based on observation of food preparation activities by UNAMID food handlers.

EXHIBIT 2

Monthly Analysis of Gastroenteritis Cases in UNAMID in Year 2010



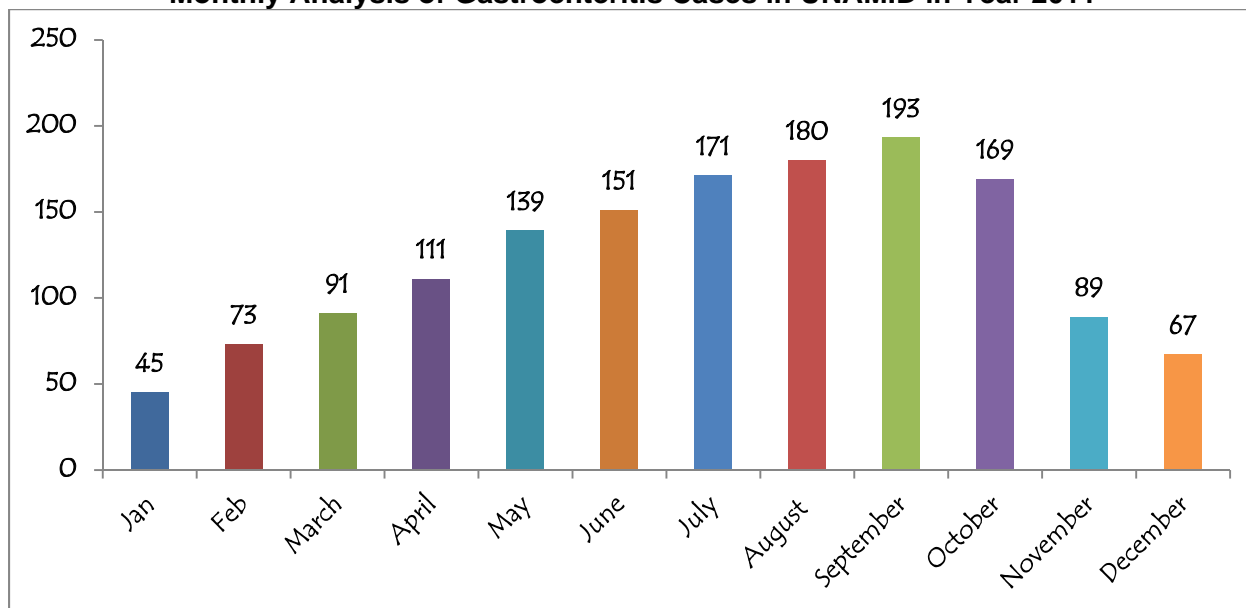
Monthly Analysis of Helminths Cases in UNAMID in Year 2010



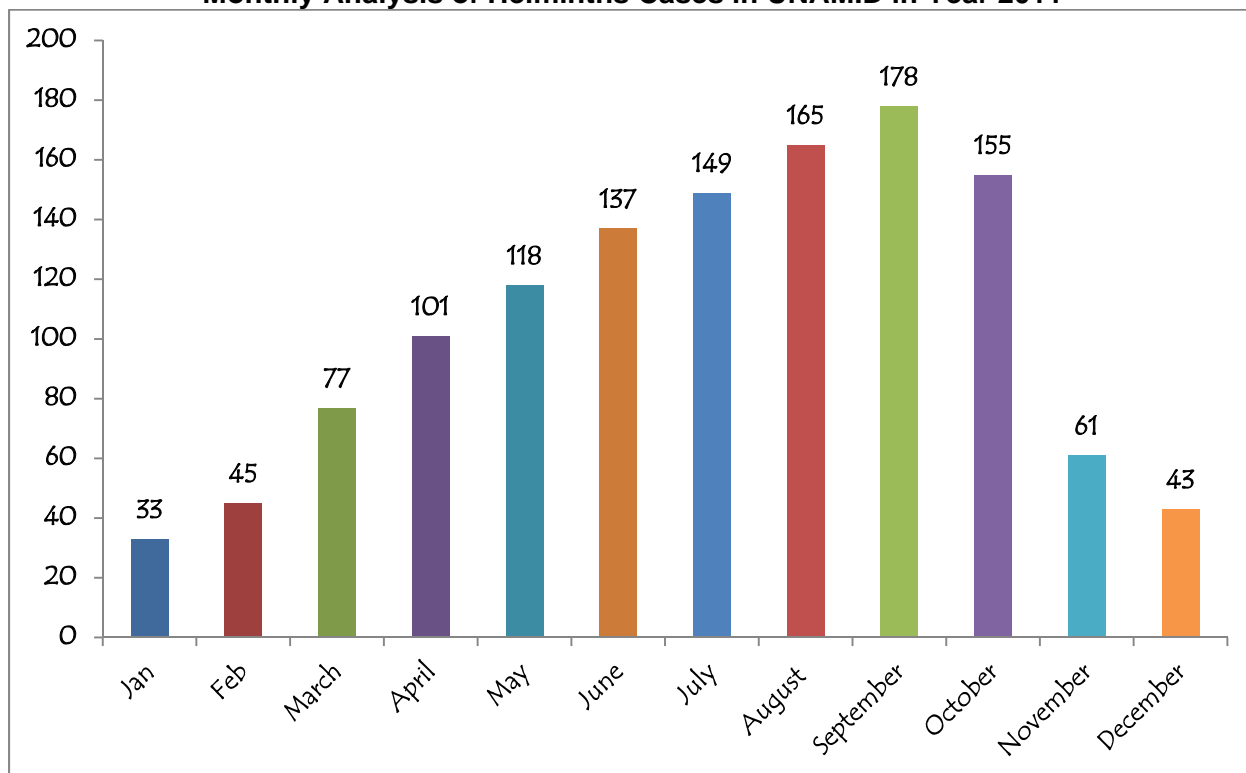
Source: Graphics developed by author based on unpublished data from UNAMID Medical Section.

EXHIBIT 3

Monthly Analysis of Gastroenteritis Cases in UNAMID in Year 2011



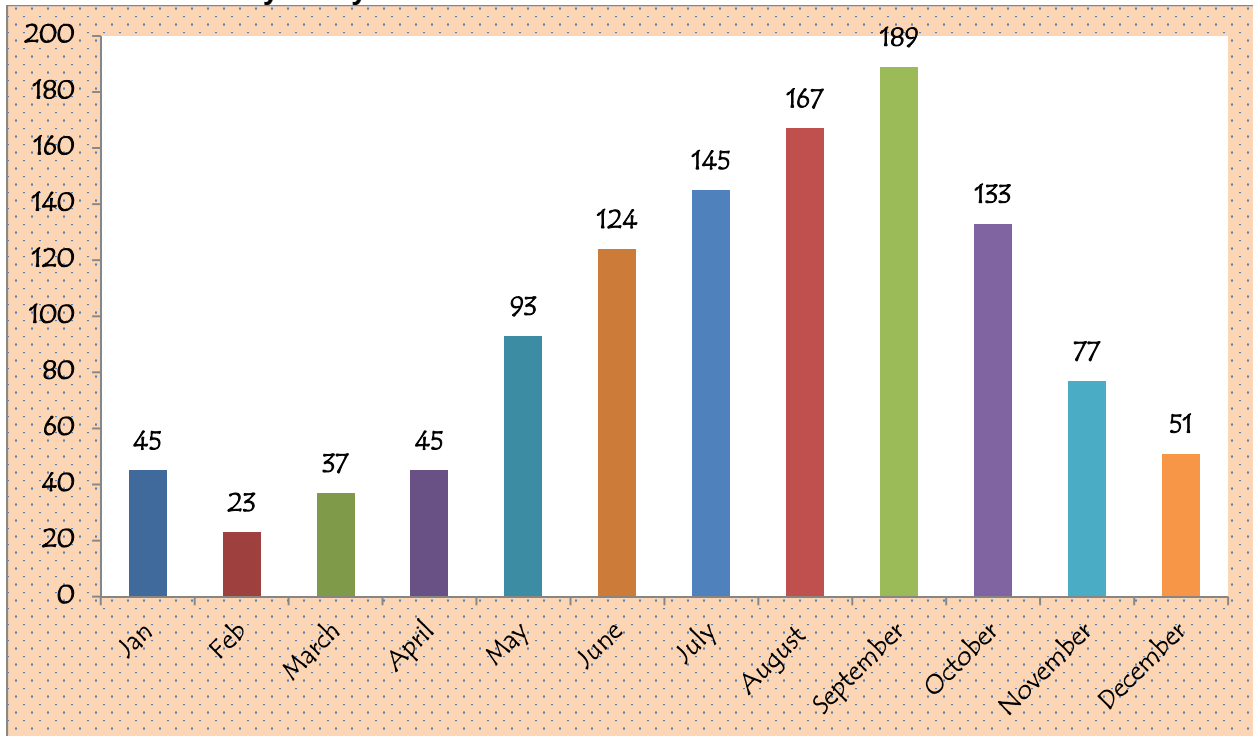
Monthly Analysis of Helminths Cases in UNAMID in Year 2011



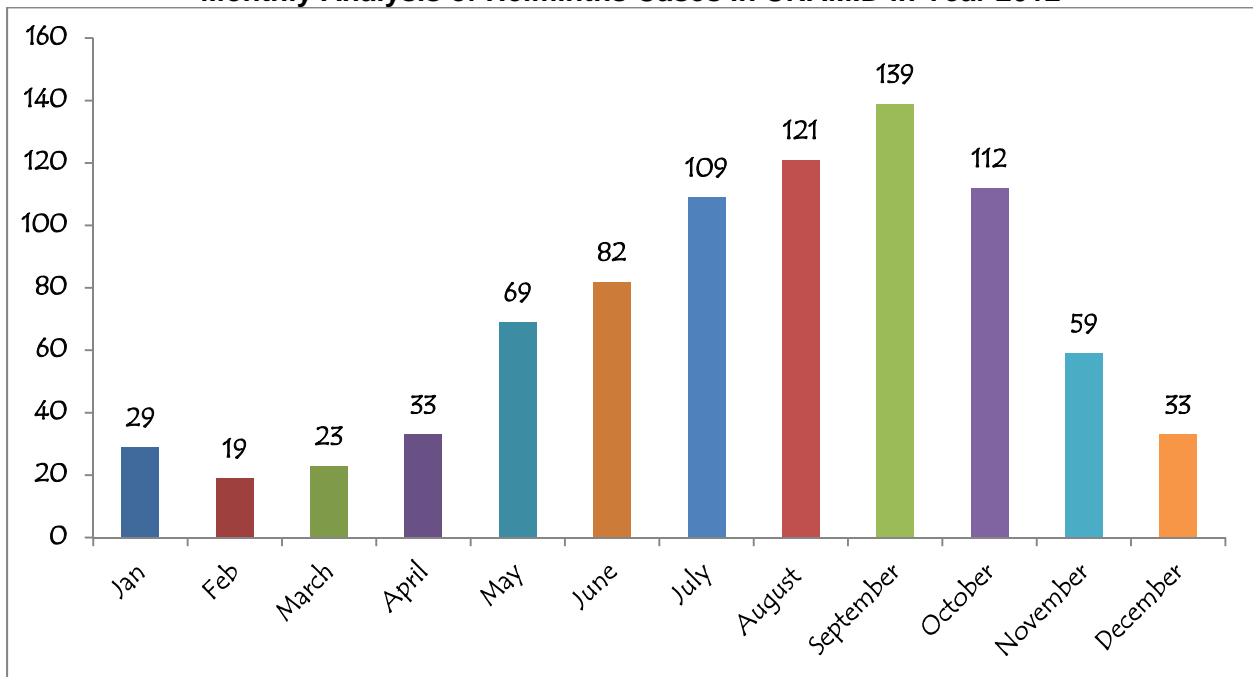
Source: Graphics developed by author based on unpublished data from UNAMID Medical Section.

EXHIBIT 4

Monthly Analysis of Gastroenteritis Cases in UNAMID in Year 2012



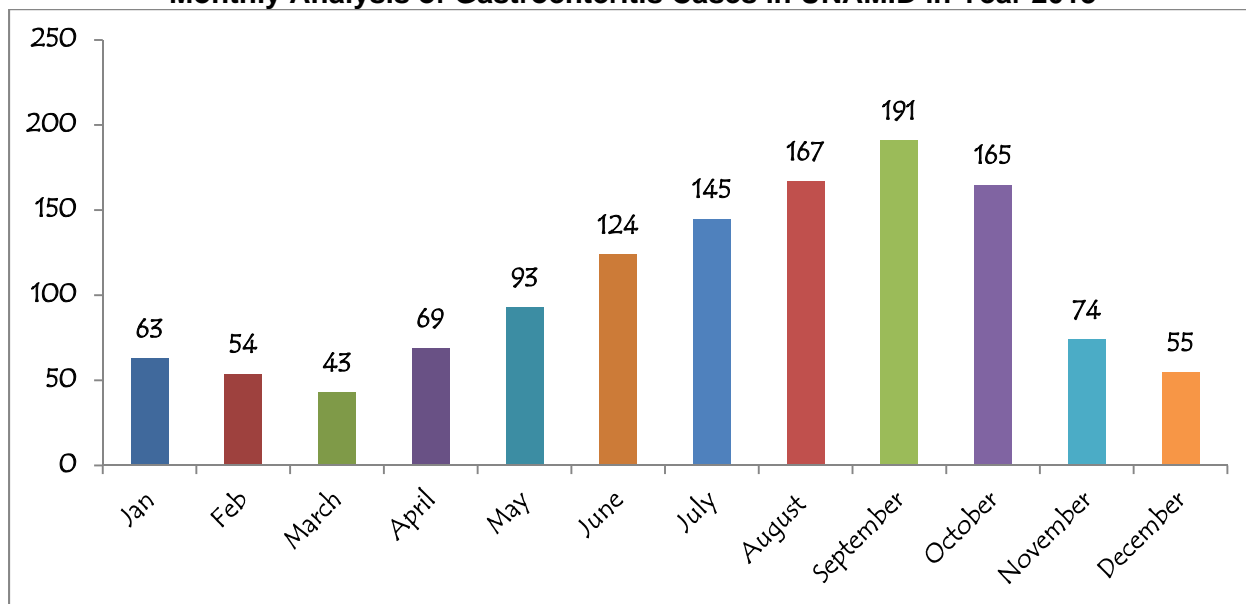
Monthly Analysis of Helminths Cases in UNAMID in Year 2012



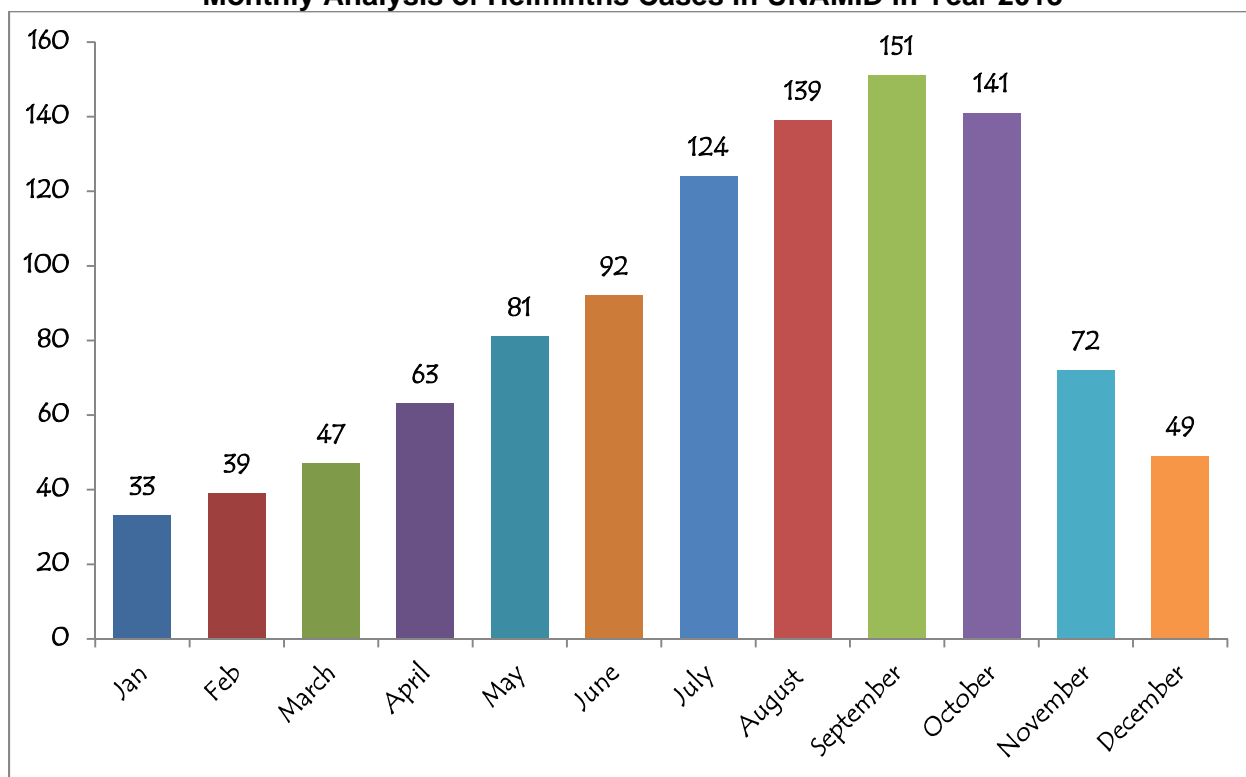
Source: Graphics developed by author based on unpublished data from UNAMID Medical Section.

EXHIBIT 5

Monthly Analysis of Gastroenteritis Cases in UNAMID in Year 2013



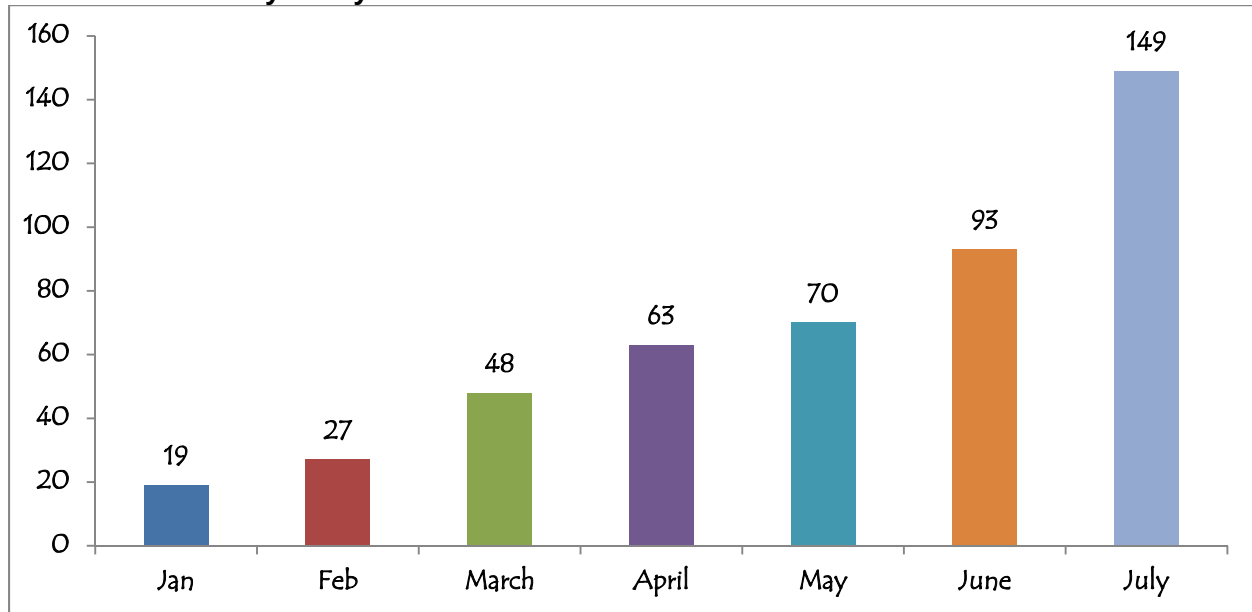
Monthly Analysis of Helminths Cases in UNAMID in Year 2013



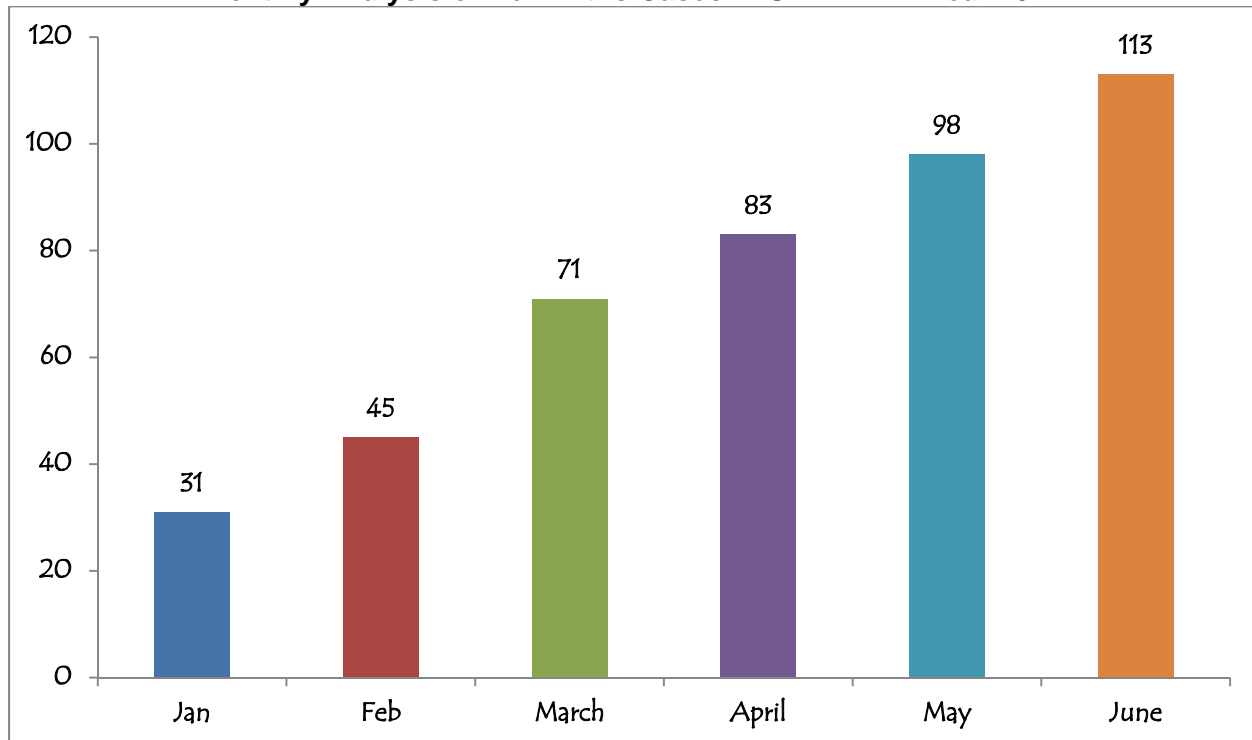
Source: Graphics developed by author based on unpublished data from UNAMID Medical Section.

EXHIBIT 6

Monthly Analysis of Gastroenteritis Cases in UNAMID in Year 2014



Monthly Analysis of Helminths Cases in UNAMID in Year 2014



Source: Graphics developed by author based on unpublished data from UNAMID Medical Section.

INSTRUCTOR GUIDANCE

Combating Food Borne Illnesses Through Safe Food Handling Practices in the United Nations/African Union Mission in Darfur (UNAMID), Sudan

Babajide Ogunjimi, MSc, MPH (MPH Class of 2014)

Marlene Janzen Le Ber, PhD (Assistant Professor, Brescia University College)

BACKGROUND

Given the statistics showing high incidence of gastro-enteritis emanating from United Nations/African Union Mission in Darfur (UNAMID), the Head of Field Medical Services (HFMS) in Darfur was directed by New York to investigate the causes, effects, and impact of food borne diseases in the mission as well as mitigating measures to curtail their spread. As a result of this development, the HFMS met with Dr. Maurice Ezeoke, Director of UNAMID Level II Hospital, and charged him to assemble and coordinate a team of experts to address the problem. Dr. Ezeoke constituted a task force on UNAMID Food Hygiene and Safety. The task force was to develop a plan of activity aimed at addressing the issue.

In Case B, the concept of safe food handling practices known as “Wholesome Food, Better Health and Business” which was subsequently introduced in UNAMID cafeterias is introduced. In spite of the support and encouragement from the mission’s management, the food safety team driving the change observed that less than 40% of the food handlers were complying fully with the dictates of the initiative. Based on identified factors for the poor uptake of the initiative, Dr. Ezeoke needed to make recommendations to the mission’s management for immediate implementation.

OBJECTIVES

1. Develop awareness about the risk factors for food borne illnesses.
2. Develop non-medical interventions to mitigate the risk factors for food borne illnesses.
3. Understand the importance of safe food handling practices in commercial catering operation.
4. Use strategic planning to drive continuous process improvement.

DISCUSSION QUESTIONS

1. What are the social, economic, cultural, and health impacts of safe food handling practices?
2. What are the steps to prevent food contamination during food handling in commercial catering operation and retail businesses?
3. What are the personal hygiene and health requirements related to food handlers?

KEYWORDS

Food safety; international; dynamic environment; food borne illness.

CASE 10

Youth as Change Agents

Jenna Paulson, MPH (MPH Class of 2014)

Thriveni S. Beerenahally, MBBS, MPH (Faculty, Institute of Public Health)

Shannon L Sibbald, PhD (Assistant Professor, Western University)

BACKGROUND

Two to three months before, I used to know there is violence, a youth problem in my area... Mum used to work in hospital as Aaya (Helper). So my elder sister was at home, me and Preethi were in other room and then man came and scolded, owner of rent house where we stayed. And he told: "You are doing very stupidly..." He beat us, he beat us for no reasons. When mother came in evening, when I was not there, she said: "What did you do to my daughters?" He did wrong way and all, and scolded very badly and my mother scolded very badly and said wrong words and all... then the man pulled her hair and took my mother outside... he was shouting and she was screaming and he was not leaving... mum fell down on the ground. And elder sister, she is pregnant, she came outside and said: "Do not beat my mother, why are you beating?" I think what man is doing, this is wrong. He beat on her also and she (mum) was hurt very badly, she said: "Do not do..." she got hurt very badly hit by him, and wheezing. Mum went to hospital because it was so bad. And the police and everyone came. This happens everywhere and in the street. It happened to me, it happens to youth, the police for many days they have not come because of the number of complaints to them. Some fathers, husbands, some boys now in jail. But problem remains the same.¹

– Anjali, age 13, Government School

Dr. Thriveni, MBBS, Urban Health Action Research Project Lead and Faculty at the Institute of Public Health (IPH), frowned deeply, her brows knit in concentration. The atmosphere of the KG Halli field office was loud and boisterous – kids were sprawled out on the ground, reading books from the small library. In the room next door, she heard the clattering of keys, of young girls clothed head to toe in black, working on completing a 3-month computer certificate course. Silently, she recounted all that she and the rest of the Urban Health team at IPH had done over the past three years. Perseverance and persistence was required to advocate on behalf of the local youth, and shift focus onto their issues, putting them in the spotlight. Certainly, over the years, she and IPH had formed a strong relationship with the youth, and they in turn had proven themselves to be truly passionate about championing their issues and improving conditions for the youth. However, there was so much more that could be done for and by them. The drive was there. She breathed out slowly, suddenly realizing she had been holding her breath. It was clear that more support was needed though, and resources were limited. Hearing the shriek of a

¹ All quotes from personal interviews by Jenna Paulson, June 2-18, 2014.

group of children, walking in their school uniforms, she glanced down at them from the window two stories above, and remembered the solemn words of one of the boys who had participated in the street plays last month:

The whole experience made me feel that it is possible for children to say something like adults. We can change it. If we try. We are the future of the country. Even children can bring in some changes if they want.

– Zahir, age 17, Private School

KADUGONDANAHALLI: THE URBAN SLUM

Kadugondanahalli (KG Halli), ward No. 30, is a poor urban neighbourhood in the city of Bangalore, India. It is one of 198 wards, and is represented by nearly 10,000 households and a population of 44,500 people.

Residents of KG Halli are faced with a multitude of problems. Navigation of and access to various services in the health care system are complex and fraught with barriers and challenges. The health care system itself is pluralistic, with a few doctors trained in allopathic medicine, and others in alternative types of medicine (i.e., homeopathic, ayurvedic, and Unani).

Services are not integrated. There is a poor referral system for patients seeking secondary and tertiary level care, resulting in a system that as a whole lacks continuity and is far from cohesive. Quality of care is poor, and there is a lack of emphasis on patient-centered care by medical practitioners. In addition, strong power dynamics at the state and country levels influence and sustain the fragmented nature of the public/administrative health system structure, where work is often done without cooperation and coordination. Along with other health issues, the prevalence of chronic conditions, mainly Type 2 diabetes and hypertension, is high in KG Halli residents. People incur high out-of-pocket expenditures for chronic disease and outpatient care, and many are either on irregular medication or none at all, as they cannot afford care. Youth in particular have very challenging living conditions. Child labour, early child marriage, tobacco use, gutka (chewable tobacco), alcohol abuse, and domestic and sexual violence are among some of the issues they are confronted with on a daily basis.

DR. THRIVENI, MBBS

Dr. Thriveni received her medical degree (MBBS) in India from Mysore Medical College in 1997. Some years later, she decided to return to school to obtain her Master of Public Health (MPH) in the United Kingdom, from the University of Wolverhampton. In 2009, she joined the Institute of Public Health Bengaluru as the project manager and took the responsibility of leading the project in 2012. She also works as Director of Sarvagna Health Care Institute, manages a dialysis unit with 10 beds, which provides free service for poor patients and runs a diabetes clinic, seeing up to 40 patients from the KG Halli community on a weekly basis.

As a part of the Urban Health Action Research Project, one of her main goals is to decrease the fragmentation inherent in the healthcare system, and bring all providers from various clinical backgrounds to the same platform, increasing overall quality of care for residents in KG Halli. Since the project began, Dr. Thriveni and the rest of the Urban Health Action Research Team (consisting of another clinician, Dr. Mrunalini, and three Community Health Assistants (CHAs), Nagarathna, Leelavathi, and Tabassum) spend a great deal of time in the community. They have strengthened the relationship with the slum residents, the local Community Health Centre (CHC), and the referral system itself by networking with some providers. In KG Halli, IPH has also helped to set up an overhead tank, running water facility for the toilets, and a drinking water facility at the public primary health centre, and a communal water basin for the community in KG

Halli. These small successes have not come about without naysaying critics, however. Dr. Thriveni has worked diligently to network and build relationships with some allopathic clinicians; it has been challenging and some even censured her, telling her: "You are wasting your time doing this. You are wasting the knowledge you have gained in medical school. Are you really a doctor?" Despite this, Dr. Thriveni has stuck to her vision, and has continued to work tirelessly with her Urban Health Team and colleagues at IPH to improve the quality of care in the area and influence public health in a positive way.

THE INSTITUTE OF PUBLIC HEALTH

The Institute of Public Health, a not-for-profit organization, was founded in Bangalore, India, in late 2005. It was the brainchild of Narayanan Devadasan and his wife, Dr. Roopa Devadasan. With the help of his friends, all of whom were doctors and other allied health professionals, IPH had a solid core team that it could build upon. Prior to starting IPH, Dr. Devadasan worked at the World Health Organization, India, where he came up with the idea of IPH and contacted his close friends to support him in his endeavour to get his project up off of the ground. Some of these friends/colleagues became the governing members and founding team of the early Institute; they all had similar ethics and values systems and were committed to working collaboratively to do a good job. During its first three years, IPH was headed solely by Dr. Devadasan, IPH Director, and a small, close-knit support team. Three years after its inauguration, in early 2009, IPH started expanding by taking on new projects, forming partnerships, and acquiring people and other resources.

Because IPH is not a self-sustaining enterprise, and receives funding on a per-project basis from various organizations, it has grown in number with each new project. Depending on the requirement of the specific project and the salary available, IPH slowly started increasing its staff. When Dr. Thriveni joined in 2009, there were less than ten people employed at IPH. Within the span of five years, that number grew to around thirty-two. Outside of project teams, the rest of the IPH staff was permanently stationed in the human resources, finance, and administrative sectors of IPH. In the early days, Dr. Devadasan focused on teaching, consulting, and training others. This work helped to generate some of the initial revenue for IPH, until the Institute started to take on major projects and engaged with donors and new partners, who were able to support IPH for specific projects.

The IPH main office is based in Girinagar, Bangalore, India. IPH, however, works in other states of India, where it provides consultation, conducts research, and supports other professionals and enterprises in the health sector. IPH's main office is in Bangalore; however, they have worked in the states of Gujarat, Chattisgarh and Kerala. There is a community centre in Kadugondanahalli (KG Halli) and an external office in Tumkur, which is used as a meeting space for staff members to discuss various projects.

Over the years, IPH has successfully formed partnerships with various enterprises all over the world, including the Sir Dorabji Tata Trust (SDTT), NRTT India, World Health Organization (WHO), WHO Alliance, EU Projects, Institute of Tropical Medicine (ITM) in Antwerp, Belgium, Misereor, Germany and Medico International, Germany. In the early years, the ITM, whose mandate is to provide for and support institutions in public health research and training, provided heavy support to IPH. Since then, the fruitful partnership between IPH and ITM has generated the resources necessary to undertake major projects to benefit public health in India thus far. Among these are action research in Tumkur, e-learning, specialized training and modules, and other short courses for IPH staff and other professionals in the health sector. In addition to the projects they take on, IPH employees may also pursue consultation work to offset the costs to run the institute (i.e. utilities).

YOUTH PROJECTS

IPH decided to get involved in youth issues for two reasons. First, one year after starting work in the KG Halli urban slum, IPH realized that there were many youth issues in the area, and that as a part of the integral development they had committed to, IPH should also pursue youth issues as a project focus. Second, the youth represent a future generation and they needed better support. Medico International, who had backed previous IPH initiatives, contacted IPH to advise that they would provide support for a youth activism project. One of IPH's representatives, Roopa, met with Medico International in Germany, and finalized the partnership.

HEALTH RALLY

The first youth-focused activity the IPH organized was the Health Rally (see Exhibit 1). It was not an activity in itself, however, its role was to make noise, spur a following, and raise awareness to bring people out to the Health Exhibition, which was scheduled for the following week. The Health Rally was used as a communication device, through which people would learn about a bigger event that they could attend, free of charge, and increase their knowledge about issues that would impact their health and overall quality of life.

To spread the word, the IPH Urban Health Team visited schools to invite children to be a part of the Health Rally. IPH wanted children from different schools to attend, so that they would get to know each other and word of the event would be more likely spread. Six schools were chosen, and about one hundred children from every school attended. Right before the event, they assembled outside the KG Halli IPH field office in four lines, and were given banners and snacks so that they would have enough energy to walk with signs, make noise, perform in the street plays (which would take place at various points along the Health Rally journey), and attract the attention of the community. Some of the youth brought instruments and noisemakers, such as drums. The energy was palpable. A huge banner was made and schoolchildren all took part in creating signs, placards, flags, and posters, all in bright, saturated colours. Some of the children drew pictures. Most importantly, all of the health issues that were broadcast through the medium of the Health Rally were chosen with the children's input. According to them, the most commonly cited major issues of the area were:

- Garbage (children playing in it and becoming sick);
- Tobacco use;
- Alcohol abuse;
- High frequency of domestic abuse and violence;
- Child labour;
- Child marriage;
- Early dropout from school; and
- No encouragement given in schools to "At-Risk" children.

The CHAs field coordinator helped the kids create the signs. After the materials were completed and youth were assigned roles to carry banners, posters, and flags, play music, make noise, and readied to perform street plays during Health Rally "intermissions", they headed out into the community on their pre-assigned route. The preparatory work for the Health Rally had been an arduous and difficult process involving applying, following up, and re-applying with the local authorities and police force, to obtain permission to carry out the Health Rally and its involved activities. A route had to be mapped out and strictly adhered to. Thankfully, after some back-and-forth, the activity and route were approved and IPH was lucky enough to capture the attention of a local TV station in Bengaluru, which would broadcast the events of the Health Rally on television. After the Health Rally, there was a lot of coverage on

the event in print media; the journalists were sure to highlight the upcoming Health Exhibition. They also covered the Health Rally at the Press Club Bangalore, where IPH representatives did a press release. During the event, the police escorted the group and ensured that only activities that had been communicated to them were put into action.

The youth took the main road in KG Halli and travelled almost 5-7 kilometers, stopping intermittently to perform street plays, in which children acted out a skit that they had practiced, on a topic of their choosing. Some of the topics called attention to tobacco and gutka (chewing) use, alcohol abuse, addiction, child marriage, child labour, and domestic violence. Through the Health Rally, IPH successfully raised awareness in the community and in the children and spread news about the upcoming Health Exhibition. Hundreds of people attended the Health Rally and even joined the group in marching through the city, making noise, involving the community, and allowing the children to take the spotlight in highlighting such provocative and serious health issues. In addition to leading the procession, the youth also strategically planned with IPH to not block traffic by carrying out street plays whenever it was appropriate to do so. This attracted more people and created a buzz, with people asking, *“What is it that these children are doing? Why are they doing it? What is this event all about?”* The community members were reading the signs, asking questions, and listening to the children; they stopped and watched the procession, and stood rapt as the children acted out colourful and realistic street plays that they could relate to. It was very exciting for everyone involved.

HEALTH EXHIBITION

The Health Exhibition took place from September 5-8, 2012, one week after the Health Rally (see Exhibit 2). The Health Rally had done its job to help raise awareness of the event and increase the likelihood of a greater turnout. A local elected representative was contacted and asked to act as host for the Health Exhibition, and introduce the street plays, which would be happening within the exhibition space. IPH also communicated with local doctors from the government and private sector to ask them to speak as guests at the Health Exhibition, as this was an inaugural function for them, and they wanted it to be as successful as possible.

IPH had three goals with respect to the Health Exhibition. The first was to create awareness of the health issues in the area. Second, IPH intended to use the Exhibition as a health-themed spectacular, and showcase the work that IPH had done thus far in the area, which was a part of their promise to the community and a testament to their growing relationship with the community. Third, in their pact to give back to the community, IPH wanted to let them know their future directions and activities, which would demonstrate the use of community feedback. The Exhibition itself took place at Bismillah Shadi Mahal, a venue that was well-known to the community members and general public. It was in a central area of KG Halli, on KG Halli Main Road. The Urban Health Team had worked hard to make the space as inviting and visually interesting as possible. The general idea of what an Exhibition ought to be like was quite different for the IPH Team and community members, however. On the first day, many people attended, expecting fun and games, foods to snack on, and a carnival theme. The reality was very different, though, and demonstrated that IPH was willing to break new ground, twist expectations, and make a powerful statement. Inside the cavernous warehouse-type space, there were stalls focusing on various health topics. Cutting straight through the centre of the room was the dominant Pill Display. It was, in Dr. Thriveni's eyes, a "super-duper" hit among kids and adults alike. Along the far wall of the space was a massive stage, where the youth, clothed in day-glo green and pink costumes, performed street plays on various health topics based on scripts that they themselves had written as a group, with the aid of the drama teacher, Mr. Srikanth. Originally, there had been a small space for a video show to take place, but later, it was moved indoors because the space proved to be unsuitable. Once it was moved

to the new space with a few chairs, there was a greater turnout. Everyone was interested in watching the video, which was all in Hindi, about generic medicines, garbage management, and other health issues such as domestic and child abuse. At its zenith, the Exhibition was all energy, bustling bodies, incessant querying, and wonder. All about the huge venue, there were large and colourful banners proclaiming the inaugural event was by courtesy of the Institute of Public Health. It was an exciting time for IPH and the response from the community and children from local schools was astounding.

The planning phase for this public event was demanding. It was completely organized by Dr. Thriveni, Dr. Roopa, Field Coordinators Amrutha and Munegowda and the Community Health Assistants (CHAs), Nagarthna, Leelavathi, Tabassum, Josephine, and Nageena. Exhibits needed to be planned, roles had to be assigned and divided amongst the Team, children had to be contacted to do the street plays at their schools, and somebody had to invite healthcare professionals to be a part of the events. One of Dr. Thriveni's colleagues, Roopa, came up with the idea of the Pill Display, which proved to be the standout of the Health Exhibition over the three-day period. It clearly showed the pills that were taken at different critical points across the lifetime (i.e. newborn, child, preadolescent, adolescent, adult, and elderly). It was striking because the entire exhibit was the length of the warehouse (about half a football field long), and was comprised of pills encased in plastic squares, paper mannequins representing individuals at different points in their lifetime, and on a raised platform just a few inches above the vast stretch of plastic squares, various vials and bottles of medication and pills. It was visually arresting and the source of much surprise over the course of the Health Exhibition. In order to create this exhibit, IPH had to borrow some of the medicines, list all of them, and ensure they had the quantity they needed. They had to buy other medicines from generic stores and keep them at Roopa's house while she painstakingly sewed over fifty plastic squares together and shut so they would safely hold the pills and medication. Few staff went to Roopa's house to help and the community centre in KG Halli was used for a couple of days before the exhibition for more hands and space to complete sewing with Roopa.

Not only was IPH designing and running exhibits, it had also invited some of its partners and non-governmental organizations (NGOs) that it had worked with in the past. IPH needed to ensure an NGO's attendance, and gather the required resources to run the particular exhibit. There were exhibits and stalls run by Foundation for Revitalization of Local Health Tradition (FRLHT), the nearby CHC, Greet India, Action for People with Disability (APD), and local teachers, among others. In addition to the Pill Display, IPH organized several other stalls on its own, which were focused on tobacco use, the Urban Health Action Research Project (UHARP), addiction, and other health-related activities (i.e. the Health Rally, street plays, and body mapping activity).

The three-day Exhibition was overall a great success; however, on the first day, not many people attended. IPH suspected the reason was because the concept of an Exhibition always involved play, games, fun, and snacks, similar to a carnival. What they had organized was entirely different – it was focused on health and raising awareness through creative health communication and knowledge translation techniques. To track event attendance, IPH kept a book at the entrance of the Health Exhibition for children to share their feedback. What they found was that the Exhibition was especially helpful for girls; many of them had questions about pregnancy and pill-taking across the lifetime. After their exposure to the Pill Display, they were more sensitized to their choices pertaining to their bodily and sexual health and what kinds of pills had to be taken at different points in their life, and the sheer amount of things that needed to be consumed all at once, at multiple times, and sometimes even concurrently. Certainly, family and friends of the youth who attended were very supportive of them attending

the Health Exhibition, participating in it, and learning things that they could apply to their own lives to promote their good health.

One of the greatest feats that was achieved through the Health Exhibition was the attraction of a local politician to the event. IPH's initial plan to have health ministers or directors attend the event was not successful. During the event, the Institute was able to form a great relationship with the local Member of Legislative Assembly (MLA), K.J. George. He was very interested in the work that IPH was doing with the local youth and in their other projects, and was willing to support them in their future endeavours. Since beginning work with IPH, he has donated computer equipment to the KG Halli IPH community centre, and has declared his wish to support the institution financially. Unfortunately, because of an Institute policy, IPH had to refuse the financial support that the MLA was offering, to his shock. Over the years, since connecting with him at the Health Exhibition, Mr. George's support for IPH-organized youth activities has endured. Their strong relationship continues today, and he has proven himself to be a true proponent of IPH ventures in KG Halli.

STREET PLAYS

I feel good participating in the street play... it gives something meaningful to peoples. Advantage of skit is, if we say, the people could not understand; they could not pick up it, some, some parts they miss. If we show, as an act, they'll understand it soon...

– Navid, age 15, Private School

What we did to practice was we made a circle. First we did a round circle, and chose some girls and boys. He [Mr. Srikanth] knows who will act properly. That is why he chooses some girls and boys and not others to do longer parts that are more important to do well. [A] politician came. We did child marriage. One scene we are doing. Daughter will ask her father: "Why are you doing?" Her friend tells her to be careful because father is drinker. Mother had to marry her daughter with him. They called the police and there were telling: "Child marriage is going on and police will come here." What happened in the family was done. All neighbours were watching and must tell, child marriage is illegal and is going on. We must stop this. In ending, he will tell: "Child marriage is not allowed in India. We have to punish you. Justice is served."

– Preethi, age 16

The first street plays took place during the Health Rally and Health Exhibition (see Exhibit 3). The children started preparing and practicing for their performances in late August, 2012. The drama teacher, Mr. Srikanth, taught the kids about drama and prepared them for their performances. IPH bought material and found a tailor to fit the children with uniforms and costumes to wear during the street plays so they could be easily distinguished. Boys and girls wore different coloured uniforms, boys in green and girls in pink. As part of the preparation for the street plays, the IPH team used the guidance of the CHAs and children to identify six locations in the KG Halli area where they and most of the community frequented.

IPH's aim in doing the street plays was to put the youth in the spotlight, as leaders in spreading knowledge about health issues that were prevalent in the KG Halli area. They wanted to train the youth so that they could return to their schools and teach their peers, and to their families back at home, and influence them. They felt that children were easier to change than adults as they are more impressionable and ready to take up knowledge than adults with their deeply

ingrained habits. The children were more than willing to share their ideas. They were also eager to contribute, and let the drama teacher and IPH staff know what they saw as youth issues in their community. As a group, they created and came up with the scripts and the topics for each skit. IPH used the input of the youth and allowed them to collaborate freely, which resulted in colourful and relatable skits that would be dramatized for the public. A few children proved they had a natural talent for acting and were given more central or leading roles by Mr. Srikanth, who recognized their skills. As a whole, the youth were trained and demonstrated a willingness to play the roles they were required to fill. They were all the more convincing because they themselves had come up with the stories, or had been through the scenarios themselves. Even children who were shy became quite enthusiastic over the prospect of performing in front of a large group. Their energy and desire to change things through an art form and be known as local champions for their communities was clear.

Hundreds of people attended the street plays. It seemed as though the child actors captured and kept the attention of the community, of people of all ages, and across all walks of life. The youth felt that by acting rather than telling, people took notice and were more receptive to the messages, because they were not being forced, scolded, or lectured. Learning was active rather than passive because children were a part of a real-life scenario that community members could relate to. The children expressed their desire to do more street plays in the future, and on a more regular basis, so that people are continually reminded about important issues pertaining to their health. They wanted to cover other health topics, too, such as Street Cleaning, De-Addiction, Daily Intake of Fruits and Vegetables, Domestic Abuse and Violence, Second Hand Smoke, What Happens to Children after Discontinuing School (Consequences of Dropout), and heavy responsibilities on youth in caring for elders. They were sure that the response from their audience was positive, too, especially since the local MLA, K.J. George, was so encouraging in his feedback to them. It made the children and their families proud.

Even though the street plays were a grand success in the community, and the children were empowered as a result and looked upon by their community as unified, change-driven, and possessing a real "voice", there were some goals IPH failed to achieve. Despite their most trying efforts, the Institute was unable to reach out to policymakers, and those capable of making changes at the macro-level. Dr. Thriveni and her Team had worked tirelessly to invite health department officials, bureaucrats, government officials, the deputy director, and program officers, to no avail. To their great disappointment, not a single representative from the Bruhat Bangalore Mahanagara Palike (BBMP) attended the events.

BODYMAPPING

With our teachers, we came to know as a class why it is important to learn and as we have become adults, it is all important for your futures and your life and all. Usually we cannot ask anything deeply to our parents, so they said to us we can share here. That made me feel good.

– Preethi, age 16

The first Bodymapping workshop took place in the new school year of 2011 (see Exhibit 4). It was the first time the IPH Team was going to work with the youth in the schools. First, the Urban Health Action Research Team visited all the schools in the KG Halli area, both government (public) and private admission schools. They needed the informed consent of the headmaster or headmistress. The Team was required to write a letter explaining what would be taught, their intent in doing the sessions, and how long a typical session would take. Obtaining the school headmaster's or headmistress' permission to do the workshop was not an easy

task, and some schools were not very welcoming; they thought the subject matter was wrong and should not be taught. However, IPH persisted and started training the CHAs on how to lead the workshop and increase their level of knowledge and confidence with the topics to be discussed.

After the schools agreed to the activity, the CHAs accompanied Dr. Thriveni, the workshop leader, to the special Body mapping workshop and health awareness sessions for the students and sometimes Dr. Roopa also accompanied the CHAs. This workshop was an important part of the building process of the relationship IPH had with the local youth, and with the schools, for future events. Despite two schools' outright refusal for the team to carry out the sessions in the schools, all others were open and willing. Initially, some schools seemed more wary than others and were keen to assign the students' teachers to sit through the workshop. Each Bodymapping session lasted a half hour but was packed full of activities to teach the children. The ultimate goal in doing the Bodymapping workshop was to get the youth to know themselves, and understand the processes within the male and female body that cause important changes. It was meant to raise their awareness of issues pertaining to their sexual and overall bodily health, so that they could make more sensible and reasoned choices to positively impact their state of health and quality of life. Sessions were conducted in Hindi, Kannada, or English. At first, separate sessions were held for girls and boys, and then later, the groups were brought together for a mixed session.

At the sessions, the general focus was on teaching the children about the anatomy of the body of both sexes, with a focus on the reproductive system. Each workshop began with an introduction of the purpose of the session, and was followed by a drawing exercise. The children were asked to draw the bodies of a six, 12, and 20 year-old boy and girl, and label them. Amusingly, the team found that great effort and painstaking detail was put into sketching the eyes, hair, nose, mouth, fingers, ears, bellybutton, and limbs, however, the reproductive organs were nowhere to be found! From the start, the team knew they had an uphill battle in getting the kids comfortable and receptive to the session material. After the bodies were drawn, the workshop leader moved on to a discussion of the reproductive organs of boys and girls. For the female anatomy, the group spoke about the uterus, and explored a model to enhance their learning. Many children were shocked to learn about the various parts of the model and had no idea what all the parts were, that they had different roles, and did different jobs. Most of the children laughed, giggled, and teased each other at first, but as they became more comfortable, they expressed gratitude for what was being taught. Throughout the session, children were allowed to talk and ask questions. Depending on how many questions the kids had and how engaged they were in each session, workshops would range from 30 minutes to an hour, and sometimes beyond that. As a group, the students realized that knowing this information was beneficial for them. Many of the students felt as though this kind of session was a blessing to them, and would benefit children all over India if it were mandatory in schools.

At first, when a school faculty member was appointed to proctor the session, the IPH team noticed that the students tended to become much more reserved, quiet, and shy. With their teachers stationed in the room for the duration of the activity, they became closed off. So, the IPH team requested that the teacher not be present for the session, in order to make the most of what little time they had with the children. In order to make it easier for the children to open up, the IPH team also placed a large question box in the classroom, so they could submit questions. This was especially helpful for shy students. When it came time to open the box and answer the questions, all students listened eagerly. During the question-and-answer period of the session, most children were incredibly curious and wanted to know about sex, how the

baby forms inside a woman, and STDs, especially HIV. They wanted to know if it was transmitted through touch, or some other means; their curiosity was clear as they had never had an opportunity to ask questions of this nature. Also surprising was the fact that many of the CHAs were unaware of issues pertaining to their sexual and reproductive health, and most of these women were mothers and had delivered children. It was clear from the feedback of the youth that teachers often refused to discuss these things with them, out of embarrassment, shame, or simply not knowing the answers themselves.

In doing the Bodymapping sessions, it came as a huge surprise for the IPH team that, in fact, most teachers were completely unaware of certain critical things pertaining to bodily and overall sexual health, puberty, menstruation, menstrual hygiene, and reproduction. Many times, Dr. Thriveni wondered to herself whether IPH should have organized a separate session for the teachers, but with limited time and resources, the youth were the audience that the messages needed to get through to. In KG Halli, and the rest of India, early child marriage and pregnancy were highly prevalent youth issues, and doing this workshop could teach the kids to make more sensible choices about their bodies and think twice before engaging in activities that could impact them negatively in the future.

Overall, the sessions were striking for the children, and all of the information was new for everyone involved. Girls and boys alike were surprised to know about the parts of the male and female reproductive systems, and the changes that occurred in a boy and girl over the years. The information on menstruation and female sexual health was particularly important and valued by the girls at the sessions; many of them had no idea what was happening with their sisters, mothers, and in themselves when somebody started menstruating or became pregnant. Girls did not know what ovaries were, nor that they produced eggs. What they learned astonished them, because nobody at home spoke about these things, as there was a lot of stigma around it. The youth often were scolded, or felt as though it was inappropriate to ask questions pertaining to sexual health to their parents or elders: it was taboo. Often, parents would brush it off; they felt that there was no responsibility or duty for them to teach their children, and nobody spoke openly about these sorts of things. The common attitude was that children would "find out later" and that it was "for elders to know." In fact, when parents of these children found out what their children were learning at the Bodymapping workshop, reactions ranged from skeptical, to grateful, to enraged. Many felt that if these things were learned, it would drive them to experiment. However, IPH counselled them and promoted the idea that if children know the mechanics of things, they won't experiment, won't harm themselves, and won't get involved in something wrong or harmful. And gradually, most parents came around to the idea that learning these kinds of things would help their children rather than harm them. The majority were thankful that somebody else could explain it to their kids, and warmed to the idea that now their children would be making better choices, because they weren't curious and diving into potentially risky activities.

THE FUTURE

In the future, the children's recommendations on ways to improve the past IPH-organized events would be implemented. Because the workshops occurred on an ongoing basis, there was time to plan and incorporate their ideas to make improvements. According to the youth, most people are unaware or ignorant of youth issues. Worse, when a child leaves school to pursue work, their issues go unnoticed or become "invisible" or "unimportant"; they felt that the earlier a child leaves school, the greater the chances of getting involved in drugs, alcohol, tobacco use, and criminal activity. However, after being involved with activities like the street plays, they were convinced that events like these give the youth an opportunity to play a central role in communicating to the community; it causes everyone they are connected to to

question their own behaviour. Despite the success of the events they had been involved in, youth still felt that changing behaviour was hard. Politicians cast a blind eye and remained a challenge in influencing public health, and many people in the community were resistant to change and were unaware of the harms or were uneducated and unwilling to listen. The children ultimately conceded that the street plays were their greatest success. Not only was the information disseminated to the community, but the plays empowered the youth and made them feel like local champions, capable of making a difference, and able to positively affect public health in those in their immediate and broader social network.

As a part of its vision for the youth, IPH intends to organize more activities and events for them, but it all is dependent on donor support and available financial and other resources.

Hypothetically, with ideal financial support from some of its partners, IPH could create a roadmap to influence public health for the better through the youth. For instance, at the KG Halli field office, Dr. Thriveni wants to have a full-fledged library with a librarian, because the children who visit the community centre everyday have created a demand for a bigger and better space. They use it communally, to share, learn, and interact with one another. At present, staff who work at the field office now have limited time and other commitments, so devoting more time to the library is very difficult for them. Similarly, the computer lab could be revamped, so that more training and learning could take place. Presently, for kids who are not in school, having a library and computer lab available to them at the centre increases their job opportunities greatly. Their chances of employment go up with the knowledge of computer skills such as typing. Right now, completing IPH's basic skills computer class takes about three months, with the child receiving a certificate upon completion of the course examination. Ideally, IPH believes in giving the children much more than simply the basics, because this is what they want and, importantly, what they deserve.

THE YOUTH...THE HEROES

Before I didn't think I could do anything. But being together all of us knowing what is a big problem is making us do something together. We can try to change things. It could change people's minds about how they do stuff.

– Srijan, age 15, Private School

Youth play a dynamic role in successful knowledge transfer to the public, and their story is inspiring and worth telling. They have some fantastic ideas on how to improve society and overall quality of life in their communities, and are passionate about making a change for the better and positively influencing public health. They have shown themselves to be capable of raising awareness of serious and pressing issues that attention has not been paid to yet. Most importantly, when they acted in unison, with a singular purpose and message, they generated results, and even garnered political attention for their efforts. As a group, the youth have acted on behalf of their community, of their country, for the millions of voices that have not dared act out of fear, shame, desperation, or a sense of defeat. As a whole, they have the power to change people's behaviour, actions, and minds. They can influence the system.

Hearing a shriek from a group of students on their way home from school brought Dr. Thriveni out of her reverie. Despite all this inspiring introspection, a nagging worry roiled her. Though the children have proven themselves to be capable of taking the reins, leading activities that benefit public health, and are passionate change agents for their community, IPH was not a self-sustaining enterprise. Its activities were project-driven and depended heavily on donor support and financial backing. Dr. Thriveni recalled the most inspiring street play that had been performed in the middle of the dirt roadway of Vinobha Nagar Kadugondanahalli Road. It had

been amazing, and made her tingle with excitement, just recalling the zest and enthusiasm of the young actors and actresses. The children were so eager to show their community how hard they had practiced and making their voices heard -- they wanted to be change agents. They wanted to improve conditions for youth in their community. They were full of ideas and recommendations. Dr. Thriveni wanted to bring the recommendations of the youth to fruition and create real and lasting changes that best served them.

A cacophony of riotous laughter made Dr. Thriveni turn to see what was going on along the winding and crisscrossing streets below. A group of children were playing Kho Kho, darting and running about. There was so much activity. Babies were running around bare-bottomed. Mangy dogs basked in the hot sun on their bellies. Women in patterned, colourful saris queued up with water jugs balanced on their heads, along the side of the blazing cement wall of the opposite building as the communal pipe gushed water for the first time in two weeks. Uniformed boys and girls walked in groups of two to five with backpacks snugly fitted to them; some were in shoes, others in bare feet. Men in collared shirts zoomed across roadways on their motorbikes and scooters nearly missing cows slowly meandering across the road, some trickily balanced three to four people on a single vehicle, each person tightly holding onto the next. All of this activity and organized chaos made Dr. Thriveni look away momentarily – something had to be done for the youth, by the youth. With such an eager group of children, all of whom had such exciting and rich stories and ideas of their own, how could she persuade her team and IPH's external partners to jump on board and support a new youth-focused project? What should her next step be? Time was limited, resources were scarce, and the youth needed to be allowed to champion their ideas again.

Youth and public health were of the essence.

EXHIBIT 1
Health Rally



Source: The Institute of Public Health, Bengaluru, 2012.

EXHIBIT 2
Pill Display at the Health Exhibition



Source: The Institute of Public Health, Bengaluru, 2012.

EXHIBIT 3
Street Play



Source: The Institute of Public Health, Bengaluru, 2012.

EXHIBIT 4
Bodymapping



Source: The Institute of Public Health, Bengaluru, 2010.

INSTRUCTOR GUIDANCE

Youth as Change Agents

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BACKGROUND

Kadugondanahalli (KG Halli), a neighbourhood within the urban slums of Bangalore, India, is riddled with barriers and challenges to navigation within the healthcare system. Residents, faced with a multitude of problems, including chronic conditions, primarily Type 2 diabetes and hypertension, have poor access to healthcare services and are, thereby, faced with high out-of-pocket expenditure. The youth, especially, are confronted with extremely challenging living conditions. Healthcare services at KG Halli are not integrated, quality of care is poor, and these trends are perpetuated by the strong power dynamics that exist at both state and national levels. For the past three years, Dr. Thriveni, Urban Health Systems project manager and Public Health Specialist at the Institute of Public Health (IPH), has been advocating on behalf of the local youth to improve their living circumstances.

OBJECTIVES

1. Generate awareness about local health issues in KG Halli, the role of the IPH, and future directions.
2. Diminish the inherent fragmentation of the healthcare system by bringing all providers from various clinical backgrounds to a common platform.
3. Reduce the prevalence of youth health issues by providing tailored support for future generations.
4. Facilitate access to quality health education programs targeted to the youth population.
5. Empower youth as leaders in spreading knowledge about health issues affecting KG Halli.
6. Encourage youth to achieve more sensible and reasoned choices regarding their health status and quality of life.

DISCUSSION QUESTIONS

1. What are the knowledge translation tools/devices used in the case study?
2. Brainstorm the advantages and disadvantages or drawbacks of each of these.
3. Consider some of the differences of using each of these in a different cultural context. What might you need to keep in mind to ensure the successful 'transmission' of the messages?
4. In what ways can IPH potentially increase the spread of its health communication to the community and youth?

KEYWORDS

Youth; health; awareness; community; slums; health rally; health exhibition; street plays; bodymapping; Institute of Public Health; Urban Health Systems Project; barriers; advocating.

CASE 11

Knowledge Dissemination and Private Well Water Testing in Middlesex County, Ontario¹

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INTRODUCTION

David Killarney, Manager of the Safe Water and Rabies Team of the Environmental Health Department at the Middlesex-London Health Unit (MLHU), stood in the office kitchen filling his tea kettle with tap water. He took a moment to reflect and appreciate the comfort and safety associated with municipal drinking water, readily available at the touch of a tap. While most Canadians receive drinking water from municipal sources, it is estimated that over four million Canadians receive drinking water from private wells, the responsibility and maintenance of which reside with their respective owners (Jones et. al., 2006). Well water contamination is often of low concern to residents with good reason; in many cases, ground water has remained pristine and safe for hundreds of years without requiring any treatment. However, Ontarians in rural areas are no longer exempt from potential concerns around their drinking water. Ground water is subject to contamination by a variety of sources including *E. coli* and other harmful bacteria, as well as pesticides and chemicals from surface runoff. These risks are especially prevalent in agricultural communities. In 2006, an estimated 45% of all waterborne disease epidemics in Canada involved non-municipal water systems, largely in rural or remote areas (Jones et. al., 2006).

To address the issues associated with well water, the Province of Ontario provides a well water testing service free of charge to well owners with the support of local health units, including the MLHU. However, participation in private well water testing by well owners has been declining in some areas in recent years, which places this group at risk of waterborne illnesses. Reflecting on the unique characteristics of Middlesex County's rural population, Killarney wondered where the gaps in the MLHU's information dissemination were and how services and information could be organized and applied to better reach out to the community. As he prepared his tea, Killarney questioned what communication strategies the MLHU was using to connect with Middlesex County's rural population to convey public health messages.

BACKGROUND

Middlesex County

The MLHU serves two different populations in Southwestern Ontario: The City of London and Middlesex County. London is located approximately half way between the urban centres of Toronto and Windsor. The surrounding areas form Middlesex County and include eight

¹ The case description, while based on a real experience, is adapted for learning purposes.

municipalities: Adelaide Metcalfe, Lucan Biddulph, Middlesex Centre, North Middlesex, Southwest Middlesex, Strathroy-Caradoc, Thames Centre, and the Village of Newbury. Middlesex County encompasses over 3,300 square kilometres of land (Middlesex County, 2012), the majority of which serves agricultural purposes – the primary economic driving force of the area. According to 2013 data, the population of Middlesex County was approximately 75,000 people (Middlesex County, 2013); 25% of whom lived in a household with a private well (MLHU, 2012b). As a predominantly urban centre, London has very few residents who relied on well water, receiving municipal water from Lakes Huron and Erie depending on geographical location within the city. Exhibit 1 features the municipalities located in Middlesex County and Exhibit 2 features the population of these municipalities.

Private Well Water Testing Procedures in Ontario

The management of private water wells is part of the provincial Safe Water program that operates under the Ontario Public Health Standards (OPHS) (MLHU, 2012). Requirement No. 6 of the OPHS reads: “The board of health shall provide information to private citizens who operate their own wells, cisterns, rain or lake water system to promote their awareness of how to safely manage their own drinking-water systems” (OPHS, 2008 p. 63). The health unit (“board of health”) is responsible for promoting well water testing and making the service accessible, whereas Public Health Ontario (PHO) completes the laboratory testing component, conveying results back to the health unit and well owners. At the MLHU, this program is housed within the Environmental Health and Chronic Disease Prevention (EHCDP) service area. The well water testing service is free for all Ontario residents. PHO recommends that well owners sample their water three times per year: in the spring, summer, and fall (MLHU, 2012), although testing may be completed more frequently if desired. Additional testing for chemicals and dissolved minerals may also be requested by well owners, but these supplemental services are not provided by PHO. Instead, it is recommended that well owners use the services of private laboratories that have been accredited by the Ministry of the Environment and Climate Change, with well owners absorbing any associated costs.

The recommendations provided by PHO are simply recommendations; there is no overarching organization that enforces sampling and there are no penalties for non-compliance with such recommendations. While local health units such as the MLHU are doing their part to encourage and facilitate well water sampling, their reach does not extend beyond providing the services and ensuring they are available. In short, the responsibility of water testing relies on the property owners and no one else.

Services Available at the MLHU

There are 12 pick-up locations across Middlesex County for residents to obtain water testing sample bottles, although only five drop-off locations for water samples. As a result, it is often required of residents to drive significant distances to drop off their water samples, travelling outside of their municipality or into the City of London. A list of drop-off locations is available online on the MLHU website with additional information on the process, including a contact number for further questions. In Middlesex London, the hours of operation for the drop-off locations are limited, with the exception of the MLHU office at 50 King Street in London and the public health laboratory, which is at the St. Joseph’s Regional Mental Health Care building, located in East London.

If a laboratory result tests positive for *E. coli* or total coliform contamination (could include a variety of other bacteria), the MLHU is notified immediately, usually within 1-2 days. Bacterial contamination, particularly *E. coli* 0157:H7 could cause severe illness including stomach cramps, diarrhea, and vomiting (Public Health Agency of Canada, 2014). More serious cases

could lead to kidney failure and even death (PHAC, 2014). Next, a letter is mailed to the homeowner with the test results, and a public health inspector provides a follow-up phone call. The purpose of the phone call is to answer any questions and discuss the possible causes of the adverse result. Once receiving an adverse result, well owners are accountable for incurring the costs of treatment or repair to the structure or water themselves. The system appears to work effectively for those who use it, yet there are fewer residents using the service each year.

The Walkerton Tragedy

Canada's "worst-ever" outbreak of *E. coli* contamination took place fourteen years ago in Walkerton, Ontario, in neighbouring Bruce County (CBC News Canada, 2010). Walkerton's water source was groundwater (or well water) and became contaminated by surface water runoff. Negligence on the part of several parties contributed to insufficient chlorination leading to 2,300 reported cases of *E. coli* and 7 deaths in a town of only 5,000 people (CBC News Canada, 2010). This tragedy was not far from the minds of Ontario residents, particularly Killarney and the Environmental Health team at the MLHU.

THE DILEMMA

With a publically funded water testing service available to residents, the low number of households that regularly sampled their private well water was alarming. Killarney's discussions with PHO identified that a meagre 1% of private water well owners tested their water three times per year as recommended and only 15-20% of well owners tested at all across the province. Exhibit 3 provides the proportion of tests submitted by municipality. At the same time, it was estimated that up to 45% of all incidents of waterborne illness in Canada were related to non-municipal water systems such as private wells or small drinking water systems (Jones et. al., 2006). It became clear that sampling rates in Southern Ontario were failing to meet the public health recommendations, demonstrating a disparity between what was suggested and what was being done (Hexemer et. al., 2008). Furthermore, data provided in a study completed in Hamilton, Ontario, a short distance from Middlesex County, confirmed through a survey that residents were indeed concerned about water safety (Jones et. al., 2006). This information prompted Killarney's questions as to why there was disconnect between clear concerns for water, yet low testing rates in the community.

THE PRIVATE WELL WATER TESTING PROJECT

Killarney determined that there was a need to assess the knowledge level and perceptions of the local population around well water testing in order to strategically build and implement a communication plan that would better meet the needs of the community. Data would need to be collected from private well owners, a unique population that differed from urban residents in London. The transfer of information regarding the importance of well water testing clearly was not working effectively with the target population. In order to gauge the needs of the local community regarding well water testing, Killarney decided to complete a needs assessment. Exhibit 4 includes the Needs Assessment Questionnaire used. The needs assessment was completed at the MLHU in the summer of 2014 with the support of the Safe Water and Rabies team and Angela Gray, a Master of Public Health student from Western University. It was important for Killarney to understand the perceptions, values, and beliefs of the target population, including attitudes and relationships towards water, in order to develop new communication strategies that would motivate behaviour change.

Working with a number of professionals at the MLHU, background information was gathered and a research question developed. The research question for the needs assessment was: "What are perceived facilitators and barriers related to private well water testing in Middlesex County?" The needs assessment would entail one-on-one interviews with community members

who owned or resided at a property with a private water well (the target population). The goals of the project were as follows:

- To identify the knowledge level among owners/residents of private wells regarding private well water testing and safe well water practices;
- To identify the facilitators and barriers to private well water testing and safe well water practices among owners/residents; and
- To identify potential effective strategies identified in the research literature to facilitate private well water management.

RESULTS

Initial visits to the more rural municipalities in Middlesex County were planned with the idea that township offices, community centres, and libraries may be good places to start. As it turned out, these community spaces did not offer nearly as much pedestrian traffic as expected. The first scheduled site visit was made by Gray to the Middlesex Centre Municipal Office located in the town of Ilderton on a Thursday afternoon. It was the week taxes were due, and municipal staff anticipated high traffic as a result. The first few people Gray spoke with were all employees and all lived in homes with municipal water sources. While the municipal personnel were pleasant and very accommodating, if Gray hoped to reach the rural residents on private wells, a different approach would need to be taken.

Gray began by taking a look at any and all potential opportunities of locating groups of rural residents together at the same time. While county fairs and special events would be the ideal places to complete interviews with residents, they were sparsely distributed throughout the summer and fall, and would not provide enough data before the collection deadline at the beginning of July. It was also planting season, and with a very late spring and heavy rains, it was a crucial time for farmers who were in the process of completing their planting. Community centres, libraries, and municipal offices were also good options, but in most cases, the farming community would be working in the field and not visiting these places during working hours. The target population also did not work standard office hours or take a traditional hour lunch from 12-1pm, so seeing these individuals on a lunch break was impractical. Local coffee shops, restaurants, and corner stores could be sensible venues to catch local people, but were also located in more developed areas with municipal water access. It became clear that simply reaching the target population would be the greatest challenge of the project.

Gray's next plan of action was to target building and farm supply stores as close to rural areas as possible. In addition, perhaps more than a few hours at each location would be required to speak with enough residents. Kenwick Mall in Strathroy was also home to a MLHU office as well as a grocery store and restaurant, which could be an option for locating the appropriate population. The Strathroy office also served as a drop-off location, meaning that well owners could drop off their water samples there on Mondays and Tuesdays to avoid transporting them to the lab themselves. Another option was to piggyback on visits to homeowners who had experienced adverse results. A new program at the MLHU had one public health inspector completing follow-up home visits to improve client service regarding well water sampling, treatment, and maintenance. In addition, discussions with the MLHU staff that worked with rural populations took place in order to strategize where to best reach the target group. Gray utilized each of these strategies in order to complete the necessary interviews to collect data for the needs assessment.

Strategic planning for interviews resulted in mediocre success. As stated by one resident in the Village of Newbury, "Everyone's got town water here, my dear. They put lots of lines in." As

spoken by a library employee in the same town, “Lots of people work and commute. I’m not so sure you’d find anyone during the day. Then again, evenings are hit and miss.” The MLHU ethics policy would not support door-to-door visits and, even if possible, how many rural residents would be sitting inside their homes during the day as opposed to working in the fields? The Private Well Water Testing Project’s needs assessment hit a turning point one evening in Parkhill, located in the far north of Middlesex County, only a short 15 minute drive from Grand Bend on the shores of Lake Huron. When approached, one resident turned to Gray and said, “80% of people have town water [...] Farmers are in the field. It’s a busy time for them. In town you’re going to catch single moms, kids using the library’s internet, and young families from town. I can tell you right now this is the wrong place for you.”

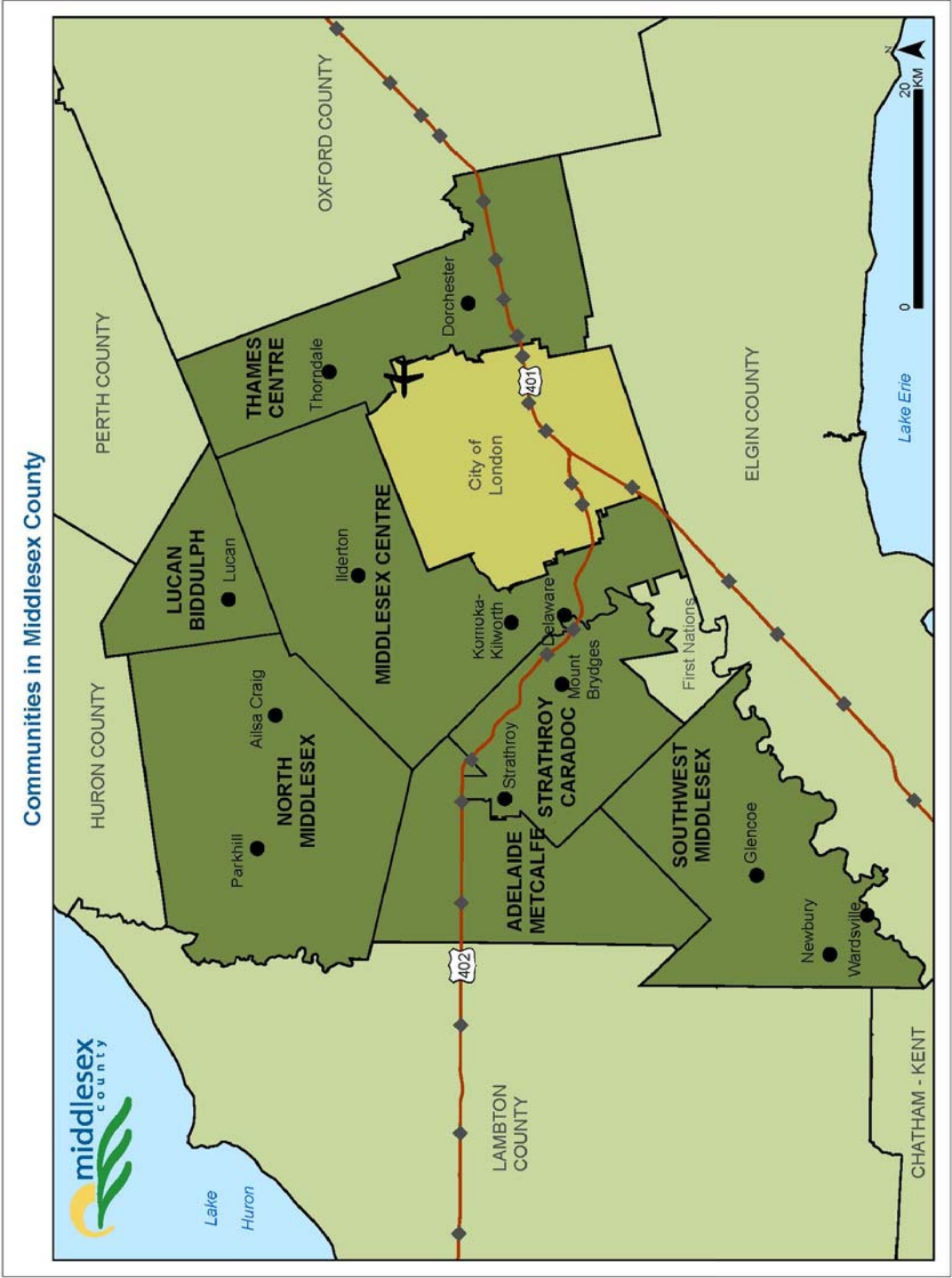
Communication Challenges Identified

In addition to the sampling challenges associated with the Private Well Water Project needs assessment, other barriers related to communication became evident. Through interviews conducted during the needs assessment, Gray found that the test instructions were complicated and unclear for some well owners, requiring time and careful review. This incomplete information could lead to an inaccurate sample or refusal for testing by the lab. One resident turned on the bypass to his treatment system because he thought that was what he was supposed to do. This was a well-educated man who lived with a private well for many years. Looking at the instructions, they did not mention whether the sample was to be a treated or required a raw sample of water. This information gathered from residents did not come without verification. According to the Water Testing Information System database, approximately 9% of samples were not tested for a number of reasons including: insufficient information on the sample, the sample was warm upon receipt, the sample was not collected in the proper bottle, the sample was too old, a unique identifier was missing or mismatched, and many more (Ministry of Health and Long-Term Care, 2013).

UNRESOLVED ISSUES

The Private Well Water Testing Project was a useful initiative in gathering feedback from the local community related to knowledge of, and perceived barriers to, regular well water testing. Yet there were now more challenges than ever. The most significant communication barrier became evident through the question, “Are you aware that Public Health Ontario recommends testing your well water three times per year?” In response, a vast majority of participants reported “no”. Killarney had a significant task here to address. If the target population was unaware of the well water testing guidelines, not testing nearly as frequently as possible, and challenging for public health professionals to connect with, what would he need to do to increase testing rates? Was the problem with knowledge dissemination or did communication need to exist as more of a two-way relationship? In what ways could the MLHU support this community in protecting health from waterborne illness? Killarney would need to determine an effective and appropriate way to communicate *with* and *to* the target population, in a way that would motivate change in health behaviours.

EXHIBIT 1
Map of Middlesex County



Source: Middlesex County, n.d.

EXHIBIT 2
Middlesex County Population by Municipality

Municipality	2006	2011	2016
Middlesex County	68,917	70,903	78,558
Adelaide Metcalfe	3,028	3,315	3,593
Lucan Biddulph	4,187	4,338	4,538
Middlesex Centre	15,589	16,487	18,546
Newbury	439	447	460
North Middlesex	6,740	6,658	7,268
Southwest Middlesex	5,890	5,860	6,094
Strathroy-Caradoc	19,959	20,978	22,183
Thames Centre	13,085	13,000	15,877

Source: Middlesex County, 2013.

EXHIBIT 3

**Annual Average Tests Submitted as a Proportion of Total Number of Dwellings,
by Municipality, 2009-2013**

	London	Lucan Biddulph	Middlesex Centre	Thames Centre	Strathroy- Caradoc	North Middlesex	Adelaide Metcalf	Southwest Middlesex
Avg. annual tests submitted	1780	413 (5%)	3052 (11%)	1988 (8%)	1746 (4%)	347 (3%)	1120 (21%)	1011 (8%)
2011 Private dwellings	n/a	1653	5808	4836	8162	2483	1064	2470

Source: Ministry of Health and Long-Term Care, 2013.

EXHIBIT 4
Needs Assessment Questionnaire

The MLHU Private Well Water Testing Project

The purpose of the project is to gather feedback from residents of Middlesex County who have private water wells. We would like to better understand the reasons that influence well water testing, including the challenges that residents may face. Your feedback is important to help us improve the health unit's services in order to encourage well water testing.

1. **Screening:** What is the source of water for your house? Is your water supplied by a Municipal water source (i.e. you periodically receive a water bill) or from a well on your property? If asked, by "well", I'm referring to any means of getting water from the ground, including dug, bored or drilled wells, and sand point.

Municipality: _____ **Type of well:** _____

2. Do you or any member of your household drink water from your well?

Yes ___ **No** ___ If no, please explain why not? _____

3. Do you treat the water supplied by your well to your house?

Yes ___ what is the treatment method/device that you use?

- | | | |
|--|--|--|
| <input type="checkbox"/> Water softener | <input type="checkbox"/> Iron filter | <input type="checkbox"/> Sediment filter |
| <input type="checkbox"/> Carbon filter | <input type="checkbox"/> UV (ultraviolet) disinfection | |
| <input type="checkbox"/> Constant chlorination | <input type="checkbox"/> Reverse osmosis system | |
| <input type="checkbox"/> Boil drinking water | <input type="checkbox"/> Other (please describe) | |
| <input type="checkbox"/> I don't know | | |
- _____

No ___

4. Has the water from your well ever been tested for bacteria (E.coli, total coliforms)?

☐ **If yes**, when was the last time your well water was tested for bacteria? _____

☐ **If yes**, how often is the water from your well tested for bacteria?

- ☐ More than twice a year
- ☐ Once or twice a year
- ☐ Every two or three years
- ☐ Less often than every three years

☐ **If no** (or can't recall), why have you never tested your well water for bacteria?

5. Have you ever tested your well water for chemicals such as fluoride, sodium, nitrates?

☐ **If yes**, when was the last time your well water was tested for chemicals? _____

☐ **If yes**, how often is the water from your well tested for chemicals?

- ☐ More than twice a year
- ☐ Once or twice a year
- ☐ Every two or three years
- ☐ Less often than every three years

☐ **If no** (or can't recall), why have you never tested your well water for chemicals?

6. (**Note:** Asked only of those that have ever tested their well water) Have you ever received a bad test result (i.e. an adverse test result) for any type of testing? If so, what did you do?

7. Are there any difficulties that you experience in testing your well water? Do you experience any challenges related to well water testing? Please describe the challenges. [Record responses verbatim; use check-boxes later for analysis]

☐ Inconvenience of pick-up / drop-off locations

- ☐ Travelling distance too far
- ☐ Hours of operation limited

☐ Lack of time

☐ Costs of testing are high (e.g. for some testing not covered by government)

☐ Lack of knowledge/skill regarding how to appropriately take a water sample

☐ Lack of knowledge regarding the frequency of recommended sampling

☐ Lack of knowledge/skill in interpreting test results

☐ Lack of perceived problem/complacency

☐ Attitude that water testing is a low priority and/or unnecessary

☐ Privacy Concerns with submitting water samples to lab

☐ Other, please specify: _____

☐ No challenges or difficulties identified

8. Please describe what could be done to help you adopt a regular routine of testing your water (at least once a year). For example, is there anything that can be done to help you or remind you to get your water tested regularly (at least once a year)?

9. If a new drop-off/pick-up location was available in this community, what are some convenient locations?

10. We are exploring other options to encourage residents in your community to test their well water. Specifically, we are looking into creating an annual "Well Water Week" where we would have Public Health Inspectors at a specific location in your community for a one-week timeframe (5-6 days) for residents to bring water samples for testing. Is this something that would be convenient for you? Would this encourage you to bring your sample for testing?

11. Are you interested in receiving a reminder service from the MLHU 3x per year? (If yes, provide information).

12. Are you aware that water should be tested 3x per year?

13. Any additional comments:

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INSTRUCTOR GUIDANCE

Knowledge Dissemination and Private Well Water Testing in Middlesex County, Ontario¹

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BACKGROUND

The Middlesex-London Health Unit (MLHU) is challenged with regards to influencing health behaviours of private well water users. Private well owners are responsible for the testing of their water, and it is recommended by Public Health Ontario to do so three times per year. However, testing rates are either declining or at best, remaining stagnant across Middlesex County. It appears that well owners are unaware of the risks of not testing their drinking water, or if they are, they have become complacent. In short, the health unit is lacking an appropriate knowledge and education dissemination strategy that is suitable and well-adjusted for the target population. The unique characteristics of the target population made this group especially challenging to engage with. Such features are associated with the agriculture industry: seasonal work patterns, limited visits to town, distrust in government, varying education and literacy levels, resilient and “tough” attitudes towards health, remote residential areas, and more. The case introduces the steps taken by the protagonist and his summer student in order to determine the knowledge level of well water testing information, attitudes towards the program, and needs of local community members around this issue. Background information on well water testing services provided by the MLHU and Province of Ontario, history from the Walkerton Tragedy, and importance of well water testing are provided. The reader is left with the challenge of developing strategic ways to engage in knowledge exchange with the community, design and deliver appropriate communication tools, and work with the community to address health behaviour change.

OBJECTIVES

1. Think critically about ways to communicate and engage in knowledge exchange with unique and sometimes challenging populations.
2. Assess barriers to transferring information and influencing health behaviours amongst rural private well owners.
3. Diagnose communication problems and formulate potential solutions to these problems.

DISCUSSION QUESTIONS

1. Why is communication important in public health?
2. Who do we need to consider when developing communication tools and strategies?
3. What are outcomes of poor communication?

¹ The case description, while based on a real experience, is adapted for learning purposes.

4. Make a list of health communication initiatives you have seen that stand out in your mind. What was exceptionally good or bad about these? (Consider print sources, commercials, social media, billboards, radio, etc.)
5. What makes a health communication tool or strategy effective? How will you know it is effective?

KEYWORDS

Private well-water; communication; knowledge dissemination; needs assessment; rural; facilitators; barriers.

CASE 12

Health Operations in Emergencies (HOPE)¹

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BACKGROUND

Dr. Harry Leonardo was managing a roster of experts in his office during an emergency at the Pan American Health Organization (PAHO) headquarters in Washington D.C. He thought to himself that he needed to create an up-to-date roster of experts ready for deployment. However, he would also need to incorporate different technical areas to share the necessary information, so that one deployed expert may have the advantage of being informed by other experts in order to complement the response to a crisis. This was the birth of an idea that would revolutionize the way information would be handled and shared during a disaster response in the region.

INTRODUCTION

As the oldest international public health agency, the PAHO has fathered much of the public health platform in the Americas. As part of the United Nations system, PAHO serves as the Regional Office for the Americas for the World Health Organization (WHO). The Organization's mission is:

"...to lead strategic collaborative efforts among Member States and other partners to promote equity in health, to combat disease and to improve the quality of, and lengthen the lives of the peoples of the Americas."

– Pan American Health Organization, 2011

As a technical co-operation agency, PAHO does not finance programs. It assists countries in the region with sharing technical information and mobilizing health resources. PAHO perceives

¹ The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariat of the Pan American Health Organization concerning the status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

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Technical Cooperation among Countries² (TCC) as a powerful instrument. TCC is understood to be an experience where there is both implementation of and participation in various projects between countries. This experience encompasses a sharing of knowledge, resources, and technical capacities, which at times may require external assistance and financial support. This resonates with the mission of the PAHO. Countries may use TCC to develop consensus-based policies and concrete actions to address health challenges together.

The Emergency Operations Center (EOC) is housed in PAHO's headquarters in Washington D.C. and is part of the Emergency Preparedness and Disaster Relief Department (PED) at PAHO. The purpose of the EOC is to monitor and respond to disasters³ in the region. The Emergency Preparedness and Disaster Relief Department of PAHO came into inception in 1976, after earthquakes in the region demanded a systematic organizational response. The department has three principle actions:

1. To provide technical cooperation (in the form of reports, guidelines, and lessons learned);
2. To mobilize experts (reinforce the capacity of local ministries of health or PAHO country offices); and
3. To present projects that cover gaps in action plans prepared by local ministries of health.

PAHO holds three regional offices: one in Central America, one in South America, and one in the Caribbean. The strategic placements of these offices provide political advocacy to reinforce the development of health services. Their regional presence allows them to better "sense" the bilateral movements and the geopolitical environment in order to ensure equitable provision of resources.

This increased situational awareness helps effectively regulate the disaster response. On the other hand, at PAHO headquarters in Washington D.C., the situation is much less complex. However, there is a need to reinforce contact with partners and donors regardless of the geographical obstacles. There is also a need to enhance the relationship between the Emergency Preparedness Departments within PAHO and between this organization and various other sources of information.

The solution to these issues was fashioned through the concept of "HOPE".

WHEN A DISASTER STRIKES

Natural phenomena such as volcanic eruptions, floods, and tropical storms affect communities every single day. However, they are not disasters until they overwhelm the local capacity to respond. Based on the severity level of the disaster and the ability of the local community to respond, the degree to which the international community must become involved is established.

² "Technical Cooperation among Countries (TCC) is essentially a process whereby two or more countries work together to develop individual or collective capacity through cooperative exchanges of knowledge, skills, resources, and technologies. Ideally, TCC activities should be initiated, organized, and managed by the countries themselves, under the direction of the respective governments and with the participation of public and private institutions and organizations" (PAHO, 2012).

³ "Disasters combine two elements: events and vulnerable people. A disaster occurs when a disaster agent (the event) exposes the vulnerability of individuals and communities in such a way that their lives are directly threatened or sufficient harm has been done to their community's economic and social structures to undermine their ability to survive. A disaster is fundamentally a socio-economic phenomenon. It is an extreme but not necessarily abnormal state of everyday life in which the continuity of community structures and processes temporarily fails. Social disruption may typify a disaster but not social disintegration" (IFRC, 1993).

For example, when a disaster strikes a locality, aid workers in the immediate region flood the area. They collect and analyze data that is ultimately processed into assessments with the aim of acquiring funds for relief efforts. Multiple agencies and organizations with their own assessors produce subsequent reports with the hope of accomplishing the same goal. This process is followed by meetings intended to prioritize needs and to select which programs will be granted funding. This process is complex and time-sensitive and is based on a collaborative effort to provide a comprehensive response to the emergency. Different organizations lead the various sectors of activity:

- WFP (United Nations World Food Programme) – Logistics
- UNICEF (United Nations Children’s Fund) – Water/Sanitation
- UNHCR (United Nations High Commissioner for Refugees) + IFRC (International Federation of Red Cross), Convener – Emergency Shelter
- WHO – Health

These Health Clusters⁴ are all under the direction of the United Nations. The need for continuous communication amongst all actors is imperative in avoiding duplicated efforts and producing a unified response.

THE IDEA

With many years of experience in the field of emergency preparedness and disaster relief, Dr. Leonardo continuously dealt with the conundrum of information management during a disaster or emergency situation. In the field of emergency preparedness and disaster relief, one must understand that in the wake of a major disaster there is a substantial loss of life. In the ensuing hours after the event, the death toll may rise dramatically as a result of the unhealthy post-disaster environment. This includes environments that reflect issues of poor sanitation and waste management, potentially acute fatal injuries and the creation of a fragile socioeconomic infrastructure. Therefore, information is key; information saves lives and the faster a group or organization has access to such information, the more efficient the disaster relief efforts can be.

Dr. Leonardo grappled with a number of issues regarding information management:

- First, there can always be a better way of managing information in any given context. The consequence of failing to admit this could be the loss of lives post-disaster;
- Second, the health sector is complicated and has gaps with regard to the provision of services;
- Third, different humanitarian and relief actors work separately with little communication amongst them, often within the organization itself (amongst NGOs) or within the country (amongst various departments); and
- Fourth, informed decision making is critical in emergency situations. This has to be supported by well-guided collaboration through a dedicated platform to sustain a disaster response effort.

Post-disaster, the assessments and project formulation by humanitarian actors typically command a five day deadline, leading to a very competitive process. Information needs to be of

⁴ What is a Health Cluster? “A cluster is a group of agencies, organizations and/or institutions interconnected by their respective mandates that works together towards common objectives. The purpose of the clusters is to foster timeliness, effectiveness and predictability while improving accountability and leadership. Globally, the Humanitarian Reform has identified 11 clusters.” In 2005, the UN Inter-Agency Standing Committee (IASC) designated the WHO as the Global Cluster Lead for Health, leading over 30 partners in this sector (World Health Organization, 2015).

high-quality, rapidly accessible and it needs to make a difference. Currently, the informational products⁵ produced in this industry are beset with a few issues:

- Often, the information is not available to all actors involved in the response in real-time;
- Reports have a tendency to carry little or too much detail; and
- The analysis is difficult as the products are not always tailored to specific audiences.

With multiple sources of information, such as the Department of Civil Defense, private and public media corporations, and Non-Governmental Organizations (NGO), various information products are readily available. These products are of different quality and often fall within quite different categories. There are no references or standard guidelines to which they can be compared, which lead to difficulty in managing the information. Given this issue, one is at risk of dealing with a “high quantity” of information and/or receiving much “poor quality” information.

HEALTH OPERATIONS IN EMERGENCIES

Health Operations in Emergencies or HOPE (Exhibits 1 and 2 depict HOPE’s current Home Page) is an information sharing platform with the following objectives:

- Support the country’s action plan and health sector response in the wake of a disaster;
- Strengthen the coordination of the response to a disaster;
- Provide a multi-user, user-friendly, easy to access platform for compartmentalized information sharing; an interface that avoids duplication of information, permits information flow amongst different entities and promotes a collaborative and complementary environment for real-time information sharing;
- Respond to the user’s needs (various actors involved in the response, including response teams, ministries of health, NGOs etc.); and
- Use actions or processes to fuel the assessments that are critical to obtain resources from donors for relief efforts.

DEFINING HOPE

Health Operations in Emergencies (HOPE) is an online interface whose purpose is to facilitate information sharing amongst the relevant humanitarian actors involved in a disaster response. Four public sectors are targeted within this platform in order to better mobilize response efforts as well as gather and analyze hazard information. However, the priority is to increase the efficiency of emergency operations support (emergency projects, technical advice and guidelines or technical expertise mobilization) with the ultimate goal of supporting the local healthcare system. This task is accomplished by sharing information about both the impact on public health (local/province/federal healthcare system) and the subsequent needs in emergency situations.

It is important to note that HOPE is not simply a tool; it is the process that is imperative to an effective response. The personnel implementing this platform and those using it will have the capacity to introduce it to the regional disaster response arena (bigger audience). It is a situation room, coordination operations center, and response team communication channel, all housed in one virtual platform with the objective of facilitating informed decision making.

⁵ By informational products, the author of the case is referring to products that complement the disaster response efforts. These include hazard maps and maps that outline the location of ongoing assessments, locations of clinics as well as situational assessments and needs assessments etc.

Currently, HOPE is in its infancy of implementation, but the process is gaining more momentum. The intention behind HOPE is to reduce the number of channels that the information must travel through and provide a common hosting platform from which to obtain crude data. In order to be successful, the platform must be accessible to all actors involved in the response, not only professionals within PAHO. In addition, the process or mechanism of information sharing within this platform must be standardized, ensuring a universal understanding of the process and the software. The instructional component for HOPE will need to be produced by the organization hosting this platform.

HOPE aims to:

- Define the level, category and parameters of the information to be shared; and
- Establish a degree of safety of the given information; and establish guidelines for information documents and products to be shared during emergencies.

These goals will help define the real measures of the information required and strengthen the relationship between PAHO's political response and the response of other parties.

The Structure of HOPE

HOPE acts as a resource for four respective partners or groups within the action of response in emergency preparedness and disaster relief (Exhibits 3 and 4 portray this process):

- PAHO personnel;
- The health ministries within the respective countries;
- The Regional Response Team; and,
- Partners and other health agencies.

Each of these actors will partner in feeding information to HOPE (Exhibit 5).

WHAT IF?

HOPE holds great potential through real-time information sharing and the impact it will have on vulnerable or high needs populations is immense. Imagine yourself at a Cholera Treatment Center (CTC) in Haiti post-earthquake in 2010; the logistical needs are numerous. From Oral Rehydration Salts to Water Purification Tablets, the logistical requirements are growing as *Vibrio Cholerae* continues to claim lives. The needs of various centers are different and the response capabilities of the involved humanitarian actors in the locality may vary. The reality of meeting the logistical needs in Haiti at the time is demonstrated in Exhibit 6. The process of requesting and subsequently meeting these needs would still consume a sufficient amount of time. One may assume that making a phone call and requesting the necessary products is simple. Unfortunately, it is not. There is much chaos in the form of disorganized relief efforts following a disaster. There is fractured communication due primarily to the damaged infrastructure and the procedures for meeting the logistical needs of the situation can be quite tedious. Some relief workers say that at times it comes down to whether they have the right paperwork or whether the stationed personnel at the warehouse were previously informed.

If a CTC was in urgent need of water purification tablets and UNICEF was able to provide such resources, HOPE would provide both these humanitarian actors timely access to this information. HOPE offers a means of enhanced situation awareness. With established guidelines, dedicated networks, and devices, a relief worker could use a short message service

through satellite phones to obtain coordinates of the closest UNICEF hub in the area. This is important information that is easily accessible. Workers are thereby bypassing the hassle of undertaking a more time consuming process to meet these dire needs in an emergency situation. The potential to delete one of the middle steps in the process is high, thereby saving time. By saving time, responders are, in fact, saving lives. This form of vital information would be provided to them and hence support the opportunity for an efficient response in the given situation.

Consider “Country A”, which became partly ravaged by an earthquake and is expecting a sizable tsunami post-earthquake. Given considerable integration of the HOPE platform throughout the region, the information will start flowing in, almost immediately. With satellite phones and mobile technology, whether it is simple texts or informative multimedia messages, HOPE could immediately begin housing and sharing this information real time.

THE ROAD AHEAD

HOPE is operated and primarily used by EOC Staff, who are constantly involved in its development on the local organization network. It currently provides a platform for sharing real-time emergency updates on events taking place in the North and South American continents. This is simply one part of the project. HOPE will eventually incorporate four additional components:

- A reporting platform for events, which would primarily cater to the health ministries for incident reporting;
- A Regional Response Team interface that would house groups and online discussion forums in a format that closely resembles a Social Media chat room. Members of the Response Team would aid in establishing and fortifying communications amongst all individuals at the site of a disaster. It will allow professionals to converse and brainstorm ideas on response efforts; from the establishment of guidelines to the incorporation of Evidence-Based Medicine. This pooling of information by different experts helps reinforce or redirect the response accordingly;
- A pilot program targeting donors and other stakeholders in order to prioritize resources and enhance the coordination amongst members of the Health Cluster; and
- Communication amongst different actors and donors involved in the response ensuring increased transparency and subsequently enhancing the reputation and credibility of an information sharing platform such as HOPE.

THE FORESEEABLE ISSUES

“The development of HOPE is complex; it is not a product but a process. The software is of little importance, it is the sharing of information, procedures and education with donors and other counterparts that is crucial to disaster response.”

– D.L. Hernandez, personal communication, June 12, 2014

The establishment of such an information sharing hub is not easy. It requires global acceptance and dedicated use by its participants. The term “global” implies the need to have all stakeholders on board with such an endeavour. Why? Disaster response cannot succeed through one organization. The needs of vulnerable communities within a disaster are complex

and require a collaborative approach. Thus, access to this hub should be universal, regularly monitored, and protected.

Ideally, a better host website will be implemented for the deployment of HOPE. The platform needs to be designed appropriately to create a user-friendly interface. Once this is done, the platform would allow information sharing for all involved participants from all affected countries. Continued feedback and use will reinforce the capacity of HOPE to endure. It is important to note that there is much potential for this online platform to prosper. PAHO is already experiencing much organizational change from within. These changes coincide with the attempt to introduce HOPE as a revolutionary tool. This tool's introduction will attempt to change the very culture of disaster response.

Different aspects of HOPE are already functional and ready to run live. HOPE requires a network in which it can be housed to provide universal access to all humanitarian actors. These components are currently distributed between different platforms and networks, requiring individual access to each component. One central interface will soon reorganize these components and attempt to provide universal access to each. HOPE will revolutionize the way information is shared in an emergency. It will empower the local health care system as well as the actors involved in the local response efforts with information in order to ensure a dedicated and fortified response.

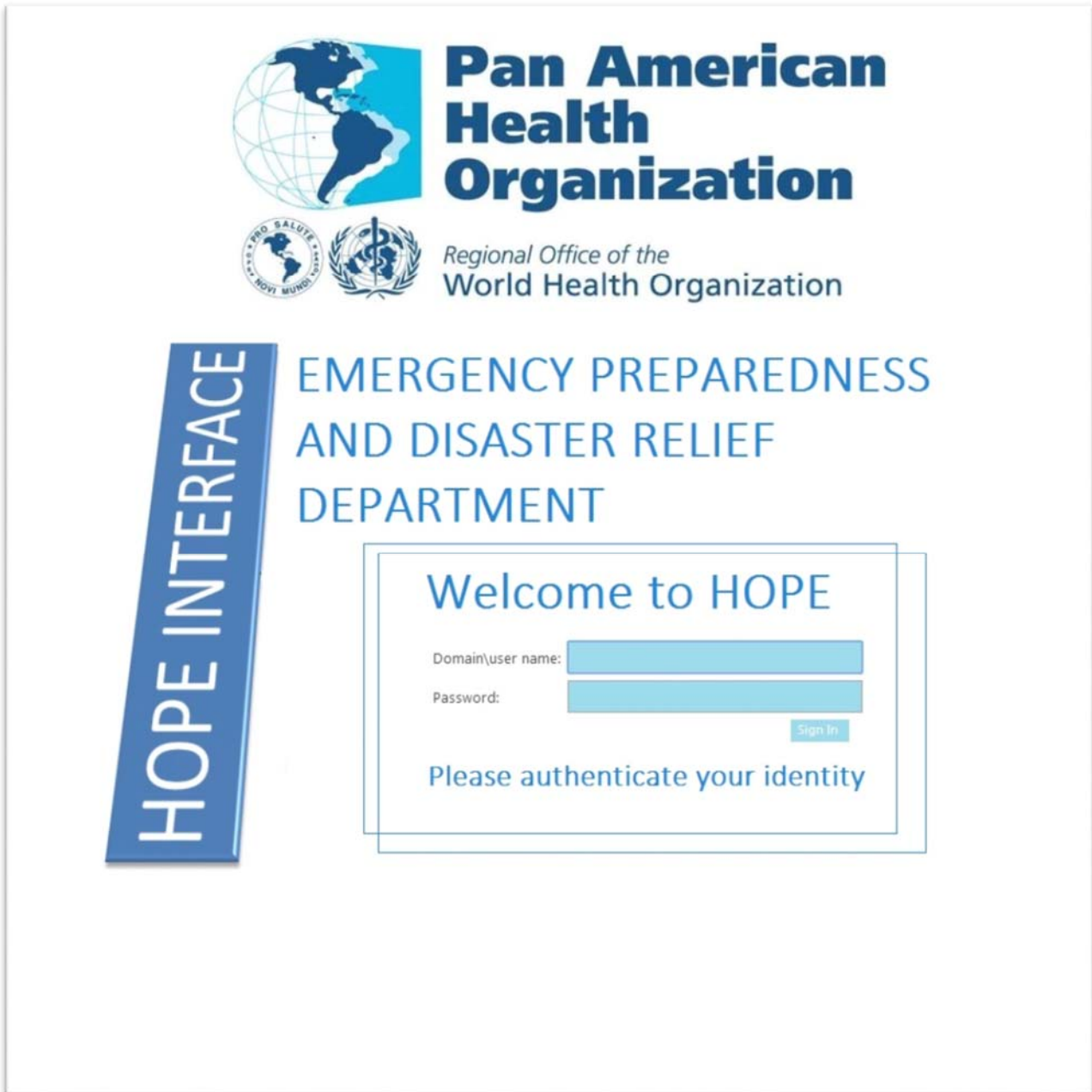
Communicating an idea is quite difficult; however the HOPE interface has been partly operational for quite some time. It is not just an idea as components of this platform have been operational since the Haiti earthquake. It was used to produce informational products for the response effort post-earthquake for Haiti in 2010 (R. Argueta, personal communication, July 1, 2014). HOPE is in its final strides of completion. With most of its components nearing operational completion, HOPE will soon be ready for implementation on its intended scale, which is across the North and South American continents. Communicating its potential and its ability to further develop the specialty of emergency response is central to its success. Dr. Leonardo must now formulate a plan to introduce HOPE to all members within the PED and PAHO as well. He must combat any reservations toward its implementation with evidence to the contrary.

HOPE is an innovative product that has both the potential to revolutionize an industry or simply fail. It is not the first of its kind as there are similar interfaces for other aid organizations. HOPE wishes to act as a universal product, with far greater accessibility and allow for more diverse operability (more functions) as well. It is important to get all members within the department on the same page. This means communicating to all internal stakeholders the process for information management.

There will be resistance and hesitation as some individuals will be reluctant to change the culture of response. Some may require more evidence to be swayed while others may follow the status quo (A. Cayon, personal communication, June 20, 2014). At the moment, HOPE is principally produced and developed within the organization. In order to effectively enhance its use amongst its partners, it will be important to obtain more stakeholder buy-in. Without such collaboration, the chance that gaps may not be addressed is quite high. HOPE is an interface that will only succeed through its increased use amongst the actors involved in this specialty of public health. It requires a trusting pool of users to establish its reputation from the ground up. Once PAHO, the local health ministries, donors, and other humanitarian actors are fully behind HOPE and its ability to innovate, only then can information management be further evolved.

EXHIBIT 1

HOPE's Home Page: *Login Portal (fictional)*



The image shows a fictional login portal for the Pan American Health Organization (PAHO). On the left, a blue vertical banner reads "HOPE INTERFACE". The top right features the PAHO logo (a globe with the Americas highlighted) and the text "Pan American Health Organization". Below this are the PAHO and WHO emblems, with the text "Regional Office of the World Health Organization". The main heading is "EMERGENCY PREPAREDNESS AND DISASTER RELIEF DEPARTMENT". The login area is titled "Welcome to HOPE" and contains two input fields: "Domain\user name:" and "Password:". A "Sign In" button is located to the right of the password field. Below the inputs, it says "Please authenticate your identity".

HOPE INTERFACE

Pan American Health Organization

Regional Office of the World Health Organization

**EMERGENCY PREPAREDNESS
AND DISASTER RELIEF
DEPARTMENT**

Welcome to HOPE

Domain\user name:

Password:

[Sign In](#)

Please authenticate your identity

Source: Created by author.

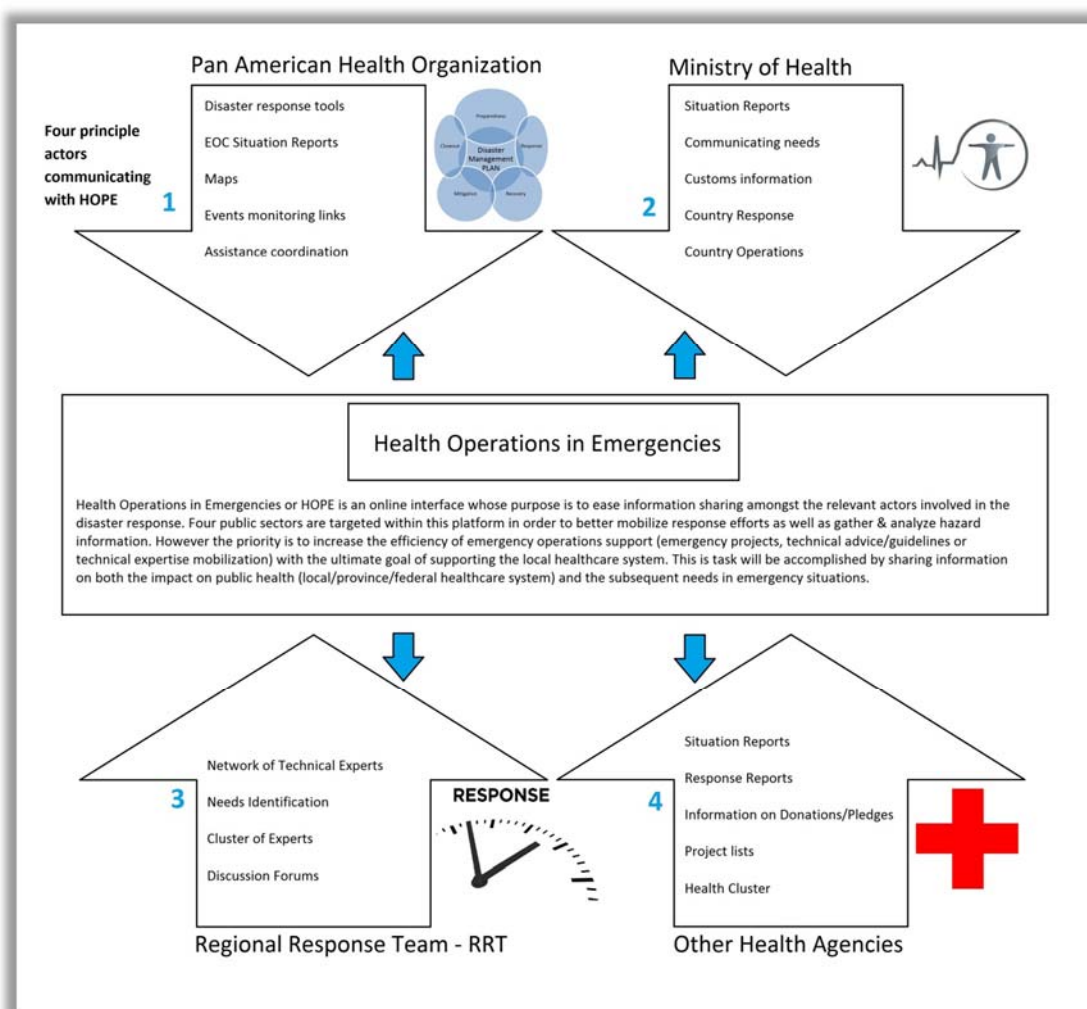
EXHIBIT 2

One of the Components of HOPE: The EOC Daily Monitoring (below is an image of its Home Page)



Source: Image is a screenshot of the LIVE platform.

EXHIBIT 3 Defining HOPE and Its Tasks



Source: Created by author.

EXHIBIT 4 Structure of HOPE

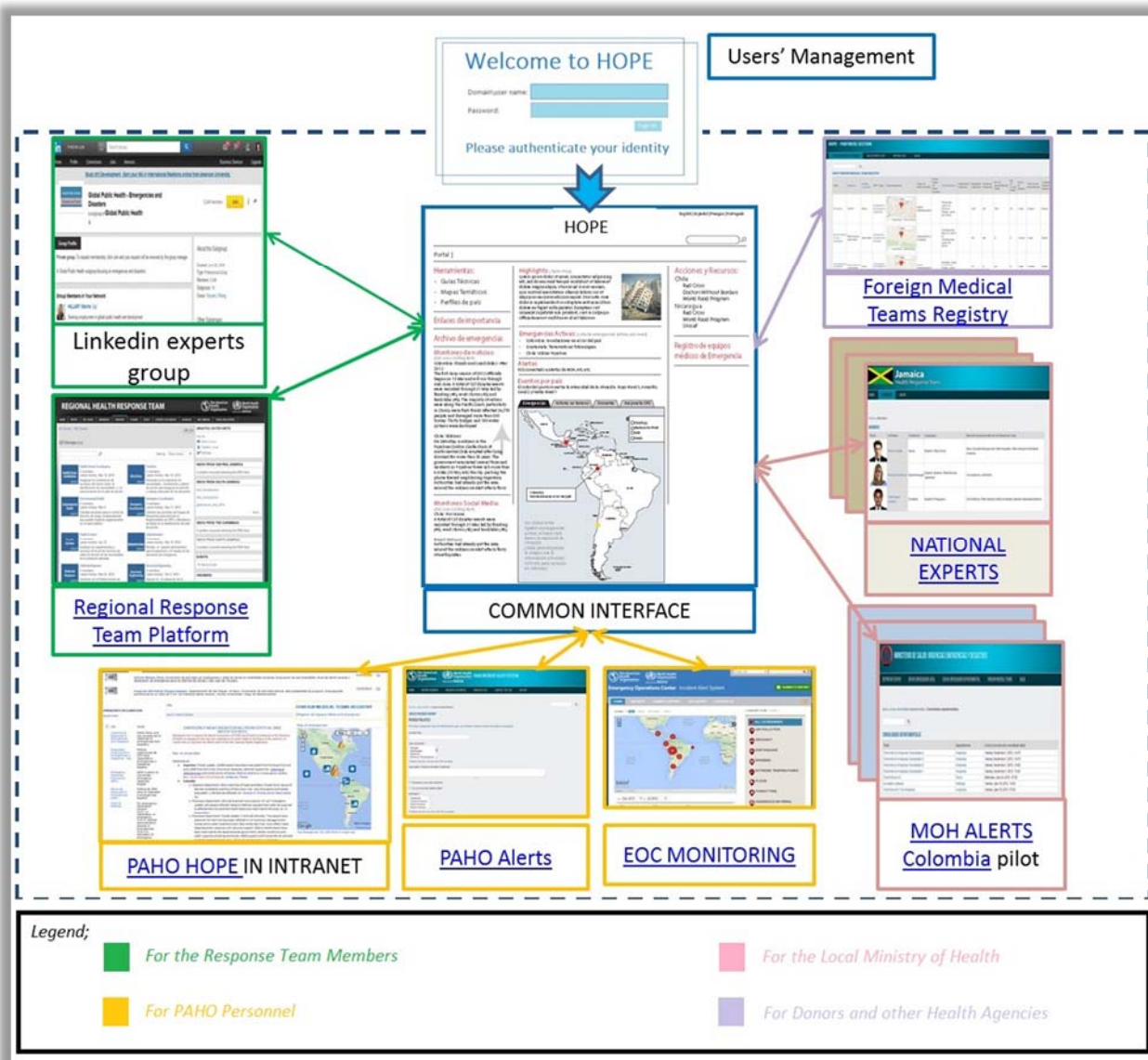
In reality this is one interface that connects FOUR platforms.
The platforms are tailored to meet the needs of the different actors involved in the response.



Source: Created by author.

EXHIBIT 5 Structure of HOPE

Detailed diagram highlighting all the components of HOPE. The colored arrows denote different users within the framework of HOPE.

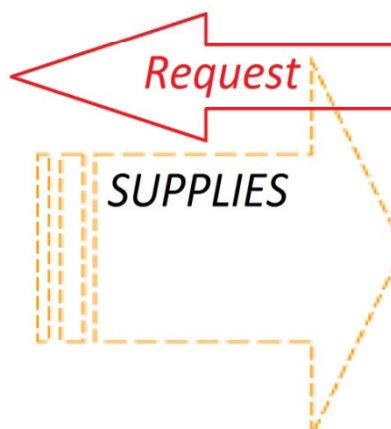


Source: Created by the author and personnel at PAHO.

EXHIBIT 6
Example of Logistics

Supplies/Sources; For example; WFP, UNICEF etc

Warehouses; WFP, NGO Warehouses



*Health Facilities;
Hospitals
CTCs
Clinics*

Source: Created by author.

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INSTRUCTOR GUIDANCE

Health Operations in Emergencies (HOPE)¹

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BACKGROUND

Dr. Harry Leonardo is the Manager of the Emergency Operations Center (EOC) at the Pan American Health Organization (PAHO) in Washington D.C. The EOC coordinates emergency relief efforts during disaster response in the PAHO region. Dr. Leonardo has developed an information-sharing platform, Health Operations in Emergencies (HOPE), to facilitate communication, enhance situational awareness, and promote collaboration amongst the stakeholders involved in disaster response. Professionals within the EOC and PAHO have reservations about HOPE. The platform has great potential, but it is unclear to what extent the relevant stakeholders have been involved in its development. Dr. Leonardo must make the best use of his resources to implement HOPE. He must formulate a strategy for testing and implementing the information-sharing platform within the organization and for introducing HOPE to all relevant stakeholders in the emergency response environment.

OBJECTIVES

1. Understand the complexities associated with communicating during a disaster, given the need for collaboration amongst aid organizations, local health systems, and the coordinating centre.
2. Appraise the operational readiness of an information-sharing platform intended to facilitate disaster response.
3. Suggest approaches for engaging stakeholders in the development of the information-sharing platform.
4. Discuss ways to ensure the usability of the communication system.
5. Apply knowledge of organizational change and communications to formulate a plan for the development, testing and implementation of the information-sharing platform, with timelines.

¹ The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariat of the Pan American Health Organization concerning the status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

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DISCUSSION QUESTIONS

1. Describe the role of the EOC during disaster response in the PAHO region.
2. What are the potential benefits of an information-sharing platform during disaster response?
3. What are the challenges involved in implementing an information-sharing platform?
4. Formulate a strategy for addressing those challenges.

KEYWORDS

Emergency preparedness; information-sharing platform; disaster response; health communications; leadership; change management; stakeholder engagement; usability testing.

CASE 13

Chikungunya in the Americas: Estimating the Burden of Disease and the Cost of Illness¹

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INTRODUCTION

Emily Lucas was a new intern at the Pan American Health Organization (PAHO) Headquarters in Washington, D.C. and her supervisor had given her the task of conducting a preliminary socio-economic impact assessment on Jamaica for the chikungunya epidemic that had been spreading through the Caribbean for the past few months. Emily had done extensive background research on Jamaica to learn about the economy and dynamics of the country. She had also researched chikungunya to get a better understanding of the disease and why it was such a big public health concern. By reading reports and talking to PAHO employees, Emily came to appreciate why the Americas as a region was so vulnerable to a chikungunya epidemic, as well as how the events leading up to this first outbreak had unfolded.

Upon looking for a methodological outline she could follow to complete the analysis, Emily came to realize that no such outline existed for determining the complete socio-economic impact of chikungunya outbreaks. She quickly came to the conclusion that in order to produce a holistic analysis of the impact she would have to pull knowledge from all the classes she had taken in her Master of Public Health degree and create a methodological framework herself before she could calculate an estimated cost for such an epidemic.

CHIKUNGUNYA

Chikungunya translates from Makonde to mean “that which bends up”, describing the posture assumed by those who suffer from severe joint pain as a result of this disease (Caglioti et. al., 2013; Her, Kam, Lin, & Ng, 2009). Chikungunya is a viral infection that is transmitted through *Aedes* mosquitoes, the same mosquitoes that transmit dengue (Caglioti et. al., 2013; Her et al.,

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2009; Thiberville et. al., 2013). The attack rate (percentage of population infected) is between 38-63% during an epidemic (PAHO, 2011). Acute illness caused by the chikungunya virus has the potential to be followed by a chronic state of illness; however, between 4-28% of infections in individuals are asymptomatic (Thiberville et. al., 2013). In those who are affected by the disease, acute symptoms start to appear around 3-7 days after being bitten by an infected mosquito (also known as the incubation time). The most prominent symptom is incapacitating joint pain (arthralgia), which is reported in 87-98% of cases, and can be accompanied by other symptoms including high fever, headache, back pain, and fatigue (Caglioti et. al., 2013; Thiberville et. al., 2013). Generally, symptoms resolve within 3-10 days; however, 30-40% of symptomatic cases become chronic with infected persons experiencing recurrent joint pain that persists for months to years (European Centre for Disease Prevention and Control, 2014). The timeframe during which an infected person is most likely to transmit the disease to a biting mosquito or through blood is from approximately 0-6 days post-infection (Staples, Hills, & Powers, 2014).

As of yet there is no specific treatment for chikungunya, and management of the disease has been limited to treating the symptoms of the disease through non-steroidal anti-inflammatory drugs and paracetamol/acetaminophen (Thiberville et. al., 2013). Also, despite the development of a few vaccines none have been licensed for use (Caglioti et. al., 2013). The best means of defense against contracting chikungunya when living in or visiting an affected area is through preventive measures, such as vector control strategies (fumigation), wearing long clothing, and the proper use of bed nets. A vector is an organism that is capable of transmitting a disease from one animal to another (for example, *Aedes* mosquitoes are the vector for chikungunya and humans are the affected animals).

Chikungunya was first isolated in Tanzania in 1952 before being detected in other African countries. The first documented Asian epidemic was in Bangkok in 1958, and since then chikungunya outbreaks have occurred intermittently throughout Africa and Asia (Thiberville et. al., 2013). Due to the low mortality rate and its occurrence in poorer tropical areas, chikungunya was generally neglected until 2005 (Her et. al., 2013). A massive outbreak of chikungunya in countries and territories in the Indian Ocean region during 2004-2005 increased concern about chikungunya among the global community. This outbreak was much larger than previous outbreaks, it affected areas where people had access to a competent health system (the French territory of La Réunion), and had a huge socio-economic impact (Caglioti et. al., 2013). Previously, most areas affected by chikungunya were medically impoverished with inefficient public prevention/control measures, and thus, outbreaks of the disease in these areas were not surprising. See Exhibit 1 for recorded global chikungunya outbreaks.

There are three main genotypes of the chikungunya virus, meaning there are three slightly different genetic compositions of the virus. They are named West African, Asian, and East/Center/South African (ECSA) and tend to be present in different regions of the globe (Vazeille et. al., 2007). The emergence of the ECSA genotype during the Indian Ocean epidemic in 2005 enabled *Aedes albopictus* to become a vector for viral transmission, in addition to the predominant vector species, *Aedes aegypti* (Caglioti et. al., 2013; Vazeille et. al., 2007).

Initially, the disease was spread through the *Aedes aegypti* species, which inhabits only tropical and subtropical climates, thereby restricting its geographic reach (Caglioti et. al., 2013; Her et. al., 2013). This mosquito is mostly found around human dwellings, which makes it easier to implement control and eradication measures in response to an outbreak of chikungunya. On the other hand, *Aedes albopictus* can be found in both wooded areas and human inhabited settings

making it near impossible to control the population (Caglioti et. al., 2013; Her et. al., 2013). *Aedes albopictus* inhabits both tropical and subtropical regions, but is also found in more temperate climates such as Europe and the northeastern United States (Parola et. al., 2006; Rochlin, Ninivaggi, Hutchinson, & Farajollahi, 2013).

VULNERABILITY IN THE AMERICAS

Before December 2013, the Americas did not have autochthonous transmission of chikungunya, meaning the disease was not naturally found in the Americas, and cases that were reported were from people who had traveled to areas where chikungunya was endemic. However, there were many factors that put the Americas, specifically the sub-region of the Caribbean, at high risk for developing a chikungunya outbreak. One of these factors is that *Aedes aegypti* mosquitoes, the primary vector of chikungunya, are present in almost all countries in the Americas and their population has been increasing in recent years due to failed eradication programs throughout the region (Brathwaite et al., 2012). *Aedes albopictus* is also present in most of South America, in all of Central America and the Caribbean, in Mexico, and at least 25 US states (Moore & Mitchell, 1997; Centre for Agricultural Biosciences International, 2013). It must also be noted that mosquito density, which tends to increase after heavy rainfalls during the rainy season, plays an important part in the likelihood of chikungunya outbreaks (Her et. al., 2013). Therefore, the time of year in which a chikungunya outbreak occurs in a previously non-endemic area may have significant consequences on the outbreak in the following months.

A factor that puts the Caribbean at particularly high risk is the travel between these countries and areas in the world that are already chikungunya endemic, such as India and other Asian countries (PAHO, 2012). Travel from these areas could be for vacation purposes or for business and trade reasons (for example, amongst French territories in both the Indian Ocean and in the Caribbean), and thus, increases the risk of transmission of chikungunya between endemic and non-endemic areas (Weber et. al., 2013).

The fact that autochthonous transmission of chikungunya had not occurred in the Americas prior to December 2013 indicates that very few people have had the infection before and therefore, do not have an acquired immunity against chikungunya. This means that there is no herd-immunity to chikungunya in this region, putting the population at a high risk of having a very large outbreak of the disease (Her et. al., 2013). Unlike dengue, previous infection with and recovery from chikungunya confers long-term immunity preventing the individual from getting the disease a second time (Her et. al., 2013).

INTRODUCTION INTO THE AMERICAS

In 2012, PAHO headed a meeting in Jamaica with international experts and health professionals from 22 countries to discuss the potential of a chikungunya outbreak and to create a preparedness and response plan for the potential introduction of autochthonous transmission of chikungunya virus in the Caribbean sub-region (PAHO, 2012). A year and a half later, the first chikungunya cases in the Americas were reported.

On the 16th and 18th of November, 2013, five people in the French territory of Saint Martin presented with symptoms consistent with dengue, but also had incapacitating joint pain (Cassadou et. al., 2014). There were a total of eight suspected cases that tested negative for dengue and were subsequently sent to the French National Reference Centre for Arboviruses in Marseille, France for further testing. The samples tested positive for chikungunya on December 2nd, and because none of these individuals had recently traveled to chikungunya endemic countries, this signaled the first autochthonous transmission of chikungunya in the Americas. Following this discovery, Saint Martin enhanced its chikungunya surveillance program and

increased communications with the Dutch side of the island in an effort to prevent the spread of the disease (Cassadou et. al., 2014).

Despite the recognition that an outbreak in an island nation should theoretically be easier to contain, autochthonous chikungunya infections have since been reported in 17 countries/territories and could eventually affect every country in the Americas where *Aedes aegypti* or *Aedes albopictus* mosquitoes can be found (Weber et. al., 2013; PAHO, 2014).

There are several potential contributing factors to the spread of chikungunya across the Caribbean. At the time the first few cases of chikungunya emerged, Saint Martin was already experiencing a dengue epidemic, thereby making the epidemiological situation complex to begin with (Weber et. al., 2013). Due to the similar symptomatology of dengue, a diagnosis of chikungunya can be easily mistaken for dengue, especially in an area where dengue is already endemic (Laoprasopwattana, Kaewjungwad, Jarumanokul, & Geater, 2012). Also, the fact that chikungunya was not a common disease created the potential for the public and health care providers alike to be unfamiliar with chikungunya or its symptoms, resulting in a lack of action. For those who had heard of chikungunya, they may have been aware that it is rarely fatal and thus viewed it with less concern than the dengue epidemic and as less of a threat to public health. Again, an important means for viral travel to other islands and countries is the common travel between territories of the same country (in this case France) (Weber et. al., 2013). Another factor that hampered the ability of Saint Martin to act more quickly to increase surveillance and control measures was the inability to test for chikungunya directly. The samples taken from the suspected cases were initially laboratory tested for dengue in Saint Martin, but when they produced negative test results they had to be sent for further testing at the French National Reference Centre for Arboviruses in Marseille, France (Cassadou et. al., 2013).

JAMAICA

Jamaica is the largest English speaking country in the Caribbean and is situated near Cuba and Haiti (the island of Hispanola). It has a population of approximately 2,930,050 people with a literacy rate of 87% (Central Intelligence Agency, 2014). Roughly 6.1% of Jamaica's gross domestic product (GDP) is spent on education compared to 5.2% of the GDP being spent on the health sector (CIA, 2014). In 1988, Jamaica's reported poverty rate was 30.5%, which officials have since been working hard to reduce; as of 2010 the rate had dropped to 17.6% (PAHO, 2013). The unemployment rate in Jamaica is 16.3%; however, the rate more than doubles for youth ages 15-24, averaging 34% (PAHO, 2013).

The Jamaican GDP in 2012 was estimated at US\$14.76 billion (The World Bank, 2014). The services sector (including tourism and insurance) is an important driver of the Jamaican economy and accounts for nearly 80% of GDP, with tourism alone accounting for 30% (CIA, 2014).

Jamaica has both public and private health care systems. The public system includes primary, secondary, and tertiary services and in an attempt to make services more accessible, patients are not required to pay user fees (PAHO, 2013). However, many people still prefer to use private services as quality of care in the public system is generally considered to be poorer (PAHO, 2013). There is an overall shortage of health care professionals in the country, specifically in nursing and midwifery positions (PAHO, 2013).

In order to obtain clean water, 13.7% of Jamaicans rely on rainwater collection, which serves as a potential breeding ground for mosquitoes (PAHO, 2013). Jamaica is particularly vulnerable to

natural hazards such as hurricanes, tropical storms, and floods, and if the climate change trends continue, rising temperatures and increased rainfall/flooding will increase the risk of transmission of communicable diseases like chikungunya and dengue (PAHO, 2013).

Reasons for Selecting Jamaica

Although Jamaica had not yet reported any cases of chikungunya, Emily decided that it was an appropriate country to create a preliminary impact assessment because the results could be reasonably extrapolated to other countries in the Americas. Jamaica has a large population for an island nation, which makes it a country that can relate to both larger mainland countries as well as smaller island nations. Her supervisor also assured her that it would be fairly easy to get supplemental and consistent information from Jamaica itself compared with other nations within the Americas, should she require it.

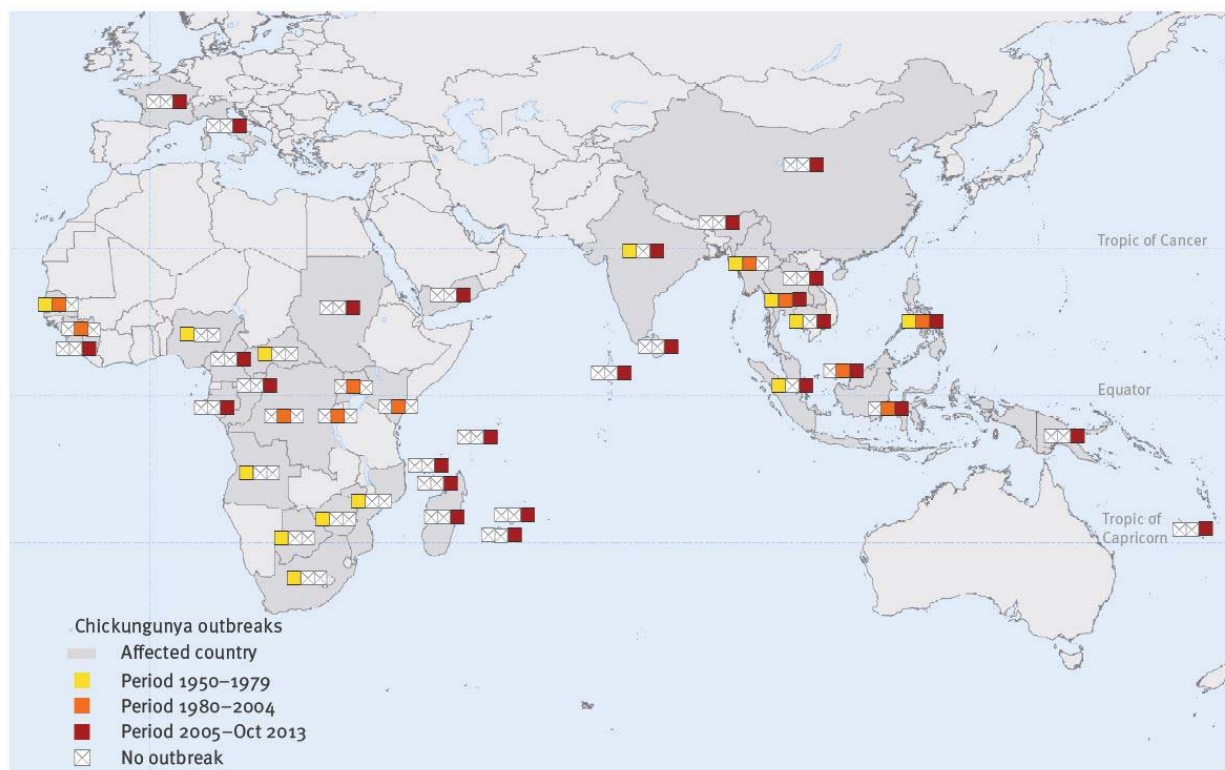
Why is this important?

Forecasting the impact of a chikungunya outbreak for a country in the Americas is important for demonstrating the potential cost to the country involved and what it would mean for its economy. This would assist with getting government officials on board to implement prevention measures. Without having countries actively engaged in these measures it would be extremely difficult to stem the spread of chikungunya throughout the entire region of the Americas, which would negatively impact millions of people directly through illness and indirectly through economic losses. Prevention and control techniques, such as educational campaigns about decreasing mosquito breeding grounds or the use of bed nets, are not prohibitively expensive. However, if governments do not think that such an outbreak would have adverse effects worth avoiding, especially in areas where dengue (a disease with similar acute symptoms but a higher fatality rate) is already common, the cost increases.

EXHIBIT 1

FIGURE 1

Historical overview of the chikungunya outbreaks prior to the emergence of the chikungunya virus in the Caribbean in December 2013



Source: Van Bortel, et. al., 2014.

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21. The World Bank. (2014). Jamaica: Data. Retrieved from: data.worldbank.org/country/Jamaica/

INSTRUCTOR GUIDANCE

Chikungunya in the Americas: Estimating the Burden of Disease and Cost of Illness¹

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Ava John-Baptiste, PhD (Assistant Professor, Western University)

Amanda Terry, PhD (Assistant Professor, Western University)

BACKGROUND

An intern at the Pan American Health Organization (PAHO) in Washington, DC is conducting an economic impact assessment of a Chikungunya epidemic in the Caribbean. PAHO would like to promote preparedness amongst PAHO member states and forecasting the economic impact may encourage governments to increase disease mitigation efforts. Chikungunya had been spreading through the Caribbean for several months and concerns about the impact of an epidemic in Jamaica were heightened by its reliance on tourism. The intern must incorporate information from a variety of sources to forecast the burden of disease and cost of illness of a Chikungunya outbreak in Jamaica.

OBJECTIVES

1. Define burden of illness and cost of illness and describe their roles in public health.
2. Calculate a disability adjusted life year (DALY).
3. Estimate the burden of illness associated with an infectious disease epidemic.
4. Identify and value cost items relevant to an infectious disease epidemic.
5. Identify, locate, and synthesize the information required to produce cost of illness estimates.
6. Estimate the cost of illness associated with an infectious disease epidemic.
7. Interpret cost of illness estimates and discuss the limitations associated with this measure.

DISCUSSION QUESTIONS

1. What type of information is required to develop burden of illness and cost of illness estimates?

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2. What sources provide accurate and up-to-date information for estimating burden of illness and cost of illness?
3. What sectors should you consider when estimating the cost of illness?
4. What assumptions are necessary to estimate the cost of illness?
5. How can you investigate the impact of uncertainty on cost of illness estimates?
6. What role does seasonal variation play in cost of illness estimates?

KEYWORDS

Chikungunya; infectious disease epidemic; Caribbean; Jamaica; burden of illness; cost of illness.

INTEGRATED WORKSHOPS

TOWARDS AN INTEGRATED CASE-BASED PUBLIC HEALTH CURRICULUM

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BACKGROUND

In our inaugural year, 2013-14, our one-year Master of Public Health (MPH) program required six courses in the fall, and another eight courses in the winter. These courses represented the five core disciplines of public health (e.g. biostatistics, environmental health sciences, epidemiology, health services administration, and social and behavioural sciences) as well as cross-cutting areas such as Developing Healthy Communities, and Leading People and Organizations in Public Health. In our adaptation of case method learning, the classroom portion of the courses consisted of three 80-minute blocks from 8:00am to 12:30pm each day.

CULMINATING EXPERIENCE: TRANSFORMING PUBLIC HEALTH COURSE

The Council for Education in Public Health defines a culminating experience as an opportunity for learners to synthesize and integrate knowledge gained from coursework and other experiences, and apply it to a situation, issue, or problem that approximates one that could be encountered in public health practice (Council on Education for Public Health, 2011). Unlike other programs where a single culminating experience occurs at the end of the program, we incorporated this into our curriculum by designing a course called Transforming Public Health that ran across both fall and winter semesters. Specifically once in the fall semester, and twice in the winter semester, we scheduled an entire day for an integrated workshop. The purpose of this chapter is to describe the three integrated workshops from our first year in terms of their structure, the learning resources required, and their deliverables, and to provide a brief rationale for our choice of topics.

STRUCTURE AND LEARNING RESOURCES

Workshops began with a session in the large classroom, where guest speakers (topic experts and community representatives) introduced the learners to the issue or topic of the integrated workshop. The afternoons were heavily weighted towards group-based learning in the six-person learning teams. Learning teams were tasked with problems to solve with regard to the topic at hand. Guest speakers sometimes circulated amongst the learning teams, acting as a resource to the teams. Each integrated workshop typically concluded with brief presentations by each learning team, accompanied by feedback from faculty and guest speakers.

DELIVERABLES

The specific deliverables varied with the integrated workshop topic, but they were always a concrete product (e.g. a brief presentation, a written policy brief) produced by the learning team and posted to our learning management system by specified deadlines during the day.

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TOPIC PROGRESSION

We sought to have the integrated workshop topics build over the year in terms of complexity and the number of stakeholders potentially involved. In addition we looked for public health issues that were timely and controversial. In 2013-2014, the integrated workshop topics/situations were: i) the public health impacts of industrial wind turbines; ii) supervised injection facilities for individuals who use injection drugs; and iii) a chemical spill and refinery fire, and evacuation of the surrounding community.

PRIOR PREPARATION

In order to generate excitement and a 'real world' feel, we found it useful to keep the topic unannounced until very shortly before the workshop. In some cases we released selected readings on the previous day, and required team preparation the day prior to the workshop. This ensured our learners were prepared and that our guest speakers could assume a certain level of basic knowledge.

The following sections provide detailed outlines for the first two integrated workshops from 2013-14. These outlines were given to the learners the day prior to the workshop if preparation was required, otherwise at the beginning of the workshop as the basic information needed to start the day. Because the third integrated workshop was designed to mimic a disaster in which the situation changed quickly, we posted regular updates on our learning management system rather than distribute outlines. We describe our approach to integrated workshop #3 following the handouts we distributed for the first two workshops:

INTEGRATED WORKSHOP #1: THE CASE OF INDUSTRIAL WIND TURBINES (*Verbatim handout*)

Background

Communities frequently face new situations that foster worries and questions about potential health impacts in the public, the government and other stakeholders. A recent example in Ontario is the installation of large industrial wind turbines (IWT) in rural areas.

Workshop

For this integrated workshop, your learning team will assume the role of a Public Health team that has been asked by a group of citizens to advise the broader general community (i.e. citizens, government, media and other stakeholders) on the community health impacts of industrial wind turbines.

To learn more about the issue, your team will attend a small conference on November 22 where two resource persons who have experience with IWTs will present their perspectives: a public health physician who has studied the literature on health impacts of IWTs and a community member who is concerned about IWTs in her rural community. Following the presentations, your learning team will have the opportunity to ask questions of these individuals to determine appropriate implications, uses, gaps and limitations of what we know about IWTs.

Your advisory response should be an appropriate public health response as viewed by your fellow public health professionals. To be credible, your response should be balanced, evidence-based, and professional. You should acknowledge sources of uncertainty, consider any trade-offs, and focus on the health of the entire community.

(cont'd)

Learning Team Preparation Beforehand

1. Based on learnings from your first semester coursework thus far, what are the key concepts and information you need to understand in order to approach this topic?
2. Using your deliberations in #1, develop (written) questions to ask the resource persons.

Learning Team Deliverables (end of workshop):

1. Prepare a 10-minute (maximum) presentation, suitable for a town-hall meeting, which summarizes the public health issues. Your presentation can include PowerPoint (no more than 10 slides), Prezi or other audio/visual aids.
2. In no more than one page (bullet-points), summarize any issues you were not able to mention in your presentation. Include a separate section summarizing your advice on the next steps the community should undertake.

Schedule

8:30-8:45	Introduction – Dr. Mark Speechley
8:45-9:10	Speaker 1 – Dr. Ray Copes “Evidence of health effects of wind turbines”
9:10-9:35	Speaker 2 – Ms. Esther Wrightman – “Community perspectives of wind turbines”
9:35-9:45	Short questions: Points of clarification
9:45-10:00	Break (Learning Teams review their prepared questions)
10:00-11:00	Q&A of prepared questions by Learning Teams
11:00-11:30	Learning Teams discuss and plan
11:30-12:30	Lunch (all)
12:30-3:00	Learning Teams prepare presentations & one page summary
3:00-4:30	Presentations
4:30-4:45	Faculty Debrief (grading of learners’ work)
4:45	Feedback to Learners

Purpose

This Integrative Workshop is one of the learning activities for MPH 9015Y Transforming Public Health. Its purpose is to introduce learners to an exercise of integration and synthesis of the materials covered to date in the fall semester courses:

MPH 9001A	Principles of Epidemiology
MPH 9002A	Statistical Methods in Health
MPH 9003A	Sustaining Environmental Health
MPH 9004A	Health Promotion
MPH 9005A	Social Cultural Determinants of Health
MPH 9006A	Developing Healthy Communities

The specific situation of public health impacts of Industrial Wind Turbines is used in the Integrative Workshop as context to which key concepts and learnings from each of the courses can be synthesized and integrated.

Objectives of the Integrative Workshop (same as the course MPH 9015Y Transforming Public Health):

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By engaging with your colleagues and professors after studying and thinking deeply about the material presented, you will be able to:

1. Analyze information from multiple disciplinary and indigenous stakeholder perspectives to determine appropriate implications, uses, gaps and limitations in a specific situation;
2. Determine the meaning of this information, considering the current ethical, political, scientific, socio-cultural and economic contexts;
3. Synthesize and integrate knowledge across disciplines, situation specific information and meaning of this information;
4. Recommend specific actions based on the analysis, synthesis and integration of information from multiple disciplinary and indigenous stakeholder perspectives; and
5. Revise judgments and change behavior in light of new evidence.
6. GRADING: Pass/Fail

Feedback from learners on IW1 was positive. While the time pressure and public presentations were a source of stress, the learners knew they were in a supportive environment and responded with highly professional presentations.

INTEGRATED WORKSHOP #2: THE CASE OF SUPERVISED INJECTION FACILITIES (*Verbatim handout*)

Background

Use of injection drugs has implications for personal health, as well as public health and public safety. In order to address this complex problem, collaborative strategies are required involving multiple stakeholders, including individuals who use injection drugs.

In September 2013, the Middlesex-London Health Unit presented a report to its Board of Health which discussed harm reduction strategies, including needle and syringe exchange programs, methadone treatment, opioid overdose prevention strategies and supervised injection sites <https://www.healthunit.com/uploads/2013-09-report-092-13.pdf> . In November 2013, the Health Unit presented another report to the Board outlining the results of a survey of people who use injection drugs in London. This survey found very high rates of hepatitis C and lower rates of HIV infections compared to similar national surveys <https://www.healthunit.com/uploads/2013-11-21-report-119-13.pdf> .

The Health Unit is currently working on a Health Status Report to further understand the drug use patterns and illnesses associated with injection drug use in Middlesex-London. This report will form the basis of planning a Municipal Drug Strategy, which will involve community partners in developing strategies to address the issues presented by injection drug use. An opioid overdose prevention strategy is currently being developed. Supervised injection sites or services are being considered in other cities and may also be a future consideration for London.

(*cont'd*)

Workshop

To learn more about the issue, your team will attend a half day conference on February 19 where four resource persons who are committed to addressing the issue of injection drug use in London, will present their perspectives: Dr. Bryna Warshawsky on behalf of Dr. Chris Mackie, Chief Medical Officer of Health , Middlesex-London Health Unit; Mr. Brad Duncan, Chief of Police, London Police Service; Dr. Lauren Cipriano, Assistant Professor of Management Science, Ivey School of Business; and Mr. Greg Thompson, Chair of the Urban League of London.

Your Task (Fictional Situation)

Dr. Mackie has recently received approval from the Board of Health, Middlesex-London Health Unit to move forward with the planning for London InSite, an organization to oversee and support supervised injection sites/services, prior to a request for funding for these services from the Provincial Government. To assist with this initiative, the position of Program Director, London InSite has been created. For this integrative workshop your learning team will assume the role of an applicant to this position. You have been short listed for the Program Director position at London Insite and have been asked to present your vision and implementation plan for London InSite to the selection committee. Following the presentations, your learning team will have the opportunity to ask questions of the four presenters. Information from all speakers can be used and where necessary your team can choose to seek out additional research to determine an appropriate vision and implementation plan for London Insite.

Learning Team Preparation beforehand

1. Based on learnings from your coursework thus far, what are the key concepts and information you need to understand in order to approach this topic?
2. Using your deliberations in #1, develop at least four (written) questions (per resource person) to ask each of the resource persons. Please have one learner from your learning team submit these questions prior to the start of the workshop on OWL Sakai by 8:45 am under MPH 9015Y Assignments.

Learning Team Deliverables (end of workshop)

1. Prepare a 15-minute (maximum) presentation regarding your vision and implementation plan for London InSite. Please address how you would propose to implement the plan given the various perspectives and how you would balance the needs of the various stakeholders. Your presentation can include PowerPoint (no more than 10 slides), or other audio/visual aids and must be suitable for a job talk.
2. Please have one learner from your learning team submit your presentation (e.g. Prezi, PowerPoint, speaking notes, etc.) on OWL Sakai MPH 9015Y under Assignments at 2:45pm - 15 minutes prior to the start of the presentations. Also, one learning team member needs to be in the classroom at 2:45pm to load the presentation onto the classroom computer.

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Schedule

8:00-8:45	Mandatory Learning Team time to develop questions (submit questions online by 8:45am)
8:45-8:50	Introduction – Dr. Marlene Janzen Le Ber
8:50-9:20	Speaker 1 – Dr. Bryna Warshawsky on behalf of Chris Mackie “Harm Reduction and Injection Drug Use”
9:20-9:50	Speaker 2 – Police Chief Brad Duncan “Community Policing Issues”
9:50-10:20	Speaker 3 – Dr. Lauren Cipriano “What about the Economics”
10:20-10:50	Speaker 4 – Mr. Greg Thompson, “Neighbourhoods Matter”
10:50-11:00	BREAK
11:00-12:00	Q&A of prepared questions by teams
12:00-1:00	Lunch
1:00-2:45	Teams prepare presentations
2:45	Teams submit presentations online
3:00-4:30	Presentations
4:30-4:45	Faculty Debrief (grading of learners’ work)
4:45	Feedback to Learners

Purpose

This Integrative Workshop is one of the learning activities for MPH 9015Y Transforming Public Health. Its purpose is to introduce learners to an exercise of synthesis and integration of the body of knowledge developed to date in the MPH Program.

The specific situation of harm reduction strategies with injection drug use is used in the Integrative Workshop as a context to which key concepts and learnings from each of the courses can be synthesized and integrated. The most advanced team presentation will demonstrate holistic integration of learning across courses.

Objectives of the Integrative Workshop (same as the course MPH 9015Y Transforming Public Health):

By engaging with your colleagues and professors after studying and thinking deeply about the material presented, you will be able to:

1. Analyze information from multiple disciplinary and indigenous stakeholder perspectives to determine appropriate implications, uses, gaps and limitations in a specific situation;
2. Determine the meaning of this information, considering the current ethical, political, scientific, socio-cultural and economic contexts;
3. Synthesize and integrate knowledge across disciplines, situation specific information and meaning of this information;
4. Recommend specific actions based on the analysis, synthesis and integration of information from multiple disciplinary and indigenous stakeholder perspectives; and
5. Revise judgments and change behavior in light of new evidence.

(cont'd)

Grading

Consistent with the overall grading for Transforming Public Health (MPH 9015Y), the deliverable from the integrated workshop will be a pass/fail. The presentation is intended to be a team effort. One team will be recognized as having the most advanced presentation. While there may be limited verbal feedback given on the date of the workshop, each team faculty advisor will give written feedback regarding the presentation to their respective teams within several days after the workshop.

**INTEGRATED WORKSHOP #3:
THE CASE OF THE COMMUNITY EVACUATION FOLLOWING
A CHEMICAL SPILL AND FIRE AT AN OIL REFINERY
(Summary description of case)**

The final integrated workshop of our first year was a simulated disaster. Because of the dynamic nature and complexity of integrated workshop #3, it is difficult to reproduce it in its entirety here. Briefly, integrated workshop #3 built on material taught in courses towards the end of the winter semester, including the role of public health units in disaster response. Because the learning teams had considerable experience working together, integrated workshop #3 appropriately placed a heavy emphasis on smooth team functioning, and rapid deliverables. This also entailed the application of the Incident Management System, which required learners to know the required skills, competencies, and roles of individual team members: Operations Manager, Planning Manager, Logistics Manager, Finance Manager, Safety/Risk, Liaison and Communication.

Not only was this the most complex and time-urgent integrated workshop, it involved the most guest speakers, including a chemical spill expert from the local fire department, a medical officer of health, a representative of the Red Cross, and a representative of Tara International, a training agency for NGOs.

Objectives

To assess learners' abilities in the following key areas:

1. Assessment and analysis – assessing the situation and analyzing the potential health concerns that should be acted upon.
2. Response management – acting upon the recommendations of the assessment and analysis, to decide what actions are taken.
3. Communications – all internal and external communication related to the event, specifically what, when, and how to disseminate information.
4. Decision-making – ensuring learners know what decisions they can make, and the approval process for this (knowing they need to get approval from MOH for communications, expenditures, etc.).

(cont'd)

Structure

Rather than a two-page handout (as reproduced from the first two integrated workshops, above), integrated workshop #3 was a dynamic unfolding set of scenarios that we posted to our learning management system as the day unfolded. To summarize, the day began with a news story about a chemical spill at a local oil refinery, after which the teams assembled and assigned their individual roles. This was quickly followed by a fire, which was fanned by high winds and caused smoke plumes over the surrounding area. By 10:00 the mayor was calling for an evacuation of the immediate area. Learners in their teams quickly wrote a public communiqué about potential public health risks and precautions, which they 'released' to the public after receiving approval by the medical officer of health and the public relations person.

The next escalation occurred when the provincial police force deliberately disrupted cell phone service as a precaution against a rumored terrorist attack. Rumors also spread that a Level 3 biohazard facility in the vicinity may have been the 'target' of the attack. By noon the terrorist attack had been identified as a hoax, but the situation had worsened because of explosions at the refinery. Local ERs were swamped with people complaining of breathing difficulties, nausea, and vision problems, and patients were being evacuated to a nearby city. The learners were also faced with media interviews with frantic citizens, a power failure, and a confirmed release of toxic chemicals in both water and atmosphere.

The final integrated workshop was also the first to engage members of MPH faculty in role-playing, including the mayor, a reporter, a government representative, and a frantic citizen.

CONCLUSION

We conceived of the integrated workshops as a sort of "Case 2.0" – opportunities to use active learning to integrate and synthesize material learned to that point in the classroom, and to practice applying skills to real or realistic public health issues. Learners were expected to make the 'least worst' decision, under time pressure, and to defend their choice. By involving genuine experts and having them provide feedback to the learners, the integrated workshops brought the community into the classroom and enhanced the linkages between our program and the surrounding community.

Planning for and implementing three integrated workshops during our first year required substantial faculty and staff resources. The informal impressions of faculty and outside experts supported the notion that the meta-objective of 'big picture' thinking required for public health practice was met by the integrated workshops. Learners demonstrated an awareness of the interdependencies involved with complex public health situations, and had learned to identify and make use of the unique skills of individual members of their learning teams. Although the situations were obviously simulated, learners took them seriously and demonstrated a calm confidence and professional demeanor.

Integrated workshops offered learners an opportunity to put the knowledge they were learning into practice. In doing this, their learning became more solidified and valued (Frenk et. al., 2010). Expert guest speakers, external to the program, exposed learners to the real world of decision making. The unique and current challenges we posed in these day-long events forced our learners to think outside the box, and fast, in order to make meaningful and applicable decisions. Further, their decisions were then analyzed by our experts, adding another dimension of realism to each event. With three Integrated Workshops over the course of the program, learners' abilities to integrate, synthesize, and apply knowledge to real situations could be developed and assessed throughout the program. The integrated workshops also assisted in

the preparation for the learners' practica. The integrated workshops truly took the curriculum and the program to another level; learners and faculty alike continued to applaud the success of each event.

Our future plans include more formal evaluation of the integrated workshops as well as publication of full sets of handouts and background resources. In the meantime we would be pleased to share our experiences with other programs who are interested in exploring this promising approach towards public health curriculum integration.

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