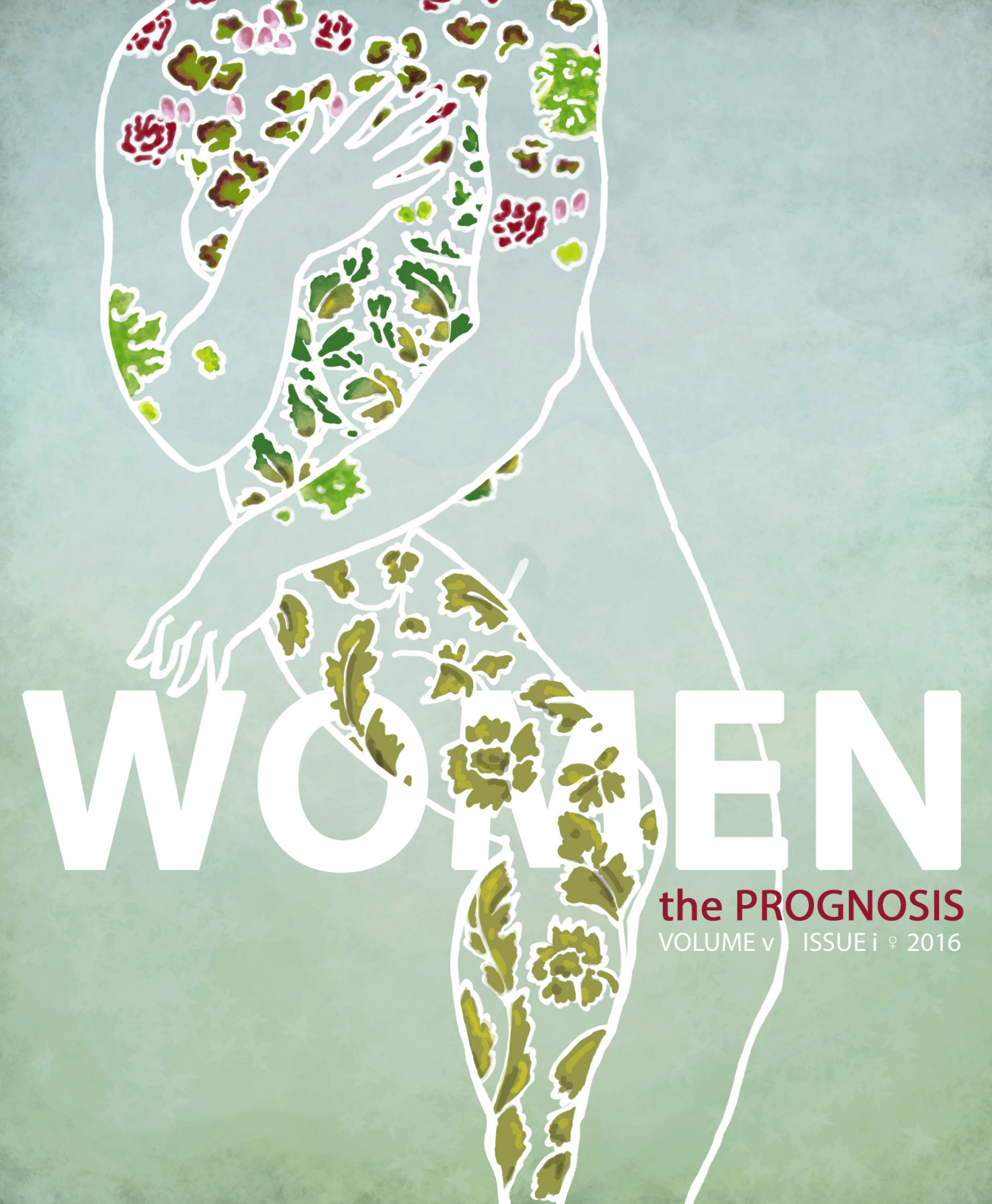

WOMEN

the PROGNOSIS
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The Prognosis:
McGill's Student Global Health Journal

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The Prognosis is supported by McGill's Global Health Programs (GHP) and the Institute for Health and Social Policy (IHSP). In keeping with the journal's focus on research at the intersection of social, biomedical, global, and local perspectives on health, these organizations are uniquely placed to support the ongoing work of this student-run publication.

GHP currently partners with numerous departments at McGill to promote human well-being, productivity and economic development, and is actively involved in research and training around the globe. Committed to collaborative projects that improve health through educational, clinical, developmental and research programs, McGill Global Health Programs is excited about new avenues to enrich the education of students interested in global health. The IHSP conducts interdisciplinary research on how social conditions impact health and welfare. In particular it aims to translate research findings in the areas of social inequalities and health outcomes into concrete provincial, national and international policies. With expertise in student training, the IHSP is keen to develop additional opportunities to spread research findings that improve population level wellbeing.

From the Editor-in-Chief

Dear Reader,

The Prognosis, McGill's only student journal of global health, was founded in 2011 by a group of innovative students who were interested in studying the emergence of global health as a budding discipline. Since then, the journal has evolved; with each new editorial team, the journal has transformed. Our editorial team this year has worked to upkeep the initial mandate of the journal – highlighting exceptional student research at the intersection of biomedical, social, local, and global perspectives of health.

Volume five of The Prognosis has, for the first time, a theme: women. Though establishing this theme, we sought to establish some cohesion while maintaining the diversity of information offered to us through interdisciplinary research. Within these pages, you will be introduced to some of the health problems faced by women all over the world, which are of consequence in the field of global health.

This volume contains six outstanding pieces of student research pertaining to women in the interdisciplinary field of global health. We start off in postwar Afghanistan, exploring mental health care for women who have been adversely affected by the violence and unrest of the region. We then have a thoughtful article on an initiative which aims to improve menstrual hygiene in India. This piece is followed by a study in family planning in Senegal, which looks into the availability of contraceptives to women in the country. We have another paper on the Inuulitsivik Midwifery Program in Northern Canada. Finally, we have research on antenatal care (ANC) evaluating its benefits and limits to maternal health.

We hope you enjoy reading the fifth volume of The Prognosis as much as we enjoyed putting it together.

Jennifer Yae Gi Yoon
Editor-in-Chief

Editorial Board

Yoana Garcia-Poulin, B.A. Philosophy & Linguistics

Montreal-born and raised, Yoana Garcia is currently enjoying her third year as an undergraduate student at McGill University. Yoana's interest in global health began as a teenager, when she had the privilege of volunteering in a nursing home. The experience left her with an enduring interest in geriatric care and bioethics. She then went on to study Liberal Arts in CEGEP, and soon discovered her passion for language, good writing, and most of all, rigorous argument. This led her to major in linguistics in university, where she continues to thrive off studying the intricacies of English grammar. She is thrilled to have been a part of The Prognosis team this year, and hopes that these articles will entice readers to learn more about the fascinating field of global health!

Kedar Mate, Ph.D. Rehabilitation Science

Kedar is a PhD Candidate in Rehabilitation Science at the School of Physical and Occupational Therapy of McGill University. He is interested in linking different outcome measures (ClinROs, PROs, PerfO, TechROs) in vulnerable populations (frail individuals, people with Multiple Sclerosis and Parkinson's). He is interested in modern methods of measuring health outcomes and statistics. His role in Prognosis as a layout editor was to work in team to improve presentation of articles and moving away from traditional black and white printing while keeping the readers interested.

Emily MacLean, M.Sc. Microbiology & Immunology

Emily is wrapping up her MSc in Microbiology & Immunology at McGill, in which she studied the parasite Leishmania. She is fascinated by global health in all its social, medical, ecological, economical, local, financial, international, etc. complexities. Currently, She is working as a research assistant in Dr. Madhu Pai's group, where she is involved in a TB biomarkers project. She has always been interested in the points of intersection between seemingly disparate areas; this curiosity was formalised during her undergrad at Simon Fraser University in Vancouver, BC, where she studied biology and art & culture studies. As an interdisciplinary field, global health is an area she wants to continue working in throughout her career. She hopes that this edition of The Prognosis can illustrate some of the depth and nuance of this vital field. Enjoy!

Editorial Board

Nick Milum, B.A. International Development

Nicholas Milum is a first-year student hailing from Vancouver B.C. He came to McGill to study International Development and the environment. He has a particular interest in layout design and graphic design. He wanted to practice these skills while contributing to a journal on global health, a topic which he thinks is important to the discussion of global well-being and human flourishing.

Marisa Okano, M.Sc. Public Health

Originally a BC girl, Marisa moved to Montreal just over a year ago to pursue a Masters of Science in Public Health at McGill. Prior to moving, she completed a double BSc Major in Biochemistry and Honours Forensic Psychology. The next goal – a career as a clinician scientist! She is passionate about cardiovascular and clinical epidemiology, with much of her research focusing on sex differences, health outcomes, drug response in women and biological markers of cardiovascular disease. On a personal level, she trains for marathons and is a hot yoga/tennis enthusiast. As a coffee addict, she spends more time at Starbucks studying and working on her research than she does at home. She has big life ambitions, and she believes that hard work, perseverance, and dedication is the key to success. "Be the change you wish to see in the world" – Gandhi.

Lekha Puri, Hon. B.Sc.

Lekha completed her Honors B.Sc. in Chemistry at McGill University with a minor in Interdisciplinary Life Sciences. Her interest in public health and medicine led her to join Dr. Madhu Pai's group on a range of projects related to tuberculosis diagnostic tools, including a market analysis of GeneXpert's cost in multiple private sectors and a cost-analysis of TB diagnostic tools in low-resource settings. She also works on several global health projects related to using medical simulation in low and middle income countries. With such a wide range of interests and knowledge, she plans to pursue an MD combined with either an MPH or an MBA and ultimately work to improve healthcare at a systems and population level. Apart from public health, she's a tea lover and an avid dancer trained in multiple styles including South Asian dance styles (e.g. Bollywood), contemporary, hip-hop, African beat, salsa, among others.

Editorial Board

Anna Qian, B.Sc. Honours Physiology

After completing high school in Vancouver, Anna went three time zones east to study physiology at McGill. Now, just a semester away from completing the last year of her undergraduate Honours program, she's hoping to be accepted into medical school in yet another new location. She has a passion for child health and humanitarianism, and channels this interest into her extensive involvement with McGill Students for UNICEF. When not in the lab, in class, or at a UNICEF event, you'll likely find Anna in the Music library. Anna believes in working hard to succeed, but she also believes in music breaks and cheap chow from Tim Hortons. By way of hobbies, Anna enjoys playing the piano, whacking tennis balls, and devouring suspense novels.

Steven Stechly, B.A.S. Cognitive Science & Social Studies of Medicine

Steven Stechly is a first year undergraduate student in the Bachelor of Arts and Science at McGill. He finds global health to be particularly interesting after travelling to both the Dominican Republic and Ecuador to provide medical aid to locals. Steven is extremely excited to be a part of the Prognosis, and expand his love for health care on the global scale. He hopes to take the knowledge and experience gained from the Prognosis abroad in future expeditions.

Jennifer Yoon, B.A. Political Science & History

Jennifer Yoon is a third-year undergraduate student at McGill, double majoring in Political Science and History. She has a particular interest in how the social and the political intersect to transform the human experience. Accordingly, she is excited to be a part of the Prognosis team to explore the ways by which a healthier population can create a healthier society. Throughout the 2015-2016 school year, Jennifer served as Editor-in-Chief for The Prognosis, McGill's student journal of global health, supported by the IHSP and Global Health Programs. In her spare time, Jennifer works as the Executive Editor & Editor-in-Chief at the Bull & Bear, the only student-run magazine at McGill, tackling a variety of issues from radical feminism to voter suppression.

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UNANSWERED QUESTIONS AND ETHICAL DILEMMAS FROM AFGHANISTAN:

UNHEARD VOICES AND ENDURING SUFFERING OF WOMEN AFFECTED BY VIOLENCE

MCGILL UNIVERSITY

SAKIKO YAMAGUCHI

Based on reflecting on the experience of working with an Afghan widow, this essay unfolds the challenges and dilemmas of providing aid for vulnerable populations whose voices are rarely heard. Though global health policy makers and practitioners are fully committed to achieving universal health care, it is easy to overlook the fact that people's suffering and emotional pain from conflicts and structural violence are multi-layered. The expression of their painful feelings, illness as a result of suffering, and help-seeking are deeply embedded in particular socio-cultural contexts and historical processes. This essay shows the limitations of uncritical applications of Western biomedical concepts in addressing the gap of mental health needs for people affected by violence.

Acknowledgements
I would like to thank Dr. Duncan Pedersen, who powerfully inspired me to develop critical insight within the field of Global Mental Health. I also thank my Afghan and Japanese colleagues for their constant support and encouragement throughout my time in Afghanistan.

Walking together in the backyard, surrounded by blooming red and pink roses and a distant view of dark blue mountains capped with white snow, I spoke with Bibi Sherin* about the weather and our families. The beautiful landscape and good company made it easy for me to forget the ominous uncertainty, lethal violence, and fragility Afghanistan faced.

On that day, Bibi Sherin unexpectedly started to unfold her past memories. Using her limited English and my limited Dari, when I heard her say, "Shohare" "Talib" "Da da da da da." I had no idea what this was about. Nevertheless, helped by her unusually strong voice, I gradually put the pieces together: a long time ago, her husband was shot by Taliban fighters. The tears that streamed down her cheeks revealed the painful emotions she had before since suppressed, especially regarding the death of her loved one. Walking in silence, side by side with her, I could find no words to ease her suffering and sense of loss.

The NATO helicopters flying noisily above us reminded me that peace was yet to come in Afghanistan.
Has she always kept the lid on her emotions, as well as her agonizing memories? Is it a conscious reaction to actively forget her past? If so, how can her emotional pains heal?

When Taliban roadside bombs and suicide attacks kill civilians on a daily basis, how can those affected by this victimization express their collective sorrow? How has the daily precariousness of this ongoing conflict affected people's mental health?

Bibi Sherin, an Afghan woman, worked as a housekeeper in the office of a technical assistance project provided by the Japanese government in Afghanistan. One of her tasks was cooking lunch, a highlight of the day for all of the staff and what seemed to be the time and space where she could release herself from daily stress, as well as uniquely express herself. Each time I told her that her dishes were tasty, she would bashfully return a pleased smile. That smile eased the stress and frustration I felt while working under such instability and uncertainty. Of the one million vulnerable Afghan widows, as estimated by the Ministry of Women Affairs , whose voices are rarely heard in a male-domi-

So What?

In order to address mental health needs for vulnerable populations affected by violence, it is important to understand that human suffering is multilayered. Suffering should be understood from a broad macro-perspective as well as at individual and collective levels in particular socio-cultural contexts.

nated closed society, she was lucky to have a paid job. Unfortunately, our project was about to end.

Knowing this fact, she told me, "The project ends. No job." Although I responded that I would talk with my boss, I was unsure whether we could find another job for her. I could sense her growing concern and anxiety at losing her precious source of income. As a breadwinner, despite having the extreme disadvantage of being an illiterate woman, she was under enormous pressure to find another job. I can recall my shock when I once noticed, as she removed her scarf to fix her hair, that her dark locks had started to turn white. I wondered if her white hair showed not only the direct impact of protracted violent conflict, but also the suffering endured from such economic hardships and distress.
As the project drew close to an end, Bibi Sherin started to become absent from work. One day, when I asked about her absence, she told me that she sometimes felt chest pain. Several days later, she took an unpaid leave to go to Pakistan with one of her sons to see a doctor.

Will vulnerable populations, such as illiterate widows, be kept confined to impoverishment as victims of structural violence? To what extent are Afghan religion, culture, or traditional values reflected in the Western notions of human rights, gender equality, and empowerment of vulnerable populations?

As the project drew close to an end, Bibi Sherin started to become absent from work. One day, when I asked about her absence, she told me that she sometimes felt chest pain. Several days later, she took an unpaid leave to go to Pakistan with one of her sons to see a doctor. Considering the extra expenses of her trip to Pakistan, instead of seeing the closest Afghan doctor in Kabul, it was not an economically rational choice.

Is her help-seeking behavior signaling a gap between the people's need and what the Afghan Ministry of Health and the international humanitarian assistance have been trying to provide?

In countries like Afghanistan where the government budget heavily relies on foreign aid, health resources are barely available, and the insecurity hinders access to available health services, is the concept of universal health care a pipe dream in the end?

On my last working day in Afghanistan, I visited Bibi Sherin to say good bye. Luckily, despite her concerns, she had been given a new post in another project. When I informed her that I was going to study mental health, another Afghani member of staff who translated for me explained, "When Bibi-san (Bibi Sherin's moniker) went to Pakistan, the doctor told her that the chest pain is caused by her mental illness. It is great to hear that you are going to study about these conditions. Mental health is important in Afghanistan because many people are suffering."

Are Bibi Sherin's white hair and chest pain an embodiment of her attempt to actively forget the agonizing memories and cope with the psychological distress?
Is her help-seeking behaviour reflective of the challenges being faced in the realization of a universal health care system in Afghanistan?

Would the medication prescribed for her chest pain also take her psychological suffering away, even if her current situation keeps a lid on her emotions?
Who will hear the voice of vulnerable populations, such as illiterate widows like Bibi Sherin, and how can we help them heal their collective emotional pain?

I left Afghanistan in the summer of 2011 with these questions unanswered. My days with Bibi Sherin have made me recognize the need for an in-depth understanding of the distress and illness that are embedded within historical and socio-cultural contexts that differ from our Western premises. Cultural context is sometimes overlooked in favour of biomedical evidence

when explaining health outcomes. To adequately address these unanswered questions, we must recognize that Western biomedical concepts may fail to consider the way people affected by violent conflict suffer.

**The names used in this article by the author were used with permission.*

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IMPROVING MENTAL HEALTH CARE IN POST-WAR AFGHANISTAN

MCGILL UNIVERSITY

MONICA BAHOSHY,
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LEILA FARAHDEL,
RYAN HARTLEY,
ADRIANNA MODAFFERI,
ARYAN SHEKARABI

Mental disorders act as a leading cause of disability world wide, especially in war and disaster torn regions. The effects of mental conditions are especially high in women living in "fragile states" such as Afghanistan, where resources to appropriate mental health care are extremely scarce. HealthNet TPO, a Dutch NGO has made an attempt to fill this fundamental health care gap through a three-tiered intervention. This case study critically evaluates HealthNet TPO's efforts in Afghanistan based on the intervention's scope, performance, and sustainability. The findings of this case analysis conclude that HealthNet TPO has been successful in sustainably expanding mental health resources; however, it remains unclear if the performance level is satisfactory to meet the elevated needs of the Afghan population.

The Global Burden of Mental Health

Mental disorders are one of the leading causes of illness and disability worldwide, with depressive conditions acting as the fourth leading cause of the global burden of disease. Approximately 1 in 4 individuals will suffer from a mental illness at some point in their lives. (1, 2) Both the rates and severity of depression are exacerbated in individuals living in war and disaster-torn conditions. Furthermore, depressive disorders are twice as common among women due to additional social factors such as gender discrimination, poverty, sexual, and domestic violence. (3) Some treatments are available, yet approximately two-thirds of individuals suffering from these conditions fail to seek help from a health care professional, partially due to the stigma and discrimination that surrounds mental illness. (2) Globally, there is great imbalance in the distribution of mental health resources. In low and middle incomecountries especially, the lack of approporately educated health care professionals acts as a central barrier in obtaining appropriate psychosocial treatment. (1) More than 40% of countries worldwide have no mental health policies, while 30% offer no mental health programmes for their distressed populations. (2) Moreover, war and disasters have a major impact on psychosocial well-being, doubling the rate of mental disorders amoung the population. (1) In addition, approximately 80% of people affected by wars, violent conflicts, and displacement from their homes are women and children. (3) Since mothers are the primary caregivers for their families, changes to their health status may impact their child care abilities, and by extension, the health of their children. As such, the lack of access to appropriate treatment within these nations make mental disorders that much more devastating and debilitating. The objective of our case study is to analyze and evaluate a mental health intervention in Afghanistan. Also, we will present recommendations based on our analysis of the services provided, which we hope will inform future mental health interventions in developing regions.

So What?

Mental health is an important aspect of health that is negatively affected in areas of war and destruction. The war in Afghanistan strained the healthcare system, leaving its most vulnerable population – women – with no access to resources. Quality mental healthcare services in low-resource areas must be addressed through the expansion of existing services, collaboration with the government, and the implementation of evidence-based practices.

Afghanistan's Need for Mental Health Services

After the fall of the Taliban regime in 2001, the Afghan health care system was completely demolished, with the mental health sector disproportionately affected. There were severe shortages in staff, supplies, orga-

nization, and infrastructure. Mental health services were limited to a few regional hospitals and the only psychiatric hospital was destroyed. (4) There were no qualified psychiatric nurses or clinical psychologists and only two practicing psychiatrists to treat a population where approximately 60% suffered from mental illness. (4) With these characteristics, Afghanistan was classified as a "fragile state", as its government lacked the capacity to provide the basic services and necessary security measures for its population. (4) Without a department of Mental Health in the Ministry of Public Health (MoPH) in Afghanistan, it was difficult to categorize the needs of the population.

In the late 1990's, the World Health Organization (WHO) Regional Office for the Eastern Mediterranean attempted to organize a comprehensive 3-month diploma to train 20 doctors in psychiatry, but it failed due to the high levels of violence found within these regions. (4) Later, with the help of the WHO, the Basic Package of Health Services (BPHS) was created to provide a standardized package of basic essential services and promote the redistribution of health resources to this underserved Afghan population. (4, 14) At the time, there was a strong need to develop tangible and long-term improvements to the health care system as a whole. Given that the nation had been in a constant state of war for decades, addressing mental health issues associated with the stress and uncertainty of living in these conditions became imperative. (4) When the BPHS failed to accurately describe the targeted mental health interventions, donors doubted the feasibility of integrating them into the basic services and ultimately neglected this crucial health care sector. Therefore, devising a solution now relied on external organizations to develop their own methods and tools. (4) The MoPH realized the necessity for a sustainable mental health program and restructuring of the health care system. An estimated 13 million Afghans suffered from mental health problems, and even more struggled with varying degrees of stress disorders. (5) A survey conducted in Nangarhar Province in 2003 confirmed that the rates of depression and anxiety are high, particularly amongst women. It revealed that 58.4% of all women in the province had depressive symptoms, 78.2% had anxiety symptoms, and 31.9% had PTSD symptoms. (5)

HealthNet TPO's Global Presence

HealthNet TPO is a Dutch non-governmental organization, established in 1992 by Médecins Sans Frontières to bridge the gap between emergency aid and structure development. HealthNet TPO works to improve health care in war- and disaster-torn areas with an overall mission to "reach accessible health care for all". (6) To date, HealthNet TPO has implemented projects in 27 different countries, with a long-term presence in several fragile states, including Afghanistan, where they have been active since 1993. (4) In early 2002, HeathNet TPO attempted to begin addressing the mental health needs in Afghanistan. Using the WHO Mental Health Gap Program as a guideline for services and interventions, they designed and implemented a project that aimed to provide comprehensive and diverse training programs for mental health care practitioners in the Nangarhar province (population 1.38 million). (7) After conducting a needs assessment in Nangarhar, they discovered that this population was devoid of any mental health care, and therefore designed a three-tiered, sustainable scheme to enable the existing health care system to address this pressing issue. (4)

The Three-Tiered Intervention

The first goal was to integrate mental health care into basic health services. (4) HealthNet TPO approached

this objective by training health care workers in the identification and management of mental health conditions at each of the three levels of the health care system: health posts, basic and comprehensive health centers, and district hospitals. At the basic and comprehensive health centers, health care workers were trained in the identification and treatment of priority disorders. Physicians received additional comprehensive psychotropic training, and nurses and midwives were trained on psychosocial interventions and psycho-education. (4) District hospital mental health services were expanded to include both outpatient and inpatient services. Each hospital was assigned a full-time physician who had been trained in mental health care at the psychiatric department of a teaching hospital in Pakistan, and a psychosocial worker trained to provide support groups and psycho-education. (4) Training sessions were initially conducted in English and translated into Pashto by Afghan doctors on the HealthNet TPO team. The training sessions involved videos, role-play, group discussion, and patient-doctor simulations. (4) To integrate this program throughout the entire province, a multistep approach was taken. First, the population was assessed through focus group discussions to explore the local concept of mental illness, and classified these disorders as either epilepsy, common (such as depression and anxiety), or severe (such as psychosis) mental disorders. Next, materials and methodology were developed and training began in six rural districts, called the Shinwar cluster. The training programs and the provision of psychotropic drugs were then expanded throughout the entire province and integrated within the general health budgets. (4)

The second goal was to strengthen community care and resilience through psycho-education on mental health issues, psychosocial distress, and coping mechanisms. (4) Community health workers now offer support groups and workshops on a variety of topics such as grief, drug use, and domestic violence. They also implemented individual case management through supportive counseling. The final goal was to achieve policy support and integration for mental health. HealthNet TPO was able to reach this goal by initiating the establishment of the Mental Health Department within the MoPH in 2005 by providing financial support and acting as an active partner within the Afghan MoPH. (4)

Analysis of HealthNet TPO's Intervention

In order to evaluate HealthNet TPO's intervention in Afghanistan, we conducted a 3-factor analysis. By evaluating HealthNet TPO's efforts in the Nangarhar region based on their scope, performance, and sustainability, we can analyze both the strengths and weaknesses of the intervention in order to evaluate and adapt the program for future improvements and expansions.

Scope

To appropriately determine whether HealthNet TPO's intervention in Afghanistan was of adequate scope, we applied the framework proposed by the WHO in the WHO MIND project. (8) In this outline, the WHO describes the various types of mental health interventions that should be included, along with the resources and availability that should be allocated to each, in order to execute an effective mental health intervention. This framework is illustrated by a pyramid of health care: the peak represents interventions that require more resources and infrastructure, while the base of the pyramid describes more community-based and self-care oriented initiatives (Figure 1). (8) The key takeaway from this WHO framework is that lower income countries looking to develop their mental health services should focus less on costly resources that often

meet a lower demand, such as in-patient mental institutions, but rather should focus efforts on establishing and expanding the use of less costly interventions, such as mass community mental health services, as well as promoting and educating on self-care. Another key point highlighted by the WHO report is that, in order to have the greatest impact, mental health services should be integrated with primary health care, via incorporation within general health facilities.

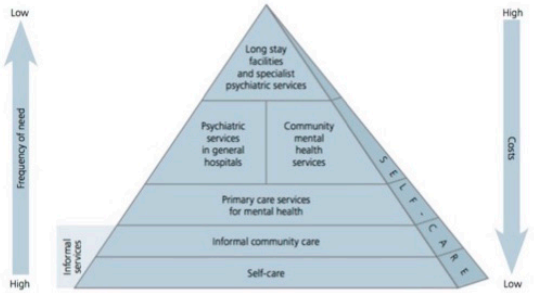

Figure 1[7]: Optimal Mix of Mental Health Services - WHO Pyramid Framework | This framework demonstrates that greater resources should be allocated to low cost, high demand services, and lesser to high cost, low demand facilities when attempting to integrate novel healthcare services.

When the state of affairs was compared pre and post HealthNet TPO's intervention, it was clear that these methods covered a wide scope of mental health services. Before the intervention was implemented, Afghanistan's population of more than 21 million lacked basic mental health care, with only two practicing psychiatrists and no other health care professionals with any mental health training. (4) There was also no mental health care representation in the MoPH of Afghanistan. The intervention tackled these issues by providing appropriate training for health care workers at several levels of the health care system. (4) Overall, HealthNet TPO's intervention led to the addition of 931 community health care workers, 275 nurses, and 334 physicians trained in mental health care. (4) A comparison with pre-intervention is described in Table 1. The data also show that the intervention focuses mainly on community mental health care initiatives and self-help/support groups, which is in congruence with the Optimal Mix of Mental Health Services proposed in the WHO pyramid framework. (8) Based on this, it can be concluded that the scope of HealthNet TPO's intervention in Afghanistan was successful in expanding at levels of the health care system to better serve the needs of the population.

Table 1: Comparison table between prior and post intervention

Pre-intervention (2001)	Post-intervention
2 psychiatrists	931 CHWs, 275 nurses, and 334 physicians trained in MH
No mental health care representation in MoPH	MH in first tier BPHS and representation in MoPH
	Basic/comprehensive health centers
	District hospitals with specialists
	Community health care with volunteers and CHWs

Performance

To evaluate the performance of HealthNet TPO's intervention, the "Triangle of Health Care", described in Dr. William Kissick's book titled Medicine's Dilemmas: Infinite Needs Versus Finite Resources has been used as a framework. Dr. Kissick proposed that health care is constrained by three competing, yet equally important factors: access, cost, and quality. He argues that when one of these factors is changed, it inherently affects the others. For example, if one were to increase the quality of health care, it would subsequently increase the cost of the care offered. To take this further, within an area where medicine is not socialized, an increase in cost would cause a decrease in access to services.

Based on the data reported by HealthNet TPO, overall access to mental health services had increased when

comparing the number of consultations for mental health disorders before and after intervention implementation. (4) In 2002, before the intervention was employed, the absolute number of consultations for mental health disorders totaled to 659. (4) This number increased to over 3,000 by 2004 and, finally, over 20,000 consultations in 2005 when the intervention was expanded to the entire province (Figure 2). (4) Therefore, consultations in mental health increased by over 3000% in the province of Nangarhar, and it can be concluded that access did indeed increase, likely as a result of the expanded scope of mental health services.

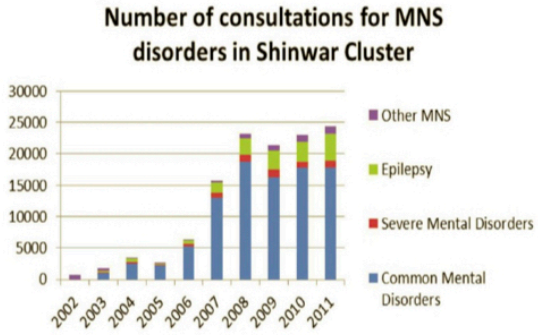

Figure 2[3]: Number of Consultations for Mental Health Services Between 2002 and 2011 | HealthNet TPO development began in 2002, and was scaled up between 2005 and 2008 to the six regions of the Shinwar Cluster. This data demonstrates the increased access after implementation of the intervention.

As mentioned previously, HealthNet TPO had been contracted by the Afghan government to rebuild the health care infrastructure in Afghanistan. Based on HealthNet TPO's 2009 financial report, the total health care spending in Afghanistan summed to €55 213 726, whereas funds dedicated to their mental health and psychosocial services totaled €993 718. (9) Based on these figures, mental health care expenditures represented 1.8% of HealthNet TPO's total health care spending in the 2009 fiscal year. In order to extract any concluding information from this figure, we used the WHO Mental Health Atlas 2011(10) (the 2006-2010 publication were unavailable) as a guideline to compare this value to other nations. In this report, Afghanistan falls into two categories based on its geographical location (Eastern Mediterranean Region) and its World Bank income level (Low). (10) Other countries in these two categories are listed in Figure 3. Based on this data, mental health care spending represented, on-average, 3.75% of total health care spending for countries in the same geographical region as Afghanistan. (10) Comparatively, countries that fall into the same income level as Afghanistan spent 0.53% of their health care budget on mental health services. (10) Therefore, two conclusions can be made when comparing Afghanistan's mental health care expenditure with geographically or financially similar countries. First, Afghanistan spent less on mental health services in relation to its total health care expenditures compared with other countries in the region, and second, Afghanistan spent more on mental health services than other countries who have similar income levels. It should be noted, however, that this data cannot be used to make a definitive conclusion on whether this expenditure is adequate to support the needs of the country or not.

Eastern Mediterranean Region	Low World Bank Income Level
Afghanistan	Afghanistan
Egypt	Dem. Rep. of Congo
Morocco	Burkina Faso
Qatar	Burundi
Saudi Arabia	Cambodia
United Arab Emirates	Bangladesh
Lebanon	Guinea

Figure 3[9]: Classification of Countries – WHO Mental Health Atlas | Afghanistan's mental health expenditures are higher than the average of the countries of similar income level, but lower than the countries in similar geographical regions.

In order to bring together the other two factors in our analysis of the intervention's performance, we would need to analyze the quality of HealthNet TPO's intervention. This analysis could have looked at a number indicators, such as suicide rates, self-reported symptoms, DALYs attributed to mental health disease. Unfortunately, despite numerous attempts to obtain data from HealthNet TPO and the Dutch government, these values were inaccessible. This represents an enormous gap in the quality analysis, as it cannot be determined whether the resources directed towards mental health services in Afghanistan produced effective results.

Sustainability

The sustainability analysis of a global health intervention should consider various factors related to project design, quality, integration, and the community of interest. (11) The Cochrane Handbook for Systematic Reviews of Interventions recommends the model developed by Shediac-Rizkallah as a useful framework for determining sustainability in public health. (11, 12) This model contains three aspects of sustainability that can be used to evaluate the mental health services implemented by HealthNet TPO.

First, HealthNet TPO's intervention does not appear to be able to maintain or sustain any health benefits achieved through the program. The increased health service coverage in Afghanistan was associated with less time spent with each patient, which in turn potentially lowers the quality of each consultation. (4, 13) Shorter consultation times may largely affect women because they experience higher levels of anxiety and depression than men. (5) With the subordination of women in social life within Afghanistan, these appointments may serve as one of the few opportunities to address their mental health issues. Furthermore, the program may be unable to continue delivering substantial benefits if financial and administrative assistance terminates. There was no projected plan for the program to be financially self-sufficient in the future. The program is currently funded by external sources, with the Global Fund as the primary donor, contributing to 49% of total funding (Figure 4). (9) The increased prioritization of mental health services in the BPHS may lead to more government financial assistance in the future but this is purely speculative. (14) In the short term, the program is sustainable due to the continual external funding by numerous organizations.

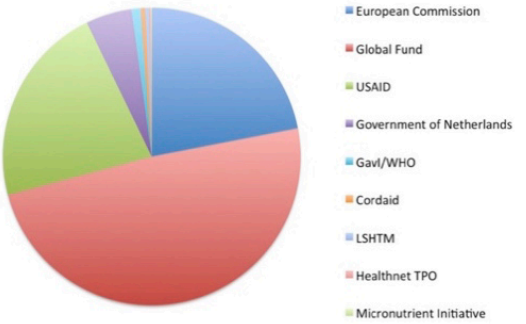

Figure 4[8]: HealthNet TPO Project Funding Structure | The program is currently being funded by nine differed external donors. The Global Fund acts as the primary donor, contributing to 49% of the projects total financial support.

For the second aspect of sustainability, HealthNet TPO was indeed successful in institutionalizing mental health services, allowing activities to continue as part of the general health care system. Mental health services were successfully integrated by educating existing staff at each level of the health care system, while HealthNet TPO continues to provide further and updated mental health training. (15) As such, long-term viability of mental health services is possible because of its incorporation into primary care, but it is questionable whether these services could continue without the

administrative support of HealthNet TPO. The improved access to services, based on the increased number of mental, neurological, and substance use (MNS) consultations is a further indication of success from this perspective of sustainability.

Lastly, the program also achieved sustainability from a capacity-building perspective. There is an increased capacity in the Nangarhar community to appropriately treat mental health issues, as the activities of the program can be maintained and continued at the connumity level. HealthNet TPO strongly emphasizes community involvement to address mental health problems through educational workshops and support groups. Increased access to information helps foster a sense of empowerment within the community, or "community resilience", because local individuals learn the skills necessary to identify and address mental health problems. (5) It is implied that the trained community members are now able to educate others on mental health and sustain these support groups, should HealthNet TPO remove its services.

In summary, the program, based on its methodology, shows signs of sustainability. However, HealthNet TPO does not provide a clear plan for how mental health services are to be sustained if the NGO's support and external financial assistance were withdrawn in the future. Furthermore, the evaluation of this program would have benefitted and been further enhanced by statistics and data describing its success at the community and patient level.

Conclusions on Mental Health Care in Afghanistan, Post-Intervention

In summary, the involvement of HealthNet TPO in Afghanistan has lead to the establishment of a mental health department within the government, as well as the integration of mental health care services into the existing health care framework. The lack of program evaluation is the fundamental shortcoming of this case study. While the main goal of the intervention to improve access to mental health services was accomplished, no definitive conclusions can be made regarding its efficacy, particularly due to lack of data on clinical outcomes. The published evaluations are purely quantitative measures of the number of patients passing through the system, with little impact evaluation of the care they are receiving. In terms of clinical outcomes, HealthNet TPO posited that the shortened appointment times due to the increased demand may negatively impact the quality of care, as physicians may turn to favoring psychotropic interventions over the more time-consuming psychosocial alternatives. (4) However, there is no published analytical evaluation of mental health care at the individual patient level. There are indications that women are less likely to make use of social resources for mental health problems. (5) Understanding that women represent a vulnerable group in Afghanistan, it would have been interesting to measure gender differences in uptake of access to care for mental health. This data is integral to health care policy reform as it provides vital information for future improvements and developments.

In order to build an accurate and comprehensive evaluation on HealthNet TPO's overall impact on mental health care in Afghanistan, it is necessary to investigate how these implemented health care policies translate to clinical practices. Since this information has not been made available to the public, it is assumed that no evaluation was performed. The following are suggested evaluation methods. Patient follow-up is crucial to provide direct feedback and allow for the improvements at the level of the patient. (16) Efficiency is a key factor in health care, and as such, a database

containing patient records and medical history would provide for better organization and access to information by the administration and health care professionals. (17) Finally, a specialized task force charged with evaluating mental health practices would provide an overall perspective on how the policy is translated to the clinic and community posts.

As Afghanistan has been in a state of war for over 35 years, the population of this nation has suffered tremendously in terms of their safety, health, and psychosocial well-being. As financial resources allocated towards health care services are often lacking, mental health, especially in fragile states, is often an afterthought. It is important for mental health initiatives to be integrated into basic health services for all nations worldwide, as mental illness is one of the leading causes of global disability. Mental health care must also incorporate evidence-based practices that account for the particularities of women's mental health, their role in society, and the gender-based issues, discrimination, and biases they face. These mental health initiatives within Afghanistan should not end with HealthNet TPO, as there are still improvements to be made. Additional efforts need to be implemented in order to assess and improve the quality of care, increase access, and promote further education on the topic of mental health in order to reduce the stigma and discrimination surrounding mental illness.

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TAMING THE TIDE: STORIES FROM INDIA

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This paper examines an innovative sanitary pad manufacturing process in India that uses machines staffed by local women. In considering its financial viability, we assess whether the intervention -- based on a social entrepreneurship model -- adequately addresses the economic and social challenges of menstrual hygiene management in rural regions of the developing world.

Background

The impact of poor menstrual hygiene management (MHM) on women's health, education, and economic participation has attracted attention only in recent years. The situation is particularly dire in India, where a national survey conducted in 2011 by the research agency AC Nielsen and Plan India found that 70 percent of women cannot afford sanitary napkins (SNs). Of the 355 million women of reproductive age, only 12 percent use SNs. In rural areas, home to 68 percent of the total population, (1) usage is even lower, at around 2 percent. (2) In comparison, 64 and 88 percent of women use SNs in China and Indonesia, respectively. (3)

The social and economic costs of inadequate menstrual protection are significant. A study of 1,033 women and 151 gynecologists found that, in addition to five missed days of school per month among adolescent girls (ages 12 to 18 years), around 23 percent drop out altogether after they begin menstruating. (4) It is estimated that providing women with more opportunities, including facilitating full participation in school and the workforce, could increase India's economic growth rate by 4.2 percent. (5)

Many girls in India begin menstruating with insufficient guidance and information about this important physiological change. (6) Studies have indicated that between 56 and 66 percent of girls have no information about menstruation prior to reaching menarche. (4,5) One study in Rajasthan found that 70 percent of girls believe that menstruation is unnatural. (7) This lack of awareness is exacerbated by persistent cultural taboos that surround menstruation, which is often "associated with impurity, secrecy, and shame." (6) Based on a study of Delhi slums, adolescent girls who are menstruating are frequently restricted from engaging in certain activities, such as worship (92 percent) and household chores (70 percent). (8)

Rather than purchasing SNs, over 77 percent of Indian women depend on cloths or rags that are often reused, while 88 percent have resorted to other materials such as ashes, newspapers, dried leaves, corn husks, and sand. (9) Furthermore, 48 and 38 percent of girls in urban and rural areas of West Bengal, respectively, reported unsatisfactory cleaning practices. (10) Although there is little data to suggest a causal link between the use of makeshift materials and reproductive disease, poor menstrual hygiene is associated with a higher risk of vaginal infections and pregnancy-related complications.

Problem Statement

In consideration of cultural factors, lack of education, and economic constraints, improving MHM requires a multi-faceted approach. Along with the behavioral challenges associated with low literacy levels and menstrual hygiene awareness, the problem is also market-based. There is little incentive for multinational companies to penetrate rural areas given the high transportation costs, difficulties of marketing to diverse and rural consumers, and relatively low profit margins. With scarce resources, commercial SNs are unaffordable and consumer access is limited. Finally,

the cost of traditional machinery necessary to manufacture SNs is out of reach for entrepreneurs seeking market entry.

Intervention:

Technology

Arunachalam Muruganantham, a craftsman from rural Tamil Nadu, India, was shocked when he realized that his wife would use dirty rags during menstruation so as not to sacrifice part of the family's food budget to purchase SNs. He recognized that an innovative solution was needed to address the MHM needs of rural women. His goal was to design a cheaper alternative to commercial SNs, which cost 4 rupees (INR) at the local pharmacy, a price almost 40 times higher than the value of the raw materials. (12)

After identifying the composition of a typical SN (cellulose extracted from wood fibre), Muruganantham set out to design a simplified and cheaper version of the expensive machine used to convert the wood fibre into cellulose. (12) In four years, Muruganantham successfully designed a semi-automatic assembly line machine using skills he had learned while working in a welding shop. He obtained machine parts through his previous partnerships in exchange for a stake in his company. (13)

Each machine, powered by electricity and a foot pedal, can produce up to 1,000 SNs per day using four simple steps. (14) First, the tough wood fibre is crushed into soft cellulose. The cellulose is then compressed into the desired shape and sealed with non-woven polyethylene. The final step involves sterilization by UV light. Upon receiving a national innovation award by the Indian Institutes of Technology (IIT) and an Indian presidential award, Muruganantham's technology was patented in 2006. (15) In spite of his success, Muruganantham has not commercialized his product, determined instead to employ a decentralized manufacturing strategy.

Addressing the Need

Muruganantham established his company, Jayaashree Industries, with the following objectives: increase the usage of SNs, create a sustainable model by providing employment opportunities, and improve health by raising awareness about proper MHM. (16) Muruganantham sells the machines at an affordable price to women's self-help groups (SHGs) in rural communities who receive financing through bank loans or non-governmental organizations (NGOs). Muruganantham transports the machines and raw materials himself, thereby reducing the number of players in the supply chain. Since he is present for the setup of the new machinery, Muruganantham also trains the women to use the semi-automatic machine in the span of three hours. All sites are staffed and managed by an average of ten women per unit. (14)

The women can customize the products they produce by selecting the name and designing the packaging. (12) With over 867 local brands, the products are marketable within many different communities despite regional variances in language and culture. (16) Generally, elderly women in the community, called resident dealers, take on the task of distributing SNs to women while also promoting good MHM practices. Another reason this model is well-adapted to rural settings is that it allows community members to obtain SNs as packages or single units, either by direct purchase or through a barter system. (13)

Infrastructure and Financing

Muruganantham sells the machine at a starting price of 75,000 INR (about 1,090 USD) with additional

costs for materials and setup. (13) The entrepreneur is expected to pay 10 percent of the initial investment, with bank loans or NGOs covering the remaining 90 percent. Loans may be obtained by members of SHGs, comprised of 10 to 20 women from the same low-resource village. This is done through the pooling of resources, generated by monthly or bimonthly contributions to a common fund, or from formal microfinance institutions and commercial banks that provide group loans. (17) The banks work closely with NGOs to help facilitate lending and educate women about income-based work. (17) Lending to SHGs is also profitable for banks, as the women are then more likely to open accounts and take out loans themselves, with a recovery rate of about 99 percent. (17) This grassroots model allows women to participate not only as consumers, but also as investors, manufacturers, and marketers.

Evaluation of Impacts and Outcomes:

Investment Details

The Jayaashree Industries grassroots social entrepreneurship model provides women with low incomes the means to start their own businesses and recoup their initial investment in under four years. Becoming a napkin manufacturer requires an initial investment of 371,170 INR (Figure 1).

Estimated monthly expenses are 84,775 INR, which include raw materials, labor, and administrative expenses. Estimated monthly revenues are 100,000 INR. This is based on the production of 5,000 packets per month (the quantity that one machine can produce) at 20 INR per packet (the recommended retail price). This means that manufacturers can expect to make a monthly net profit of 15,225 INR, a profit margin of 15 percent (Figure 2).

Expenses	Value (Rs.)
Raw Materials*	51,275
Labor*	30,000
Administrative Expenses*	3,500
Subtotal	*84,775*
Revenues	
Napkin Sales	100,000
Subtotal	*100,000*
Net Profit	**15,225**
Profit Margin	**15%**

Figure 2:
Expected Monthly Expenses and Revenues Details.
**See Appendix B for additional cost details*

Monthly sales and net profit may vary as the microenterprises set their own retail prices and may not follow the recommended pricing. With a 14 percent interest rate on the investment and 10 percent depreciation on machinery, the expected annual net profit is 106,485 INR (Figure 3). Based on these calculations, entrepreneurs can expect to recoup their initial investment of 371,170 INR in 3.5 years.

Details	Value (Rs.)
Working Place Advance	25,000
Machineries, Installation and Training Fees*	237,015
Other Accessories*	5,500
Running Capital for Two Months	98,875
SSI Registration and Other Administrative Expenses**	7,780
Total	**371,170**

Figure 1:
Total Initial Investment Details
**See Appendix A for additional cost details*
***SSI Registration was calculated using vakilsearch.com*

Figure 3: Annual Net Profit Details

Annual Net Profit	Value (Rs.)
Annual Profit	182,700
14% Interest Rate on Investment	51,964
10% Depreciation of Machineries	24,252
Net Profit Per Year	**106,485**

Low Cost Product

Jayaashree Industries SNs are demonstrated to be lower cost than other popular products on the market in India (Figure 4). The marketplace is currently dominated by Procter & Gamble (P&G) and Johnson & Johnson (J&J).[18] Popular J&J products, the Stayfree Secure Cottony Soft and Carefree Regular, retail for 2.50 INR and 5.25 INR per SN, respectively, with an average per unit price of 3.88 INR. Popular P&G products, Whisper Choice and Whisper Ultra Soft XL Wings, retail for 4.00 INR and 11.14 INR per SN, respectively, with an average per unit price of 7.57 INR. On average, Jayaashree Industries SNs retail for 1.00 - 1.50 INR per unit, less than a third of the cost of commercial products. This range depends on the pricing determined by the local women.

Employment for Women

Another positive impact of the intervention is the creation of jobs for local women. By 2014, there were over 2,000 machines spread across 887 taluks in India and 14 countries (Nepal, Bangladesh, Myanmar, Sri Lanka, Philippines, Mauritius, South Africa, Zambia, Ghana, Nigeria, Kenya, Malawi, Somalia and the USA), with each machine employing between 10 and 14 women. (16) Accordingly, there are over 20,000 women directly benefitting via employment from this model today. In India, these women make a monthly salary of 5,000 INR, or 200 INR per day for 25 working days per month. (18) These wages are competitive with rural wages in other sectors of India's economy. Based on Indian Labour Bureau data from 2014, average daily wages were 207 and 239 INR in the agricultural and non-agricultural sectors, respectively. (20) The model also offers indirect benefit to over one million "resident dealers" in communities across India. (16) From

Producer	Sanitary Napkins	Cost (Rs.)	Disposable
Popular Brand in Market*			
Johnson & Johnson	Stayfree Secure Cottony Soft	2.50/ pad	yes
Johnson & Johnson	Carefree Regular	5.25/ pad	yes
Procter & Gamble	Whisper Choice	4.00/ pad	yes
Procter & Gamble	Whisper Ultra Soft XL Wings	11.14/ pad	yes
Alternatives (Non-Profit)			
Eco Femme	Eco Femme Day Pad	236.00/ pad (Available to rural women at subsidized cost)	Washable/Reusuable
SEWA Rural	Falalin Cloth	10.00/ piece (Subsidized rate)	Washable/Reusuable
Goonj	My Pad	2.00/ pay	Washable/Reusuable
Alternatives (For- Profit)			
Jayaashree Industries	Pads	1.00/ pad	yes
Aakaar Innovations	Anandi Pad	2.50/ pad	yes
***Price per pad is approximate, calculated based on maximum retail price (MRP)**			

Figure 4: Sanitary Napkin Market in India, Price Comparison

2008 to 2012, the number of direct beneficiaries grew from 155 to 5,000, the number of indirect beneficiaries from 45,000 to 1,000,000, and the number of municipalities marketed from 7 to 35. (16) (Figure 5). These numbers represent growth rates of 323, 2,222, and 500 percent, respectively, over the four-year period.

Uptake

In India, with sales of $236 million in 2012 and projected sales of $442 million by 2017, the market for feminine hygiene products is rapidly expanding at an annual rate of 3 to 5 percent (11,13). In comparison to their competitor Kimberly-Clark, P&G has pursued a more aggressive marketing strategy in emerging markets (22), and their Whisper brand accounts for nearly half of the Indian SN market. (23) While there is no data available on the SN market share of Jayaashree Industries, the rural SN consumer market is largely untapped and vast, and it is expected that their market presence will continue to expand. (13)

Limited data on the usage and acceptance of Jayaashree Industries products has made it difficult to evaluate the impact of the venture. One trial found that women who had previously used commercial SNs were "extremely satisfied" with Jayaashree Industries products. However, it is unclear whether this experience is widespread. (18) Additionally, there is no data about the lifespan of the machines. Given these statistical gaps, it is challenging to assess the uptake of the venture, and an impact evaluation is highly recommended.

Sustainability

Muruganantham has helped SHGs arrange for bank loans and leveraged government schemes to cover the initial capital required. (13) However, the 99 percent loan repayment rate by SHGs is a positive indicator of its long-term viability. (17) It is unclear whether Muruganantham is gaining or losing money as there is no data available on Jayaashree Industries' net profits. While most of Jayaashree Industries' revenue is from machine sales, it is unclear whether the company also receives a portion of the profits generated by SN sales. Without more data, it is difficult to evaluate the sustainability of Jayaashree Industries with confidence.

Reflections:

Strengths and Limitations

The greatest strength of Jayaashree Industries is its ability to respond to the unique needs of the rural market and spread throughout regions previously untouched by multinational corporations. Through a multi-pronged approach, Jayaashree Industries created a low-cost product as well as a business model. First, their innovation has enabled rural women to practice proper MHM and offers them the opportunity to run their own SN manufacturing businesses with high returns on investment. Second, Jayaashree Industries recognizes the importance of cultural sensitivity by allowing women to market and distribute SNs themselves in a manner that suits their communities. Third, as an intervention based on grassroots entrepreneurship, the model is more self-sustaining than an external intervention from other actors, such as the govern-

Beneficiaries	2008-2009	2009-2010	2010-2011	2011-2012
No. of primary/direct beneficiaries	155	875	1,200	5,000
No. of secondary/indirect beneficiaries	45,000	150,000	280,000	10 Lakhs
Total no. of municipalities marketed	7	16	25	35

Figure 5: Growth of Direct and Indirect Beneficiaries of Jayaashree Industries from 2008 - 2012.
**Notes: 10 Lakhs = 1,000,000*

ment or NGOs. Fourth, an emphasis on transparency has allowed social entrepreneurs in other countries to access the project details of Jayaashree Industries on public domain (individuals in 110 countries have already done so), permitting replication and expansion on a global scale.

Although the grassroots model offers numerous strengths, it also presents certain limitations. First, Muruganantham's resistance to commercialization in favor of protecting local SN manufacturing limits the ability to scale-up the project, while production and marketing costs continue to rise. It may also become increasingly challenging for Jayaashree Industries to compete with multinational corporations who have started to realize the untapped potential of the rural market. For example, there is already evidence that P&G and Kimberly-Clark are designing programs to educate school-age girls about MHM. (11) Second, the sustainability of the intervention may be adversely affected by variations in the ability of SHGs to secure and properly manage loans. Third, while the machines are designed to be simple to assemble and maintain, the operators may lack the skills necessary to do so. Finally, while Jayaashree Industries recognizes the importance of coupling knowledge-sharing with marketing, there does not appear to be a concrete and effective education strategy that could overcome MHM-related stigma.

Future Directions

Within India, Muruganantham's ultimate goal is to achieve 100 percent uptake of SNs and provide employment for one million women with the installation of 100,000 units. (24) He also plans to expand outside of India to 106 countries, including Kenya, the Philippines, and Bangladesh through a network of partnerships. (12) Given the logistical limitations of supplying the machines himself, Muruganantham may need to outsource machine assembly and training to continue expansion on a national scale. He is also seeking to cultivate partnerships with NGOs, corporations, organizations, banks, and governments to facilitate financing schemes for rural women interested in participating as entrepreneurs. Finally, he hopes to expand the line of products offered to include customizable SNs that vary by size and level of absorbency, as well as other types of products, such as diapers for children and adults. Although Muruganantham is currently adamant in his opposition to commercialization, (25) whether his stance will endure remains to be seen.

Lessons Learned

The Jayaashree Industries model presents a useful case study to understand how social enterprises can help to address previously neglected health needs in rural settings. Muruganantham was able to fill a gap left by multinational corporations by harnessing his experience and understanding of the social and cultural context of his target population. Whether this grassroots microenterprise model proves to be sustainable will provide important lessons about the value of engaging local stakeholders, the obstacles to raising awareness about heavily stigmatized health topics, and the challenges of scale-up inherent in a country as large and culturally diverse as India.

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Appendix A
Total Initial Investment - Additional Details

Machineries and Other Accessories

Machineries, Installation and Training	Qty	Rate	Total (Rs.)
De-fiberation Machine	1	26,800	26,800
Soft Touch Sealing Machine	2	28,000	56,000
Belt Napkin Making Machine Length Sealing	1	20,500	20,500
Belt Napkin Making Machine Side Sealing	1	17,500	17,500
Pneumatic Core Forming Machine	1	65,000	65,500
Pneumatic Core Dies	2	1,875	3,750
U V Treat Unit	1	10,400	10,400
VAT 14.5%			29,065
Packing and Handling Charges			2,500
Installation and Training Fees			5,000
Subtotal			**237,015**
Other Accessories			
Weighing Scale (to Weigh Wood Pulp)	1		3,000
Work Table	2		2,000
Plastic Buckets and Trays	5		500
Subtotal			**5,500**
Total			**242,515**

Appendix B

Expected Monthly Expenses and Revenues – Additional Details

Raw Materials

Daily Requirements	Qty	Value (Rs.)
Wood Pulp	12.8 Kgs	742
Top Layer	400Mts	672
Back Layer	750 Grams	187
Gum	1.5 Kg	225
Packing Covers	150 Nos	225
Subtotal		**2,051**
Total Monthly Requirements	**25 days**	**51,275**

Labour

Semi Skilled Workers	Qty	Rate (Rs.)	Salary (Rs.)
Daily	6 workers	200	1,200
Monthly	25 days		30,000

Administrative Expenses

Monthly Expenses	Value (Rs.)
Rent	1,000
Electricity Bill	1,500
General Administrative Expenses	1,000
Total	**3,500**

KEEPING CONRACEPTIVES

ON THE SHELF

A CASE STUDY ON THE INFORMED PUSH MODEL FOR FAMILY PLANNING IN SENEGAL

MCGILL UNIVERSITY

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In 2011 the Informed Push Model (IPM) was designed by Intrahealth International and its partners to address the issue of contraceptive unavailability in urban areas of Senegal. The IPM is a supply chain intervention system that brings the source of supply closer to the source of demand and alleviates local health facilities from directly placing and picking up product orders. A pilot study was conducted over a 6 month period in a district of Dakar and stockouts were completely eliminated at all 14 public health facilities. The project then expanded to include all 140 public facilities in the Dakar region with continued success and is currently undergoing further scale-up to the national level.

Editorial Note: A lack of consistently reliable access to contraception is one of a multitude of factors hindering family planning efforts by women in many low- and middle-income countries. When contraceptive products are out-of-stock at the point of purchase ("stock-outs"), women's contraceptive choices are affected. It should be noted that stockouts are one of many determinants of contraceptive choice, and the authors are not positioning that stockouts are the only consideration in this matter. The following article describes efforts to implement the Informed Push Model, a supply chain intervention, in an attempt to increase Senegalese women's access to preferred contraceptive devices, by preventing stock-outs.

"Deciding about pregnancy should be by choices, not by chance. Having the information and means to do so is a basic human right. Family planning is one of the best investments that we can make for women's empowerment, gender equality, sustainable development and creating the future we want."

– Dr. Babatunde Osotimhehin
Executive Director, UNFPA

So What?

Stockouts of contraceptives at health facilities are one of the main reasons that women in low-income countries simply cannot access the family planning products they desire. The Informed Push Model is Senegal's attempt at addressing this issue by providing women with choice and availability, and thereby giving them more control over their reproductive health.

Introduction

Family planning has a strong influence on the socio-economic development of a country; it empowers women, enabling them and their partners to decide if and when they want to have children. Programs that encourage the use of contraceptives prevent unintended pregnancies and unsafe abortions, and are key to economic growth in countries with high fertility rates. In Senegal, as in many West African countries, the lack of consistent access to contraceptives prevents many women from reliable family planning.

Frequently, gaps in the supply chain lead to contraceptive products being out-of-stock in pharmacies and health clinics. Supply chain limitations also mean that many locations only offer one or two types of contraceptives, making it difficult for women to find a method that fits their family planning needs. The prevalence of family planning can be described by the modern contraceptive prevalence rate (mCPR), which is a measure of the percentage of women of reproductive age who are using a contraceptive method. In Senegal, the mCPR was only 13% from 2008-2012 (1), which contributed to the nation's high fertility rate: about 5 births per woman from 2010-2013 according to the World Health Organization (WHO). Senegal also has rapid population growth (2.6% in 2015), as well as high maternal and child mortality rates (390 maternal deaths/100,000 live births reported in 2008-2012, and 60 child deaths/1000 live births in 2012).(1) The WHO also reported that the median age in Senegal was 18 years in 2012; therefore, a large proportion of the pop-

ulation today falls into the young child-bearing age category, and family planning and contraceptive use continue to be fundamental for the overall health of the country.

Background

Over the last 3-4 decades, the government of Senegal has implemented several initiatives involving family planning (FP) as a key strategy to improve the health of women and infants (2). In 1980, contraception was made legal for the first time in the country, and in 1988 the government adopted an official policy to reduce the population growth rate and the number of children per woman. The National Family Planning Program (PNFP) was launched in 1990 and resulted in a moderate increase in the use of modern methods of contraceptives by 0.7% each year from 1992-1997 (3). However, in 1998 the FP program was integrated into the Division of Reproductive Health within the Department of Primary Health Care. This led to a reduced focus on FP as priorities were instead placed on other health issues of the country (3). In 1995 and again in 2005, Senegal's population policy was updated to align with the international agenda as per the Millennium Development Goals (MDGs), whose objectives were to reduce the worldwide maternal mortality ratio by 75%, and to achieve universal access to reproductive health by 2015. These efforts have led to important gains in the nation's maternal and child health; for example, the total fertility rate (TFR) decreased from 7.2 to 5.3, a decline of almost two lifetime births per woman between 1978 and 2005 (1). However, progress has been slower since 2005: the TFR has remained relatively constant over the past ten years and the mCPR increased by only 1.9% from 1997-2011 (5).

In February 2011, eight representatives from West African nations met at a conference in Ouagadougou where they formed a unified commitment to boost reproductive health programs in the region. Following this partnership, Senegal's government put forth the National Action Plan for Family Planning for the period 2012-2015. Its goal was to increase the rate of contraceptive use in women of childbearing age to 27% by the end of 2015 (4). As part of this action plan, the government of Senegal identified 5 key challenges that impact the progress of family planning in the country (4):

1. Demand creation
2. Availability of products
3. Access to services
4. Political and financial engagement
5. Coordination between stakeholders

Therefore, in 2012, the Informed Push Model was implemented as a supply chain delivery system intervention to address the second identified challenge of product availability.

Problem Statement

A baseline evaluation of the contraceptive supply chain from 2010-2011 in two districts of Senegal revealed that stockouts of FP products in the public sector caused over 80% of female users to be unable to acquire the contraceptive method they wanted (15). 55% of the women experiencing a stockout switched between products, rendering the contraceptive method less effective, and the remaining 45% discontinued use or went to a private pharmacy to purchase their desired product at a higher price (8). This problem of supply and demand was a major cause of low client satisfaction, and in 2011 it was reported that 29% of women in Senegal had an unmet need for FP (7). Therefore, an intervention in the supply chain system was necessary to address the issue of contraceptive product stockouts at local public health facilities.

Project Intervention

Initially, the system to distribute contraceptives from central warehouses to local facilities used a "pull" model based on customer demand (2). The system was managed as follows:

- Local health facilities known as service delivery points (SDPs) sent their orders to the district depots
- The district aggregated these orders and sent a collective order to the Pharmacies Régionales d'Approvisionnement (PRA)
- The regional facility transmitted the orders from all its districts to the Pharmacie Nationale d'Approvisionnement (PNA)

In this system, each operational level was responsible for planning their commodity needs and placing orders four times a year. The PNA then delivered products based on the quarterly inventory records. Although this system ensured effective integration of FP products in the PNA system, a drawback was the problem of storing enough products since the PNA, PRAs, and districts had to stock large quantities of different contraceptive products at one time. Moreover, delays were often noted in the ordering of contraceptives by the SDPs because profits from the sales of contraceptives were first used to pay for the SDP's operating costs. Furthermore, the local staff of medical practitioners and midwives often did not have the resources or the expertise to maintain an adequate stock of supplies. The inefficiencies in this system resulted in major stockouts at the SDPs even when contraceptives were available at the national or regional levels.

Fixing the supply chain:

The "push" model of delivery is based on forecasted demand of products as opposed to actual or consumed demand (Figure 1) (8). The IPM brings the source of supply closer to the source of demand by employing dedicated professional logisticians to deliver the contraceptive products through loaded trucks directly to the health facilities. These logisticians project demand for contraceptives and are therefore directly "informed" on the needs of each SDP. Based on these forecasts, contraceptives are delivered to the SDPs on a monthly basis, which relieves health facilities from the task of placing orders and spending time picking up the products (8).

Key features of the IPM intervention include task shifting, public-private partnerships, payment based on consumption, and aligning incentives, as described below:

Task shifting

By using specialized logistics professionals based at a regional level to carry out tasks such as quantification, data collection, and distribution, the logistics performance of the delivery system is improved, and health workers are thus freed to focus on their specialties in providing health services. The logistics professionals come from the private sector and utilize a practice called vendor-managed inventory, whereby they take responsibility for actively resupplying SDPs rather than the SDPs requisitioning products. Additionally, by distributing products directly from the regional level to the SDPs, the district is no longer required to maintain a physical inventory, thereby streamlining the supply chain. The district's role shifts from physical supply chain operations to management of SDPs and service provision. Task shifting also allows for leveraging of the limited supply chain management expertise by using a small number of trained professionals to serve a large number of SDPs.

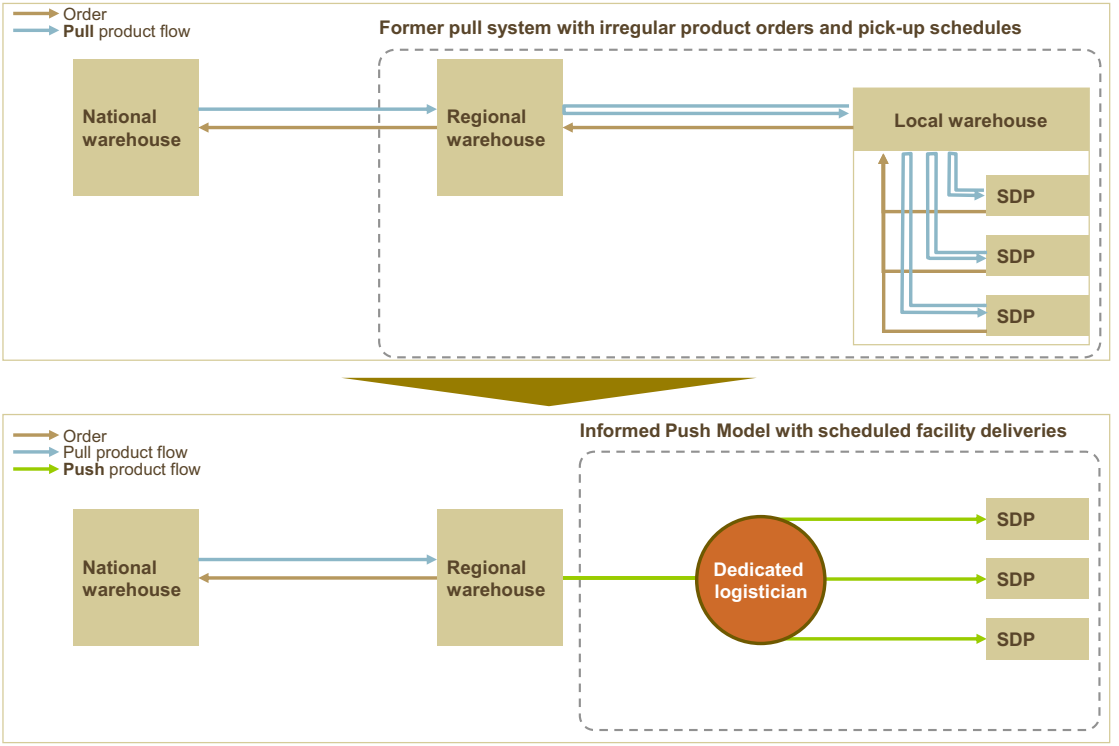
Public-private partnerships

The IPM uses private operators, or third-party logistics providers, to store and distribute the family planning products to public health facilities. The third-party logistics providers are experienced logistics companies with previous experience in the health sector, and are managed with performance-based pay contracts to ensure results.

Payment based on consumption

Before the IPM, SDPs were required to pay for family planning products at the time of order, which resulted

FIGURE 1. Informed Push Model Streamlines Deliveries and Eliminates Orders Between Service Delivery Points (SDPs) and the Regional Warehouse



in major cash flow problems. With the IPM, the products are delivered and consumption data recorded. The SDPs are then charged based on these consumption rates. This re-established the cost-recovery system and eliminated the cycle of stockouts at SDPs.

Aligning incentives

The IPM aligns the incentives of all parties involved in making sure that family planning products reach SDPs and the community.

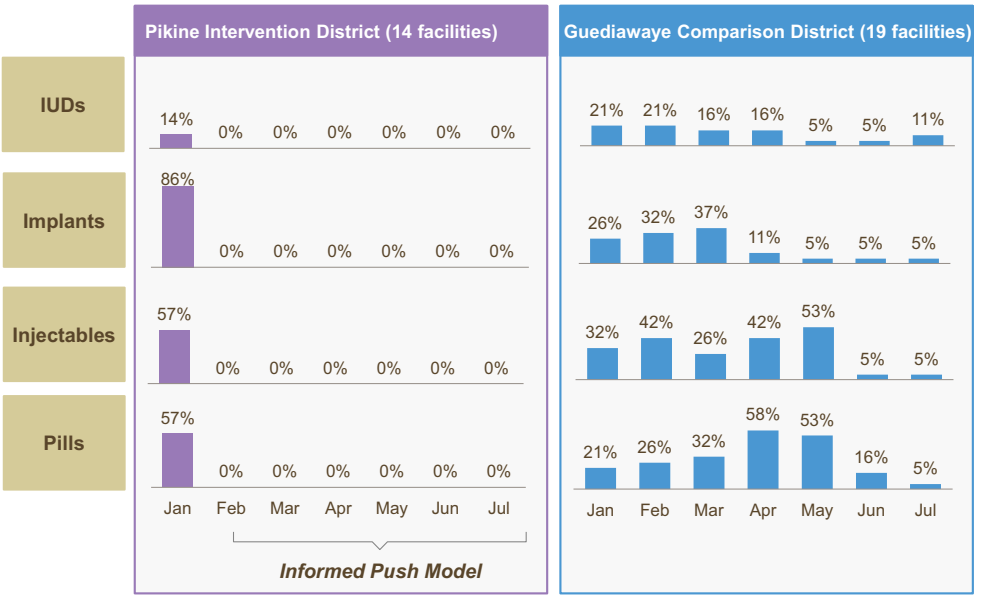
Implementation

To assess the efficiency of the IPM in reducing stockouts as well as its feasibility and sustainability, a pilot project was undertaken in the Pikine district of Senegal over a 6-month period from February 2012 to July 2012. The neighbouring district of Guediawaye, where the IPM was not implemented and the original "pull" delivery system was maintained, was used as a control for the pilot study (8).

Evaluation

The IPM is evaluated using several different indicators. The immediate process indicators of the IPM are measured through changes in contraceptive stockouts rates and mCPR. The downstream, long-term outcomes of the IPM are measured by Senegal's fertility rates and maternal mortality rates. The results of the IPM through these indicators are discussed below.

FIGURE 2. Percentage of Facilities Experiencing a Stockout in 2 Comparison Districts, Dakar, Senegal, January–July 2012



Process indicators:

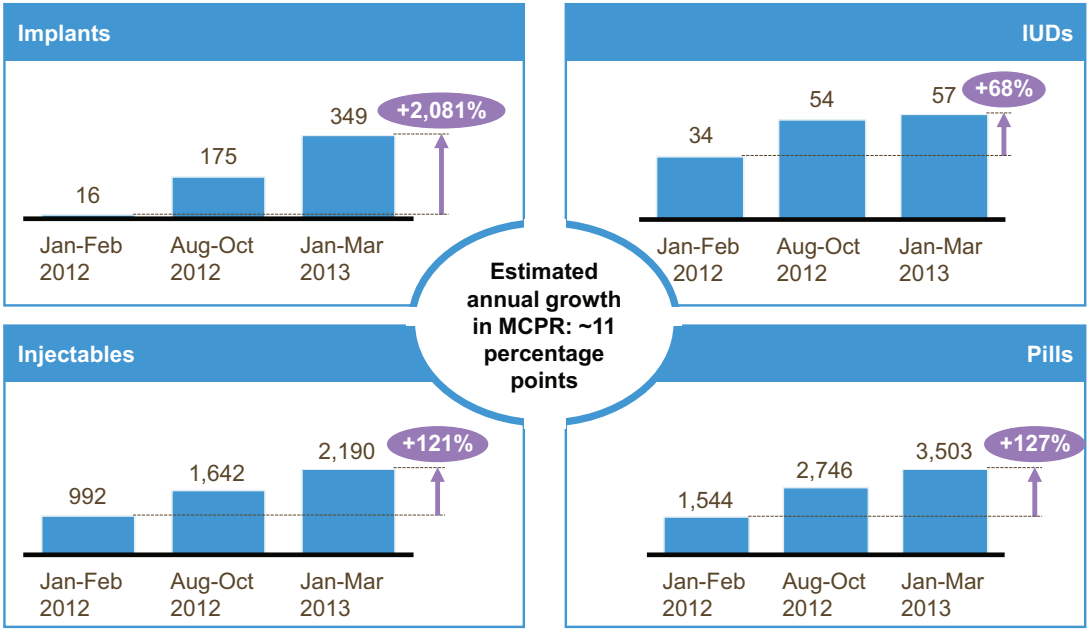
The results of the pilot study in the Pikine district were dramatic. Before the IPM was implemented, Pikine experienced high levels of stockouts, such as a 43% stockout rate for the injectable contraceptive Depo Provera, and an 82% stockout rate for the contraceptive implant Jadelle (15). This translates to the products only being available to consumers about 17 and 5 days out of each month, respectively. However, after just one month of the IPM's implementation, stockouts of oral contraceptive pills, injectables, implants, and intrauterine devices (IUDs) were completely eliminated in all 14 public health facilities in Pikine (Figure 2) (8). In the Guediawaye district stockout rates persisted at an average of 23%. The immediate success of the pilot study led to the expansion of the IPM delivery system to include all 140 public health facilities in the entire Dakar region, and within another six months the stockout rates dropped to less than 2% throughout the city (8).

In addition, the elimination of stockouts led to an increase in contraceptive use. After one year of the IPM's service delivery improvements, the mCPR in Pikine rose by 11% (Figure 3) (8). The types of contraceptive methods used also changed. Women started taking advantage of the newly available choices, such as the long-acting contraceptive implants, whose consumption increased by 2,081% in just one year (8).

Downstream outcomes:

Apart from the immediate results of the IPM, the sustained outcome of this intervention would be a reduction in fertility rates and maternal mortality rates. However, it is currently not possible to conclusively evaluate the long-term effect of the IPM pilot study as these data are only collected at a national level, and the IPM is still undergoing scale up to include the entire

FIGURE 3. Average Monthly Consumption of Contraceptives in Pikine District, Dakar, Senegal, Before and 1 Year After IPM Implementation



country. Furthermore, such data is only available up to the year 2013, and according to the World Health Organization, the fertility rate in Senegal dropped only slightly from 4.98 to 4.93 births per woman from 2012 to 2013. Therefore, a decline in fertility rates when the IPM is functioning at a national level is necessary in order to deem the IPM project a success. Furthermore, Senegal will hopefully experience a decrease in maternal mortality rate as the IPM continues to operate throughout the country. In 2013, the maternal mortality rate was about 350 deaths per 100,000 live births, and 16.4% of deaths among women of reproductive age were due to maternal causes (13). In the future this number must decline in order to deem Senegal's IPM a success for maternal and child health.

Funding and Cost Analysis

Funding for the IPM relies on private donors. In 2012 the Bill and Melinda Gates Foundation partnered with the international NGO Intrahealth as well as Senegal's Ministry of Health to implement the pilot study. About 160,000 USD was spent on the progressive expansion of the IPM in 2012 (4). After the success of the pilot, the Bill & Melinda Gates Foundation and Merck & Co. Inc., through its Merck for Mothers initiative, announced a $9 million partnership to provide financial and technical support for the national expansion of the IPM (12). Senegal's Ministry of Health, Senegal's National Pharmacy (the PNA), and the private software company Dimagi, are working in partnership with Intrahealth as the lead implementing partner (9).

The total annual operating cost for family planning when the project reaches a national scale in Senegal is estimated to be 500,000 USD, which is equivalent to about 11% of the national annual spending on con-

traceptives (8). The IPM functions under a cost recovery model, in which revenue is not recognized until the seller's costs have been recovered in sale transactions. Preliminary analysis has therefore suggested that the total costs recovered at a national scale will be 1,050,000 USD annually (8). This represents a level of sales that would support a national mCPR of 25% to 30%. It is also expected that 50% of the cost recovery (525,000 USD) will go to IPM logistics costs, such as hiring of trained logisticians (10).

In Senegal, private-sector pharmacies and health clinics may charge 3 to 9 times the price for a health product compared to a public facility (8). Before the IPM was implemented, the price of one month's supply of oral contraceptive pills from a private pharmacy in Senegal was about $3.10 (USD). Due to the decrease in stockouts at local public clinics, oral contraceptives have been made available to women at a price of about 20 cents US per month (11). To date, about 2.3 million USD has been spent on the expansion of the IPM from 2012-2015 (4).

Project Challenges:

Further cost-effectiveness analysis is critical for a complete evaluation of the IPM. For example, the cost of PNA management and the cost of integrating other products into the IPM supply chain are unknown. To ensure project sustainability and self-sufficiency without relying on outside sources of funding, the IPM must transition to being fully managed by the PNA and its 11 regional PRAs. Currently, the PNA is reluctant to ensure their sustained involvement in the project. The target of having the PNA managing the IPM in 6 regions of the country by July 2015 was not reached. Intrahealth is therefore working with consultants from McKinsey to present a sound transition plan of the IPM that will include the proposed operational system and a financial balance showing how PNA can break even or possibly even make profit (M. Dicko, personal communication, October 23, 2015). There is also the intention to request a consultant to undertake a high-level advocacy plan with the Ministry of Health, private partners supporting health in Senegal, and the PNA. As such, the IPM design will remain flexible to respond to the most cost-effective and politically viable option. At this point it is not clear what the PNA's role will be in continuing the IPM and therefore Intrahealth is currently in discussions with the PNA and with the Ministry of Health on this issue (15).

Furthermore, to ensure the project is sustainable at the final national scale up stage, there must be integration of the IPM system with other health products so that delivery costs remain feasible. The IPM is currently distributing 11 family planning products, however this must be increased to 118 health products in total (M. Dicko, personal communication, October 23, 2015). Therefore, in-depth product segmentation analysis is needed to guide the inclusion of additional health products, and a comparative analysis of the cost per unit of product delivered through alternative distribution models is also necessary.

Reflection

Although the IPM is viewed as a success story for Senegal's family planning initiative, the scale up of the project to a national level is encountering several challenges. The bigger the operation and the more extensive the geographical reach, the more supplies and manpower necessary to sustain the project. As the model expands into regions that are less populated and potentially have more difficult road conditions, modifications are necessary to ensure optimal delivery systems. The government of Senegal is therefore working on establishing standard operating procedures, issuing and managing contracts with private logisticians, and supporting data use and performance management to advance the IPM nationally (8). It is also necessary to train providers in contraceptive technology and to intensify demand-creation and advocacy activities focused around family planning.

This supply chain intervention case study highlights the complexity of system implementation, evaluation, and scale up of programs targeted towards urban districts to more remote areas with limited resources. Improved maternal health is a global initiative, and the IPM reflects an important first step in achieving this goal for a country with traditionally limited access to reproductive health services. Given that the project is still in progress, substantial conclusions cannot yet be drawn. However, the program was largely successful in eliminating contraceptive stockouts in the country's most populated region, a key issue to be addressed. Future consideration of geographical delivery barriers, information sharing, and health promotion programs would be highly beneficial in ensuring the continued success and uptake of the program. Hopefully, the IPM can serve as a model for other countries with high maternal mortality rates and low contraceptive availability to continue making progress in achieving health equity throughout the world.

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RECLAIMING CHILDBIRTH: THE INUULITSIVIK ABORIGINAL MIDWIFERY PROGRAM

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KEDAR MATE

The Inuulitsivik Midwifery Program was created in response to the inefficient evacuation policy implemented by the Government of Canada in the 1950s. Under this evacuation program, pregnant women from the Nunavik region would be sent to deliver in southern Canadian hospitals, in an effort to decrease the high perinatal mortality rate in this region. Maternal and child health disparities persisted, with Inuit women and their babies continuing to suffer worse health outcomes than the rest of the Canadian population. The Inuulitsivik Midwifery Program, implemented in 1986, is designed to bring birth back to the isolated Nunavik communities. The program is currently based in three main birthing centres located in Puvirnituq, Inukjuak, and Salluit, Quebec. Implementation of the program saw a major decrease in the evacuation of pregnant Inuit women to southern hospitals in Canada. The program is correlated with a decrease in perinatal mortality rates, and increased patient satisfaction. Canada's brutal history of residential schools and attempts at a "cultural genocide" of Indigenous peoples (encompassing First Nations, Metis, and Inuit) have resulted in vast economic and health disparities that are rooted in a multitude of factors. For this case study, the focus will be on Inuit communities in Northern Quebec. A critical evaluation of the Inuulitsivik Midwifery Program, a community-based initiative in response to the Evacuation Policy of the 1970s, will be conducted, followed by concluding recommendations. It is believed that midwifery programs may act as a potential solution to address several relevant Sustainable Development Goals proposed by the United Nations: good health and well-being, reduced inequalities, and sustainable cities and communities (2). This case study examines the impact of culturally sensitive interventions in assisting Canada's most marginalized population.

Background:

Inuit Communities

The Inuit people have much lower life expectancy relative to other Canadians; Inuit men are at a gap of 10 years in Nunavik compared to non-Indigenous men. The birth rate in Inuit communities is twice that of the Canadian average, which led to a 12% increase in the Inuit population between 2006 and 2011. Within such demographics, it is noteworthy that 25% of all first-time mothers are under the age of 20 at the time of their first pregnancy (3). The rapid growth of these communities combined with stark health disparities, exemplify major public and global health concerns. It is important to note that data on Indigenous health is widely regarded as inadequate and incomplete; there are several limitations to this case study as there has not been enough meaningful research and data collection performed in these communities (4).

So What?

From this case study we learn about the importance of having global health solutions that are tailored to the specific needs and context of the communities being served. The Inuulitsivik Midwifery program was established by members of the Inuit community who saw a significant lacking in the way pregnancy and birthing services were administered. The vital take away, that can be applied in many global health contexts, is the significant impact associated with listening to communities, and providing them with platforms through which they can voice their needs and proposed solutions.

Inuit in Canada live in 53 remote isolated communities across regions of Arctic Canada. Health care in these areas consists of limited nursing stations, as well as doctors, dentists and specialists who visit two to three times annually. Nunavik patients in need of urgent and emergency care must be transported by air approximately 1000 km (a four to eight-hour flight) to Montreal, Quebec or Moose Factory, Ontario (5). This is particularly problematic for Inuit women who experience higher rates of complications during pregnancy and have infant mortality rates more than four times the national average (3). As Professor Yves Bergevin, Senior Maternal Health Advisor to the United Na-

tions Population Fund argued, the scaling up of quality services and the targeting of the vulnerable allows us to address poverty and inequity (6).

Evacuation Plan

Due to difficulties in recruiting medical professionals to rural Inuit communities, the Evacuation Policy was implemented in the 1970s by the Canadian government. Pregnant First Nations and Inuit women were routinely sent to the south and other regional centres, typically at 36 weeks' gestation, to complete their pregnancies in a medical facility. Women who rejected this evacuation were often deemed uneducated, selfish, and guilty of putting the health of their families at risk. This evacuation policy has resulted largely in "needless isolation, duress and distress for Aboriginal women forced to give birth apart from their partners and families". This situation would indeed be regarded as unacceptable to any other Canadian population (7).

The evacuation plan was partly successful in decreasing stillbirth and perinatal death rates among Indigenous populations; however, by its end, perinatal mortality rates among the Inuit were still two and a half times the Canadian average (8). Women who were separated from the support of family and friends experienced low social support and high stress during the perinatal period, which may increase the risk for many maternal and newborn complications, including premature and small for gestational age infants, and postpartum depression (9, 10). The most significant negative impact is psychological, as demonstrated by mothers who mentioned to researchers that "only their first children were real Inuit, not [those delivered outside the community]" (11). The cultural identity of those born outside Inuit communities is compromised by the evacuation policy, as these Inuit children are denied traditional ceremonies and rites of passage integral to Indigenous upbringing.

Before the Evacuation Plan:

Traditional Birthing Practices

Beliefs and traditions based on pregnancy and childbirth vary among Aboriginal communities, and reflect unique views and needs. The Indigenous way of life interweaves medicine and spirituality, representing an interconnection between mind, body, spirit, and emotions – all of which are viewed as essential to optimal health (12). The birth of a child signifies new life and balance between the spiritual and physical worlds (13). Aboriginal birthing practices are an art form that has been passed down through generations, preparing girls to grow into mothers. Extended family members, especially grandmothers, play an important role in the traditionally natural approach to pregnancy and childbirth, as they guide women through the entire pregnancy and childbirth experience. Pregnancy is viewed as a gift from the creator; a woman's ability to give life and raise children is deemed sacred, bestowing upon them authority and respect within Aboriginal cultures (14,15,16).

During pregnancy, Inuit women increase their intake of caribou, muktuk, and seal, while limiting their consumption of berries and aged food based on the sage advice of the elderly women in the community (17). Although their avoidance of berries is based on anecdotal evidence, it coincides with scientific findings suggesting that berries may contain small amounts of alcohol due to natural fermentation, which is harmful to the developing fetus (18). A woman-centred process (19), childbirth is an event eagerly anticipated by the local community. Following birth, ceremonies are conducted to establish familial relationships and strengthen communities (20). The baby is kept in constant contact with the mother, either in the hood of her parka, or nestled in the front of the parka feeding (21).

Traditional Midwifery

Prior to implementation of the evacuation policy, traditional Aboriginal births were assisted by older, experienced women from the community (21). Because of the cultural familiarity of the Aboriginal midwife, she was able to incorporate various traditional elements

involving spiritual, mental, physical, and emotional health in the community services she provided. Aboriginal midwives were charged with passing moral and ethical values from one generation to the next, in addition to guiding the birthing process (21). In contrast, Westernized evidence-based medicine is based on the biopsychosocial model which views health and disease as an independent entity from other aspects of well-being. An extensive comparison between modern methods of medicine and Indigenous practice was reported by Durie et. al. (2004) which noted that Indigenous knowledge is often discredited on the premise of scientific evaluation, which disregards anything that cannot be supported by empirical evidence. It considers Aboriginal knowledge of social, physical, spiritual, and mental health as inferior, subordinate or irrational superstitions (22). Modern medicine has institutionalized the birthing process, prioritizing birth outcomes and leaving little room for the Aboriginals' spiritual understanding of childbirth (22,23).

Loss of birth, loss of spiritual life

The evacuation policy, officially implemented in the early 1970s, sought to improve perinatal and maternal health outcomes, using modern science as a supposedly superior knowledge system. The policy was unsuccessful, with large disparities persisting between Aboriginal communities and the rest of Canada (24). Furthermore, the evacuation policy has been reported to have profound spiritual and cultural consequences on Aboriginal communities (25,26). Health Canada, public health officials, and many Aboriginal organizations are now beginning to acknowledge the pivotal role loss of culture has played in shaping the health conditions of Aboriginal Peoples, and have recognized the possible benefits of Indigenous knowledge, language and spirituality in health services for the population (27). The Society of Obstetricians and Gynecologists of Canada (SOGC) also concluded in 2007 that improving prenatal and birth experiences for Aboriginal women should involve "expanding health centres and providing training for Aboriginal midwives within [their] communities" (10). These parallel lines of thought have contributed to the marriage of traditional Aboriginal values with evidence-based medicine, in order to create modern Aboriginal midwifery programs better suited to serving this high-risk population.

Post-evacuation policy:

The re-birth of Aboriginal Midwifery

The Inuulitsivik Aboriginal Midwifery program began as a result of activism for Inuit cultural revival and self-government, with the opening of a birthing centre in Puvirnituq in 1986. The main objective: to bring birth back to the community. Following the opening of the birthing centre in Puvirnituq, similar centres were created in Inukjuak in 1998, and in Salluit in 2004. These three birthing centres provide intrapartum care to 75% of the Hudson coast. The remaining 25% live outside these three communities and need to "leave home"; however, unlike with the evacuation policy, they still receive care in their own region, language and culture (28).

As mentioned, midwifery has always been a part of traditional Aboriginal birthing culture. Respecting the importance of Aboriginal traditions, the current midwifery program integrates Western medicine with traditional knowledge. The midwives in Nunavik are the lead caregivers for maternal and newborn care. The midwives lead a weekly meeting with a perinatal review committee – an interdisciplinary team consisting of midwives, student midwives, nurses and doctors. During these meetings, they agree on a plan of care, including site of delivery, for each individual patient. At this time, the midwives begin weekly follow-ups with the pregnant mother until birth. Two midwives are normally present at parturition, with nurses or an on-call doctor in Puvirnituq ready to assist if needed. Following delivery, the mother and baby are seen daily for one week. Subsequent follow-up visits then occur once per week for up to 6 weeks post-partum. These midwives also provide care outside of pregnancy, from adolescence to menopause, such as contraception education, STI prevention, and uterine and cancer screening (28).

Program Implementation: Training and Selection Process
A critical component to the success of this program is the competence of the midwives. Midwifery students are chosen from the community; both the health care providers and community members base the selection on applications and interviews. Selecting the students from amongst the community guarantees culture and language proficiency, as well as sustainability of the program. These students are trained for day-to-day clinical situations in the community, in conjunction with structured learning modules. Training on-site avoids reviving the nightmare of residential schools, and equips trainees with important skills to cope with the settings and situations that are frequently seen in Nunavik. The return of childbirth facilitated by the midwives provides a sense of empowerment and autonomy to the community (28).

Teaching and evaluation are facilitated by two groups: Inuit mentors and non-Inuit mentors. The non-Inuit mentors are asked to recognize their role as teachers, not as leaders, respecting the Inuit culture and tradition. The teaching method follows the Inuit pedagogy, which emphasizes "being shown rather than told", mentorship, storytelling, and other traditional oral methods (28).

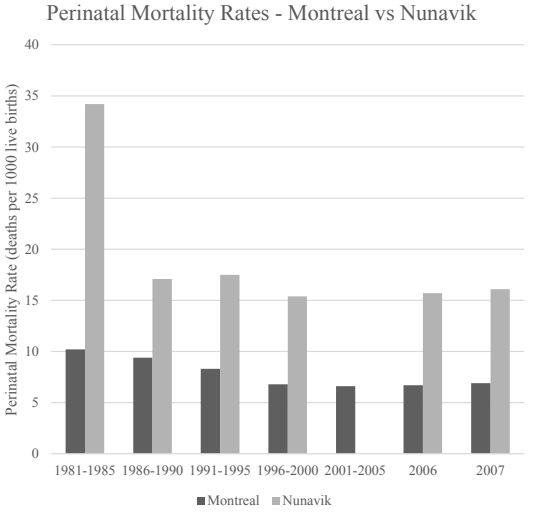
By the time the students graduate, they are expected to have acquired emergency skills, well-women/baby care, and community health experience at a comparable, if not more extensive, level as the rest of Canadian midwives. Requirements for graduation include completion of 1240 supervised clinical hours, follow-up of 60 perinatal cases up to 6 weeks postpartum, and attendance of 40 births as a second attendant, where the student takes responsibility for the immediate care of the newborn (28).

Program Evaluation:
A major limitation of the evacuation policy, which governed Nunavik maternal health until the implementation of the Inuulitsivik Midwifery program in 1986, was the cost of transporting pregnant mothers. Transportation costs for the region of Nunavik are undocumented, however we examine Nunavut's transportation costs, as both regions are similar in terms of geography and population demographics (29). Of the $100 million transferred from the federal government to Nunavut health care between the years 1996-2006, over $50 million was used for transportation (30). This figure highlights the burden of transportation on health care expenses when relying on evacuation to southern hospitals as primary modes of treatment for Aboriginal communities. In addition to the high cost of transportation, Inuit women report greater dissatisfaction with treatment in southern hospitals. Although difficult to quantify, this dissatisfaction certainly adds to the monetary costs of the evacuation program, jeopardizing its efficiency. Dr. Gary Pekeles, director of the Northern and Native Child Health Program at the McGill University Health Centre, estimates a cost of $20,000 to evacuate a single pregnant mother from Nunavik (31). Using this figure, it was estimated that the Inuulitsivik Midwifery program avoided a total of approximately $2,900,000 in transportation costs between 2000-2007 by overseeing 1,184 births in Nunavik (86.3% of all births in that time frame) (32).

Perinatal Mortality Rates
Perinatal mortality rates are used as a primary evaluative indicator of the Inuulitsivik Midwifery program, as it is "arguably the most important indicator of the quality of perinatal and maternity care" (33). Between 1981 and 1985, under the final years of the evacuation policy implemented by the federal government, the perinatal mortality rate (per 1000 live births) in Nunavik was a staggering 34.2, compared to 10.2 in Montreal. Nunavik's perinatal mortality rate decreased from 34.2 to 17.1, recorded between 1986-1990, and was as low as 15.4 between 1996-2000, compared to 6.8 in Montreal the same year (23) (see Figure 1). These decreases in perinatal mortality observed in Nunavik since 1986 are coincident with the implementation of the Inuulitsivik Midwifery program (1986), pointing to a correlation between the implementation of the midwifery program and lower perinatal mortality.

The persisting disparity between Montreal and Nun-

avik perinatal death rates cannot be blamed on ineptitude of the Aboriginal midwifery program, as there are many upstream contributing factors to the higher perinatal mortality rates in the Nunavik population. Namely, most pregnancies in Nunavik are considered high risk due to the harsh realities of Aboriginal health, including high risk of mental illness, alcohol abuse, smoking, food insecurity (9), and a greater likelihood of developing certain gestational complications (32).



Transfer Rates

The main objective of the Inuulitsivik Midwifery program was to return childbirth to the Inuit communities of Nunavik, and reclaim its cultural significance. Thus, transfer rates may be analysed as a processing indicator of this program. Under the previous Evacuation Plan, 91% of pregnant women in Nunavik were transferred to medical facilities outside of the region, mainly in Montreal and Moose Factory Ontario (32). With the implementation of the midwifery program, this percentage decreased dramatically: 13.7% of pregnant women were transferred outside of Nunavik between 2000-2007, with 86.3% of Inuit women giving birth at one of the three Inuulitsivik health centres. Moreover, Inuit midwives made up 72.8% of the birth attendants in the same time period, with the remaining 27.2% consisting of non-Inuit midwives and physicians (32)

Hudson Coast and Ungava Bay – A Comparison

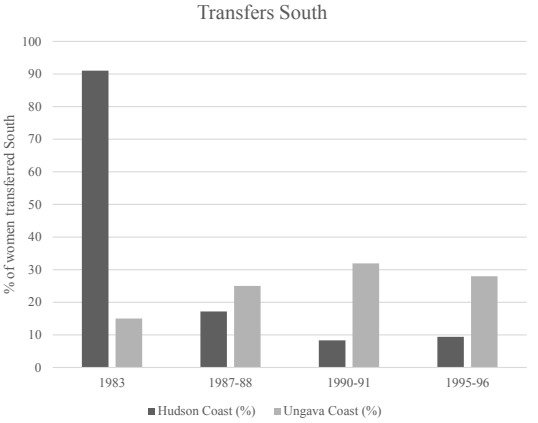
The Ungava Tulattavik Health Centre is another health centre in Nunavik, located on the Ungava Bay. This health centre is staffed mainly by non-Inuit physicians, and existed before the creation of the Inuulitsivik Midwifery Program in 1986. This created a kind of natural experiment, to observe any differences the Inuulitsivik Midwifery program would have on important outcome measurements such as perinatal mortality (34).

When comparing perinatal birth outcomes on the Hudson Coast, where births are led by Aboriginal midwives of the Inuulitsivik Health Centre, to the Ungava Coast, where births are led by trained physicians stationed at the Ungava Tulattavik Health Centre, it was found that there was no statistically significant difference in perinatal death rates between the two communities (33). As such, measures such as episiotomy intervention rates between the two delivery programs are studied as a proxy for unnecessary interventions. There is a stark contrast between episiotomy intervention rates between the Hudson Coast and the Ungava Bay, with rates almost six times higher on the Ungava Bay from 1990-1991 (33). Additionally, there was a higher rate of evacuations to hospitals in the south on the Ungava Coast, despite the dominant presence of professionally trained medical doctors at the Ungava Tulattavik Health Centre (see Figure 2). A possible explanation is that there is a high turnover of doctors on the Ungava Coast, which perpetuates the constant presence of less experienced medical professionals on site (33). This hypothesis illustrates an important strength of the Inuulitsivik Aboriginal midwifery program, being that local Inuit are trained to oversee the low-risk births, reducing the turnover rate and increasing the collective knowledge and experience shared among the midwives.

Reflections and Recommendations:

The implementation of the Inuulitsivik Midwifery program is novel in that it accommodates the culture

of the Inuit communities of Nunavik, while providing modern medical treatment and care to delivering mothers. This program veers from the colonial oppression, marginalization, and forceful integration policies of the past which prevented Aboriginal communities from developing in accordance with their own needs and interests (35). It is important to note that Indigenous communities have higher health disparities compared to the rest of Canada, with Aboriginal women carrying an even more disproportionate burden of disease as well as poorer social outcomes (36). Thus, it is paramount that policies targeted to serve this population be stringently evaluated and revised, as was the case with the Evacuation Policy. This policy was catered towards the Western ideal of medical practice, and failed to acknowledge the cultural significance of Aboriginal ways of healing.



A major accomplishment of the midwifery program is the nature through which it was established. Members of the Hudson Bay Inuit community who had personally experienced the shortcomings of the Evacuation Policy created the Inuulitsivik Health Centre Midwifery initiative. Furthermore, the program achieves the integration of modern, evidence-based medicine with traditional Aboriginal practices to deliver more suitable care to the Inuit women of Nunavik (16). Finally, continuity and stability of the program is accomplished through the integrated midwifery educational system. The Inuulitsivik midwives are long term staff that deliver culturally relevant care to their fellow community members. This eliminates the problem of the high staff turnover rates seen in non-Inuit managed health centres (10).

It is immensely important, however, to keep in mind that the establishment of this program should not bring an end to the discussion surrounding the provision of permanent services that would enable all mothers to deliver their children within their own region. This program is only feasible when it comes to delivering low-risk births – high-risk births still need to be evacuated south (32). This study concludes that efforts to establish resources and facilities catered to the delivery of high risk births in the community should be undertaken. This may help reduce the stagnant perinatal death rates of the Nunavik population observed in the most recent data (Fig. 1). Aboriginal women should not have to choose between their culture and their safety.

This case study is wary of declaring the Inuulitsivik Midwifery program a success, as there is crucial data missing from this analysis. Firstly, the cost analysis is incomplete, as there are discrepancies in the financial reporting between different organizations (37,38), and full audit reports are not publically available for the Inuulitsivik Health Centre. Costs specific to the Midwifery program are also unavailable. A full cost-benefit analysis is also missing from our report, as it is difficult to represent qualitative successes in a way that can be compared to costs in dollars. In a program such as this, total social costs and benefits must be included when evaluating the overall efficiency of the program. This case study calls for further data collection from the midwifery program, including qualitative measures that can evaluate community development, cohesiveness, gender inequalities, and overall satisfaction. Furthermore, a lack of comprehensive quantitative data (with sufficient statistical power) such as a complete history of perinatal mortality rates with the Evacuation Policy vs. the midwifery program, interrupt the complete evaluation of the intervention. It is paramount to the long-term success of the Aboriginal mid-

wifery program that more research is done to evaluate the impact of this program and all other First Nations health care initiatives. A comprehensive monitoring and evaluative system must be integrated into the Inuulitsivik midwifery program in order to allow local and provincial policy makers to address and improve critical areas of weakness.

Concluding Remarks:

The Inuulitsivik Midwifery program is recognized by numerous organizations, including the International Confederation of Midwives, the World Health Organization, and the Canadian Society of Obstetricians and Gynecologists (39). As the first midwifery program of its kind in Canada, it has been used as a model for the implementation of other midwifery programs in the country, serving Aboriginal populations outside of Nunavik (17). Potential scalability in other countries with marginalized Indigenous populations is questionable, and must be considered on a case-by-case basis. Currently, the midwifery-led health centres are unable to manage high-risk deliveries, and must resort to evacuating these pregnant women to deliver in a hospital setting. This solution may not work, for example, in a country whose government cannot or will not afford the transportation costs of high-risk pregnancies.

Contemporary global health trends focus on increasing the proportion of physician-led deliveries in established medical facilities worldwide – a concept at odds with the Inuulitsivik Midwifery program. It is important to understand that global health is an extremely nuanced field, with no such thing as a one-size-fits-all solution. This leads to more tailored global health interventions, best-suited to the population being served. In the case of the Nunavik population, deliveries in hospital required the isolation of the Inuit mother from her family, her language, and her culture. A more suitable approach, tailored to the Inuit population of Nunavik, was achieved through the collaboration of the Inuit, physicians, and health experts alike.

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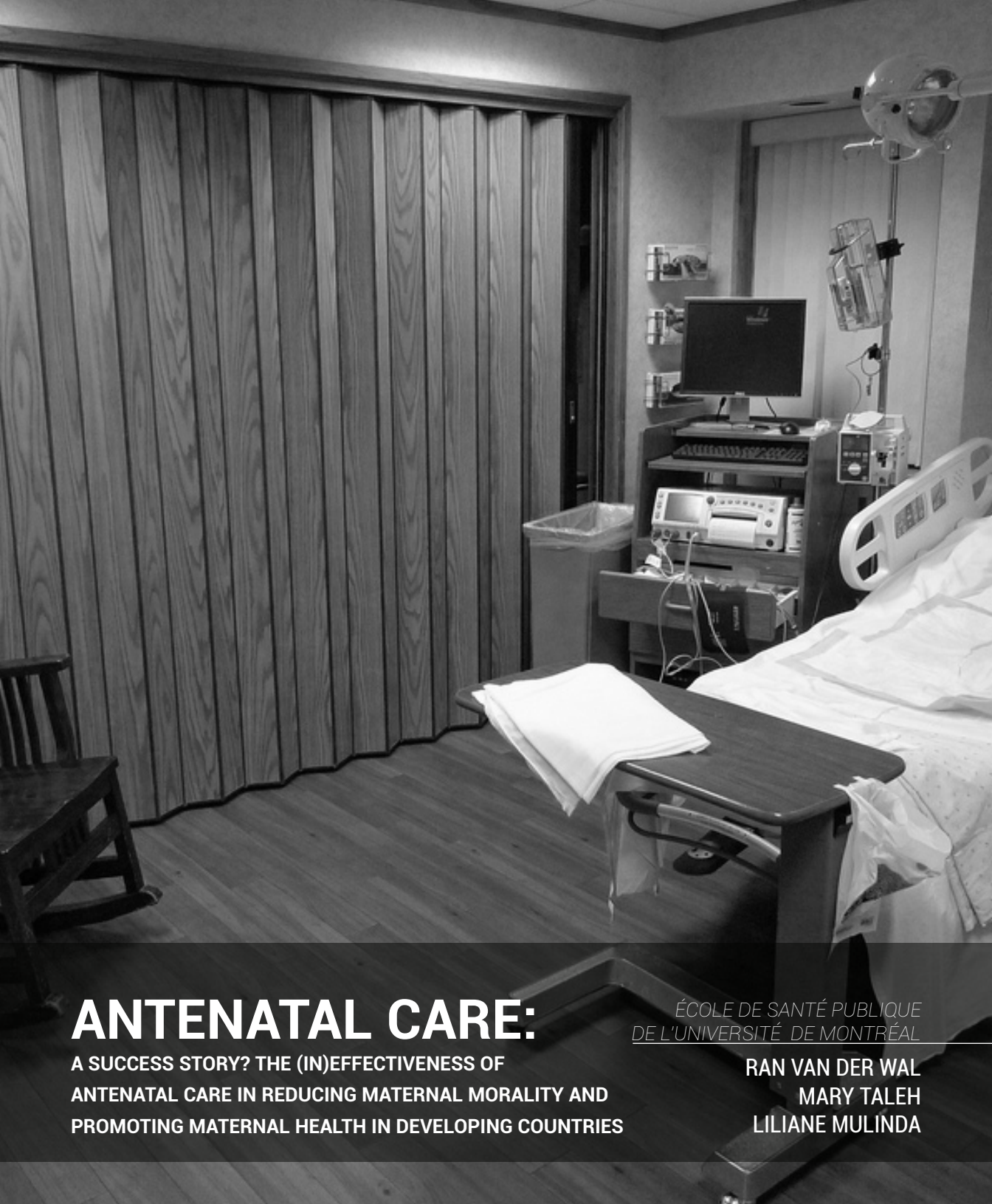

ANTENATAL CARE:

A SUCCESS STORY? THE (IN)EFFECTIVENESS OF ANTENATAL CARE IN REDUCING MATERNAL MORALITY AND PROMOTING MATERNAL HEALTH IN DEVELOPING COUNTRIES

ÉCOLE DE SANTÉ PUBLIQUE
DE L'UNIVERSITÉ DE MONTRÉAL

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MARY TALEH
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Antenatal care (ANC) is considered a success story in low- and middle-income countries (LMIC), as its uptake is very high. This paper aims to assess its effectiveness to reduce maternal mortality and promote maternal health in LMIC. Facility-based deliveries attended by skilled personnel are required. Focused on counseling, ANC could lead to facility-based delivery, but socioeconomic and cultural factors, and the quality and accessibility of services determine its uptake. A package of evidence-based interventions during ANC reduces maternal mortality and morbidity. ANC provides a platform to address social problems such as gender violence as well. Despite the opportunities ANC represents, challenges are found at client, workforce and health system levels.

Introduction

The 2014 Millennium Development Goal (WHO) Report estimates that 83% of women in low-and middle-income countries (LMIC) received at least one antenatal care (ANC) visit by skilled health personnel during their pregnancy in 2012 compared to 65% in 1990 (1), leading to ANC uptake called a success story (2). ANC provides the opportunity to reach many pregnant women and, arguably, should be put to the most effective use possible (3). Upon closer inspection however, major discrepancies exist between and within countries, resulting from determinants that appear quite similar across contexts (4, 5). Moreover, it is questionable whether ANC should have been given the praise it received, as it has proven to be ineffective in predicting or preventing maternal mortality (6).

In this paper we will describe the relevance of ANC in relation to maternal mortality and maternal health, as well as examine the factors that influence its utilization in order to assess whether ANC can truly be qualified as a success story in LMIC. Although maternal and neonatal health and mortality are closely linked, notably while discussing ANC, this paper will focus specifically on issues in relation with maternal health and mortality.

So What?

ANC can contribute to improved maternal health and reduced maternal mortality if aligned with the socioeconomic and cultural realities of women in LMIC. However, both quality and accessibility of ANC need improvement. Health system strengthening and workforce improvement therefore remain a priority to ensure that the most vulnerable, the poor and rural women, will benefit from ANC services.

What is Antenatal Care?

ANC is an "umbrella term used to describe the medical procedures and care that are carried out during pregnancy" p. 1 (6). The British Ministry of Health introduced ANC in 1929 as a prophylactic care program. Visits were intended to start in early pregnancy with 4-week intervals; 2-week intervals from 28 weeks to 36 weeks, and weekly from then on. This model was widely adopted and nearly universal in high-income countries (HIC) (7), even though there were substantial differences between countries with regard to the number and content of ANC (3).

The model remained unchanged until 2001, when the World Health Organization (WHO) commissioned a randomized controlled trial (RCT) with nearly 25,000 women in four different countries at varying stages of development (8). The RCT compared the standard eight-visit ANC model with a new model consisting of five goal-oriented ANC visits and found that pregnancy outcomes were similar. For pre-eclampsia, however, an increased risk could not be ruled out. The WHO subsequently adopted the new model of 'focused ANC', and a minimum of four ANC visits is now the

recommended ANC frequency (9).

The content of ANC is dictated by evidence-based interventions such as tetanus immunization, detection and treatment of sexually transmitted diseases, iron and folate supplementation, and in case of an HIV-positive mother, an antiretroviral course for the prevention of mother-to-child transmission. The focused ANC (FANC) model stresses the importance of counseling and the writing of a birth and emergency plan (2, 10).

The Determinants of ANC

ANC coverage is usually expressed as the percentage of women who have had at least one ANC visit, which is very high at 83% in 2012. However, only 52% of the pregnant women in LMIC received a minimum of four ANC visits in 2012 (compared to 37% in 1990) (1). Why is it that nearly 50% of women in LMIC do not receive adequate ANC?

The meta-synthesis of Finlayson and Downe (2013), which included 21 qualitative studies involving 1,230 women in 15 countries, studied ANC uptake and identified three key themes (11). The first theme, "pregnancy as socially contingent and physiologically healthy" emphasizes cultural and contextual aspects. Resistance to risk-averse care models is observed in women who regard their pregnancy as a healthy physical state, and as such do not see a need for a check-up with health professionals. Moreover, in some cultures, health-seeking decision-making is beyond the pregnant woman's control. Instead, husbands, mothers-in-law, or tribal elders decide whether or not women attend ANC. This is further compounded by traditional or cultural beliefs about pregnancy disclosure. Respondents in South Africa think it wise to wait until several periods are missed before determining that they are pregnant. In rural Pakistan women are embarrassed by their pregnancy as it demonstrates their sexual activity. In several parts of Africa and Southeast Asia women believe that they are vulnerable to witchcraft in early pregnancy. Going to public places, notably to an ANC clinic, is perceived as a public declaration of pregnancy and is thus undesirable.

Theme two, "resource use and survival in conditions of extreme poverty", relates to the direct and indirect costs of ANC visits (payments for drugs and transportation or loss of income), as well as the dangers and difficulties during travel (fear of attack, bad road conditions, etc.). Even though ANC itself might be free, the poorest simply can't afford any additional expenses, as all their money is required for basic survival.

The last theme, "not getting it right the first time" refers to supply challenges. Pregnant women perceive that ANC is not worth the effort because clinics are understaffed and under-resourced. Sometimes, procedural rules are inhibitive, for example denying women access to delivery facilities when they don't have an ANC card, and may serve as a reason why women might attend one ANC appointment only. Disrespectful, humiliating, or even abusive behaviors of health staff are critical barriers to ANC use as well.

Authors conclude that there might be a misalignment between the current ANC program design that is centralized and risk-focused, and the socioeconomic and cultural realities of some women in LMIC. The standard ANC design is based on premises such as 'pregnancy is potentially risky', 'pregnancy is a positive life event', and 'women have sufficient resources to make rational health choices'. The meta-synthesis, however, found that pregnancy is regarded as a healthy physical state, might be socially risky because of the belief in witchcraft or the shame associated with sexual activity, and (in)direct financial costs can impede seeking ANC. The same misalignment is found on the supply side as well. Whereas the program design is based on ANC being affordable (or even free), positive or irrelevant staff attitudes, and fully resourced clinics, the

reality is that unexpected costs arise, staff attitudes are highly important, and clinics often lack drugs, medical material, and equipment.

Simkhada et al. (2008) systematically reviewed the literature on factors affecting ANC utilization in LMIC and conclude that women's social, political and economic status needs to be taken into account (4). Based on 22 quantitative, 4 qualitative, and 2 mixed methods studies, the authors identify 7 themes. Under the theme of "socio-demographic factors", women's education is identified as the best predictor of ANC visits. Studies also found that ANC use increases with the husband's educational level, with being married, and with the age at the time of marriage. Specifically, those 19 years and older are more likely to make use of ANC than those who are younger at the time of marriage. Women pregnant with a first child are generally more likely to use ANC, as is the case for women with birth intervals of more than 3 years. In 'unwanted' pregnancies, women tend to start ANC later and visit less frequently. Nine studies show a significant role for religion, ethnicity, and caste. In India, Muslims are more likely to use ANC than women practicing other religions. Women from lower castes in India and from marginalized groups in other countries are less likely to use ANC.

Other themes that Simkhada et al. identify are: "availability" of health care services, including opening times and waiting times; their "accessibility", with urban women being more likely to use ANC than rural women, the latter experiencing significant distance and transport barriers; and "affordability". Significant economic relationships are found in 21 studies, varying from household wealth, socio-economic status of the women (paid employment, employment outside the home), and expenses related to ANC service use, including costs of drugs and laboratory tests. "Women's position in the household and society", their autonomy and decision-making power influences ANC use, as does "women's knowledge, attitudes, beliefs and culture". Women exposed to mass media with knowledge about family planning, danger signs in pregnancy and dietary knowledge, as well as women who have prior experience with miscarriage or neonatal death are more likely to use ANC. Fear of witchcraft and the shame associated with pregnancy are also deterrents. In the final theme, "characteristics of health services", supply side barriers, such as poor quality of care and negative attitudes of health personnel, are identified.

Studies that examine the determinants of delivery care show that factors influencing delivery in health facilities are similar to factors affecting ANC uptake. Gabrysch and Campbell (2009) found only two previous reviews on determinants of delivery service use in LMIC, of which Thaddeus and Maine (1994) reviewed the whole range of determinants and Say and Raine (2007) specifically focused on place and socio-economic status (12-14). Thaddeus and Maine's seminal work "Too far to walk" presented the 'three delays model' in which factors affecting delays in decision-making to seek healthcare, delays in arrival at the health facility, and delays in adequate healthcare provision were identified for the period between the onset of obstetric complications and their outcomes. They found that quality of care was a more important barrier to healthcare seeking than cost (13). Say and Raine (30 studies in 23 countries) found a wide variation in the relationship between determinants and the use of maternal healthcare services, mainly because of contextual variety and methodological challenges, as not all studies equally controlled for potential confounders (14).

Gabrysch and Campbell's own extensive review that includes over eighty studies found that determinants had not changed significantly over time, and the study was appropriately called "still too far to walk" (12). They conclude that studies had concentrated on sociocultural and economic accessibility variables and neglected factors affecting physical accessibility and perceived

need/benefit. They warn against drawing conclusions when not every possible factor influencing service uptake is considered. For example, studies in Ghana and Nigeria conclude that promotion of female education would be the most effective measure to reduce maternal mortality, while accessible quality health care was not considered (15, 16). Berhan & Berhan (2014) is the most recent meta-analysis of determinants for birth in health facilities. They found that urban women were 9.8 times more likely to use services than rural, and use increased for women with secondary education or higher versus primary or no education (OR = 5.7; 95% CI, 3.77-8.6). However, the meta-analysis only deals with socio-demographic factors and half of the 24 selected studies took place in Ethiopia, which makes results less generalizable (17).

There are many determinants that affect use of ANC, notably the use of 4-visit ANC. Determinants may be interlinked in the sense that educated women may be living in urban areas where more health services are offered, more knowledgeable to appreciate ANC services, and more likely to have paid jobs and the decision-making power to seek care. Determinants have differential effects across countries or among different areas within a country, emphasizing the importance of context. Quality of services is still insufficiently measured (12), and while it is important to address women's autonomy or education, it won't solve any problem if health services are not accessible or inadequate.

How does ANC contribute to the reduction of maternal mortality?

In 2013, approximately 289,000 women died "during pregnancy, childbirth, or within 42 days after termination of the pregnancy from causes (excluding accidental or incidental causes) related to - or aggravated by- pregnancy or its management" p. 29 (18), of which 99% lived in developing countries (19). The estimated lifetime risk for maternal mortality in 2015 was 1:33 in high-income countries versus 1:41 in low-income countries, with the highest risk in Chad (1:18) (19), thereby representing the largest discrepancy of all statistics in public health (5). The most recent WHO systematic review on global causes of maternal deaths by Say et al. (2014) reviewed 23 studies published in the period 2003-2012. They found that nearly three quarters of all maternal deaths were due to direct obstetric causes and 27.5% to indirect causes. The top 3 causes of death were hemorrhage (27%), hypertensive disorders (14%) and sepsis (10.7%) (20). These direct causes for maternal mortality, together with the clustering of mortality around delivery, illustrate the need to focus on intra-partum care, i.e. all women should have access to skilled attendance (by a midwife, doctor, or nurse with midwifery skills to attend to uncomplicated deliveries at labor and birth (21), and timely referral to emergency obstetric care (EOC) (5, 22, 23). This chapter looks into the main causes of maternal mortality and how ANC addresses them. It examines the pathways of the association of ANC uptake with facility-based delivery and its challenges.

ANC is a relatively cheap intervention that can be planned over a 9-month period and provided to women in practically any geographic area. Providing access to appropriate care during labor and delivery, however, is a much more complex endeavor, requiring highly skilled personnel and a functional health system providing basic and EOC services (22). This has led to programs focusing on ANC rather than delivery care (24), but how effective is ANC in reducing maternal mortality? ANC has been routinely delivered in developed countries for nearly a century (25). Its effectiveness, however, has only been challenged in the 1980s -1990s (26). Cochrane (1972) states that ANC, by some chance, escaped critical assessment and that ANC should be subjected to RCTs (cited in Carroli 2001 (10, 27)).

In 1996, McDonagh confirms that many of the antenatal procedures comprised screening tests that rarely

complied with established effectiveness criteria, and that results from RCTs were available for nutritional supplementation only (6). She defines risk factor as a link in a chain of associations leading to illness and identifiable prior to the event it predicts. This requires good medical history taking, which has been a challenge. To detect pre-eclampsia, blood pressure must be taken. Not only are there many systematic and random errors made in blood pressure recording, the natural history of the pre-eclampsia is not known, and the positive predictive value of taking BP was estimated to be 40% only (28). Many other screening tests had low predictive power as well (as low as 13%), and even ultrasounds in the UK produced over 50% false positives (Tew 1990, cited in McDonagh (6, 29)). It resulted in many women being referred unnecessarily, overburdening the health system, and causing unnecessary stress and cost to women.

Rooney reviewed the effectiveness of ANC for the WHO in 1992 and questions the beneficial associations between ANC and maternal morbidity and mortality. The decline in the latter since the 1930s could be partially attributed to improved obstetric care and, in places where ANC is lacking, delivery services are likely to be poor and information systems unreliable (7). Rooney was unable to identify studies in LMIC that adequately controlled for confounding factors, which is essential as outcomes of ANC attendance (vs. non or late attendance) are likely to be confounded by socioeconomic factors, education, knowledge, distance etc. She points out that ANC, like other screening programs suffers from 'inverse care laws', i.e. those at highest risk are least likely to make use of preventive services (7).

Carroli et al. (2001) updated and expanded the Rooney's review and provided an overview of evidence-based interventions that aim to prevent, detect, and treat causes of maternal mortality and serious morbidity to be included in ANC. Regarding hemorrhage, ANC's role is limited: detection of women at risk and ensuring that they deliver in an adequately equipped facility, detection of signs and symptoms, combined with immediate referral, and reduction in anemia prevalence. Folate and iron supplementation are recommended for the latter. With regard to hypertensive disorders of pregnancy (HDP), authors repeat findings articulated by McDonagh: the lack of consistent patterns in disease etiology, identification, and treatment (except for caesarian sections) make it challenging to effectively address HDPs, even though it is hypothesized that calcium supplementation could reduce HDP. With regard to sepsis, the last of the top 3 causes of maternal death, most effective interventions take place in the intra-partum period. Tetanus vaccination is an exception: the 2-dose vaccination provided in the ANC period has been one of the most successful interventions against puerperal sepsis (10).

In recent years, interventions during ANC addressing indirect causes of maternal mortality have demonstrated effectiveness. Early detection and treatment of plasmodium falciparum malaria in pregnant women and antiretroviral therapy (ART) of HIV-positive pregnant women can reduce maternal mortality.

Preventing malaria in expectant mothers is of great concern, especially in parts of the world where it is endemic. Annually, 25 million pregnancies are affected by malaria in Africa alone (2). Malaria can lead to severe anemia in pregnancy, which increases the risk of mortality associated with haemorrhage during delivery. The highest malaria infection rates are found in the second trimester. ANC is therefore crucial to detect malaria with rapid tests, to treat with artemisinin-based combination therapy, and to prevent through intermittent presumptive treatment and the use of insecticide treated bed nets (30). Although Carroli et al. did not find convincing evidence regarding the effectiveness of intermittent prophylaxis for malaria during pregnancy, a 2006 Cochrane Review found

significant reductions in maternal anemia in intervention groups. In 2012 McGready et al. (31) demonstrated a significant decline in maternal mortality through systematic screening and treatment of falciparum malaria during pregnancy. Over a 25-year period the maternal mortality ratio in Thai-Burma border camps dropped from 499/100,000 to 79 ($p<0.05$), of which nearly 40% was caused by infection of non-puerperal sepsis and falciparum malaria.

With high prevalence and infection rates of HIV, ANC has gained popularity as a means to detect and treat HIV in pregnant women (20, 24). In populations where HIV prevalence is higher than 15%, half of the pregnancy-related deaths are related to HIV (32). In a systematic review from 2003-2014, Holtz et al. (33) find that ART reduces maternal mortality. The effect is greater if ART is started at an earlier stage of the pregnancy, with CD4 counts >350 cells/mm2, and when the disease is less advanced. The so-called B+ regimen, which the WHO recommends since 2012, starts all HIV-infected pregnant women on a single-pill fixed-dose triple ART, regardless of CD4 cell count, from their first ANC visit and for the rest of their lives (34). Authors state that this seems to be the right approach to reduce HIV-related maternal mortality. They warn, however, for a risk of increased mortality in the 30-day period after ART initiation, notably in women with advanced HIV. They advise intensive follow up and vigilance in this period.

Generally, interventions shown to be effective in pregnancy relate to chronic maternal conditions (anemia, HDPs, and infections) rather than acute, such as hemorrhage and obstructed labor that emerge close to delivery (10). As the greatest dangers arise in the intra-partum period, the contribution of ANC to maternal mortality reduction is therefore in encouraging women to deliver in adequate health facilities with competent staff (24). This is why, in the model of FANC, so much attention is given to health promotion, birth preparation, and emergency plans (22).

Studies have demonstrated that pregnant women attending ANC services are more likely to deliver in a health facility with skilled birth attendance (21, 35-37). Different causal pathways explain this association. The information and quality of care that pregnant women receive during ANC could make them opt for facility-based delivery (38).

In a cross-sectional cross country analysis of 19 sub-Sahara African countries, Nikiema et al. (2009) researched the health information pregnant women receive during ANC to predict delivery in a health center. It is hypothesized that increased knowledge about danger signs and potential complications in pregnancy and delivery will increase use of delivery services. This means that women need to receive advice and remember it. The study found, however, that less than 50% of the women reported having received health information and the ones that did, remembered it in varying degrees (recall from 6% in Rwanda to 72% in Malawi). Recall increased with the number of ANCs received, as was the likelihood of receiving health information, which doubled with 3 ANC visits (OR=1.9) and nearly tripled with 5 (OR=2.72). Disturbingly, women considered high risk did not consistently receive more health information. Rural women were less likely to have been advised (OR=.70) whereas they are more likely to be more distant from EOC services. Teenagers and uneducated women received less health information as well (OR=.84 and OR=.65 respectively). Authors looked at the interaction between the number of ANC visits (with and without health information) and institutional delivery. They concluded that women were more likely to deliver in a health facility with every additional ANC visit; the effect was even greater when women received health information (e.g. OR=1.6 for 2 visits compared to OR=3.82 for 5 or more visits, and OR= 2.34 and OR=4.81, respectively, with health information) (38).

The "psychological factor" plays a role as well. Getting familiar with health personnel during ANC lowers the threshold of getting into health facilities during the intra-partum period (37). For many women and girls, ANC services are their first point of contact with official health services. If this has proven to be a positive experience, it will be more likely that they opt to continue using these services for delivery, notably if delivery will be assisted by the same health care provider who provided ANC (2).

Another causal pathway is found in the change of health habits as a result of regular use of ANC services that aim to reinforce using skilled birth attendance for delivery (36). Studies evaluating curative services found that targeting maternal behavioral change may have a large impact in settings with high rates of modifiable risk factors (39, 40).

That said, much depends on the quality of services that women receive. Ensuring the use of up-to- date clinical protocols and standards based on evidence is essential (21). Barber (2006) found that women receiving most of the ANC procedures prescribed by national protocol were more likely to deliver in a health facility (OR=2.29 (1.18-4.44)), but no significant association was found with women who received 75% or less of the content (35).

How does ANC contribute to Maternal Health?

With the acceptance of the FANC as the new ANC model, WHO moved away from the risk detection approach aimed at reducing maternal mortality to a focus on improving maternal health, which is both required to improve newborn health and an end in itself.

Campbell and Graham (2006) include ANC as an essential component to an effective strategy to reduce maternal mortality outside the intra-partum period. On top of medical interventions, advice giving is recommended regarding care-seeking for normal deliveries, planning of maternal and neonatal emergencies, recognition of dangers signs, warmth and exclusive breastfeeding, contraception, and birth spacing. Obstetric, medical, and social histories need to be recorded to not only detect pre-existing and medical conditions, but to identify social problems such as violence (22).

Sexually transmitted infections (STIs) can cause serious maternal morbidity and perinatal morbidity and mortality, but have hardly any impact on maternal mortality (24). Systematic screening and treatment for syphilis is part of FANC as it shows high cost:benefit ratios, notably in LMIC where prevalence might be twice as high as in industrialized countries (5-15%) (10). A study in Zambia found that untreated syphilis resulted in abortions, stillbirth, low birth weight, prematurity or congenital syphilis in 58% of the affected pregnancies (41).

Pregnancy may aggravate pre-existing health conditions. For one, it engenders haemodilution, a normal process in which iron is depleted regardless of iron supplementation. Iron levels return to normal quickly after the pregnancy, which is the reason why universal iron supplementation is no longer recommended. In LMIC, however, two-thirds of women suffer from anemia, and as anemia is often the underlying cause of mortality, iron and folate supplementation remain recommended for the FANC (6). Other factors aggravating anemia include malaria, intestinal parasites, sickle cell disease, infections, blood loss, or poor socioeconomic conditions (42).

ANC represents a strategic entry point for the prevention of mother-to-child transmission (PMTCT) of HIV. HIV is associated with stillbirth, ectopic pregnancy, and spontaneous abortion (10). Early detection of HIV during ANC visits facilitates taking preventive measures to avoid or lower the risk of vertical trans-

mission during pregnancy, delivery, or breastfeeding. In 2013, approximately 210,000 children were infected with HIV in sub-Saharan Africa (43), of which over 90% occurred by vertical transmission (40). If infected infants are not treated, half die before they are 2 years old; however, adequate interventions can reduce mother-to-child transmission to 5% instead of the 20-45% if no antiretroviral (ARV) prophylaxis is utilized (44). A systematic review and meta-analysis of 44 studies by Wetstein et al. (2012) looks into ARV prophylaxis coverage in 15 sub-Sahara African countries (45), where 90% of the PMTCT need is (44). They found that the 'opt-out' approach to HIV- testing was successful: 93.7% of the women were tested compared to 57.6% when the patient would request to be tested (opt-in). Overall, 70.3% of pregnant women receive some ARV prophylaxis, with better uptake when the male partner is involved and when women deliver at a health facility. Uptake on continuous ARV treatment is very low: of the 22.3% eligible women (based on CD4 count) an estimated 61.1% started treatment. Authors conclude that coverage needs to be improved if the UNAIDS goal of eliminating all pediatric HIV infections by 2015 is to be achieved (45). The B+ regimen that starts all HIV-infected pregnant women on lifelong ART extends protection from mother-to-child transmission to future pregnancies from the moment of conception, which is not unimportant in environments where fertility rates are high (34).

HIV-infected pregnant women are also more exposed to opportunistic infections like tuberculosis (TB) than HIV negative women, and the risk of active TB increases during pregnancy (10). Nguyen et al. systematically reviewed tuberculosis care for pregnant women (2014). The 35 studies selected for review, of which 20 were carried out in LMIC, show that diagnosis during pregnancy is often delayed, as TB symptoms resembled pregnancy symptoms. Both TB prophylaxis and treatment seem safe and effective for pregnant women and their babies, provided that early initiation and effective follow-up are guaranteed. However, this early practice was lacking, perhaps why TB prophylactic treatment showed a low compliance rate (46). TB is the third leading cause of death among women of reproductive age (15-44 years) and can cause infertility and poor reproductive health outcomes (47). With approximately 510,000 women dying from TB in 2013, and 3.3 million contracting TB, integrating TB care in ANC would improve TB diagnosis and treatment (46, 48).

Through social history taking, ANC provides an opportunity to bring up sensitive issues affecting maternal and neonatal outcomes, such as gender-based violence (GBV). However, abused women start their ANC late, often in the third trimester only (49). Heise et al. give a global overview of GBV and its reproductive health consequences. Violence compromises women's mental and physical health, and may result in adverse pregnancy outcomes. Direct consequences on reproductive health are increased risk of unwanted pregnancies, STIs, and HIV, as women subjected to domestic violence are often unable to request the use of condoms or other forms of contraception. Sexual and physical violence is associated with chronic pelvic pain, irregular vaginal bleeding, sexual dysfunction, and premenstrual distress. Indirect consequences include a variety of risky behaviors, such as (excessive) drug and alcohol use, less contraceptive use, and promiscuity. Physical or sexual abuse during pregnancy has been linked to increased risk of antepartum hemorrhage, miscarriages, abortions, stillbirth, fetal distress and growth retardation, low birth weight of the infant, and neonatal death (50).

Gender-based violence is a public health priority, and health professionals need to be well trained in identifying the signs and symptoms in pregnant women during routine ANC. Health professionals can create a safe/secure environment during ANC visits, where women feel free to disclose these sensitive issues, re-

ceive (community) support, counseling, and information regarding legal assistance from organizations advocating for women (51).

Female genital mutilation (FGM) is a traditional practice that is common in about 28 African countries, and in certain parts of Asia. An estimated 100 to 140 million women and girls have undergone FGM, and about 2 million girls are at risk of undergoing FGM annually (52). The WHO defines FGM as "partial or total removal of external female genitalia or other injury to the female genitalia whether for cultural or any other non-therapeutic reasons" p.1 (53). The antenatal period is an excellent opportunity for the healthcare team to counsel, to promote health, and to educate women, their partners and family, regarding the health consequences of FGM, the risks of re-infibulation in case of multiple deliveries, and to discourage women to request re-stitching after delivery. This is also the ideal moment to encourage women to advocate for the elimination of FGM in their communities, where the practice is deeply rooted, to prevent future generations of women and girls from undergoing the same procedures (51).

Discussion

In our quest to find out whether ANC truly has been the success story some claim it to be, we found reason to answer both positively and negatively.

Even though ART treatment and rapid detection and treatment of malaria during the ante-partum period have demonstrated effectiveness, ANC might not be the best approach in reducing maternal mortality, as most deaths occur in the intra-partum period. However, as easy as it might be to criticize the success of ANC with regard to reduction of maternal mortality, it is much harder to produce evidence to support its (in)effectiveness. Maternal deaths, even with high ratios in the hundreds per 100,000 live births, are often too small in number to produce significant results, unless an unrealistically high sample size could be secured (6). The study would have to be prospective in order to ensure that all maternal deaths are properly registered, a process complicated by home deliveries, abortions, weak existing maternal death registration, and the misclassification of many maternal deaths (5, 54). Not only would such a study be very laborious and costly, with numerous potential confounders, it would be hard to control for interaction between variables and contextual variation might make generalization challenging (7). Furthermore, even if ANC were ineffective, how ethical would it be to take away a health service that is so widely accepted and used?

Several studies have focused on ANC contributing to a reduction of maternal mortality through indirect causal pathways aimed at health facility delivery. Indirect effects of health education and personal experience may be difficult to assess. They are important, however, in raising awareness regarding the importance of skilled birth attendance during the intra-partum period (55), which is considered to be the priority strategy to reduce maternal mortality (56). Even though it is suggested by some that ANC would rather be a marker of facility-based delivery (37), others claim that some features of ANC, such as the lower costs and the fact that women can plan their visits, which result in a much higher uptake of ANC than facility-based deliveries, make ANC sufficiently distinct for it to be considered a predictor for professionally assisted delivery (2, 37). It is reported that women who have had one ANC visit are six times more likely to deliver with a skilled birth attendant (SBA), and women who had more than four visits, compared to women with fewer visits, are 3 times more likely to deliver with an SBA (24).

Moreover, ANC might be the only service provided for women, thus the only opportunity to reach them, so there are practical reasons to keep ANC (6). ANC transcends basic healthcare by providing a solid ground for

counseling and health promotion (22, 24). Adopting healthy habits and building a healthy environment for women and their babies, through breastfeeding, postnatal care, family planning, and birth spacing, as well as learning how to recognize danger signs during pregnancy and to be prepared for emergencies are all essential components in the new model of FANC (10, 22).

Unfortunately, health promotion and counseling are often not provided during ANC, and/or women are not able to remember the messages (38). Moreover, counseling appears to be very time consuming: whereas prior to the introduction of FANC a minute and a half was dedicated to counseling, now counseling would take on average an additional 30 minutes. This does not take into account informing and counseling of women for additional services such as TB or violence. Additionally, health staff would need to be trained to provide effective counselling (57).

Significant dose-response effects have been observed with regard to the number of ANC visits and the health information provided, other ANC content delivered, and facility-based delivery attended (35, 37, 57). Furthermore, a 2010 Cochrane meta-analysis that included 7 RCTs involving over 60,000 women showed that even though most outcomes were not significantly different in the FANC model compared to the traditional ANC model, there was evidence that perinatal mortality might have increased with the reduced visits model in LMIC (58). All the above-mentioned considerations taken into account, it might be wise to conclude that for LMIC a reduction of ANC visits should not be a priority (58), especially not in countries where the average number of ANC visits is not more than four visits anyway (57).

ANC has become the platform to provide other health services related to improving maternal and neonatal morbidity and well-being. In that light, efforts to include interventions addressing GBV need to be encouraged. Interest in GBV and pregnancy only developed in the last few decades, whereas violence in pregnancy is more common than several recognized maternal health conditions that are currently being screened for (59). Ganatra et al. showed that more pregnant women die from domestic violence (15.7%) than from sepsis (13.2%) or eclampsia (8.3%), and was bested only by postpartum hemorrhage (30.6%), the acknowledged number one cause of maternal mortality (60). Currently, deaths by injuries and accidents fall outside the scope of the ICD10 definition for maternal mortality (18). ICD11, however, might take suicide into account as in some countries suicide rates among pregnant women are very high, especially when the pregnancy is unwanted (20).

FGM, another prevalent form of GBV, requires sensitive attention as well. Even though women might understand that it is a harmful medical practice, underlying sociocultural and belief systems, as well as the role of the women in the society, make it challenging to address this issue effectively. Health facilities known to refuse re-infibulation after delivery, for example, may even cause women to avoid using their services, possibly leading to much greater harms to the woman and her child (52).

This brings us to the complicated field of the determinants for service utilization. There are many factors determining the use of ANC. At the demand side, the most important seem to be education and location, with uneducated poor and rural women being significantly disadvantaged (4, 17). Apparently there is a disconnect between the current ANC model and the socioeconomic and cultural realities of pregnant women, with many women regarding pregnancy as a healthy state instead of a risky undertaking requiring medical follow-up; some women simply do not have the means to access ANC even when offered for free (11). Sociocultural and economic accessibility variables are well researched, but factors affecting accessibility

and perceived need/benefit are neglected (12). Quality of care, however, seems to be one of the strongest facilitators of facility-based delivery (13). Health system strengthening is therefore crucial for effective delivery of reproductive health services. More investments need to be made in health workforce improvement through training and motivation strategies. Effective support and supply of health facilities, as well as reliable and timely health information are necessary to (further) improve quality of care (61). For policy relevance, supply-side challenges such as service accessibility and quality are more amenable to change than sociocultural factors such as women's autonomy, and whereas addressing those factors are important, how much good will autonomy do if there is no health center in the vicinity that can provide basic and emergency obstetric services (12)? More efforts could be made to include the community. Many of the health information, education and promotion activities could be provided by community health workers, for example (62). This would lessen the burden of counseling during ANC as well.

Addressing maternal mortality is not only important from a health perspective, it is important for economic and social development at both the individual and national levels as well. At the family level a mother's death affects children's health, education, and welfare, effects that can be carried on inter- generationally (63, 64). At macro-level, maternal deaths lead to loss of productivity, which, globally, has been estimated to represent 15 billion USD per year (63).

Maternal deaths are just the 'tip of the iceberg'. For every maternal death, 30 women suffer debilitating physical and mental disabilities, such as fistula, infertility, damage to reproductive organs and nervous systems, chronic pain, depression, and social isolation. The total number of women suffering illnesses and near misses after delivery is estimated to be 10-20 million per year (23, 65). Demographic transition with reduced fertility rates in notably India and Nigeria that accounted for a third of all maternal deaths in 2015 (19) are reducing global maternal mortality figures. Yet the epidemiological transition brings other challenges, such as the burden of noncommunicable diseases in pregnancies, which needs further exploration (20).

Conclusion

Although ANC might have started as a more ritualistic intervention, in time it has developed into a solid service with evidence-based interventions. ANC is widespread and widely accepted, as coverage data demonstrates. Attending ANC to enhance SBA attendance and facility-based delivery is the ultimate aim of the FANC, for which counselling is essential. Accepted FANC measures to reduce maternal mortality and morbidity include the detection and treatment of STIs (especially syphilis), anemia (through iron and folic acid supplementation), malaria, HIV, and TB. To qualify ANC as being truly effective, evidence-based interventions need to be correctly applied to as many pregnant women as possible. Significant improvements are therefore required with regard to its quality and accessibility. It is essential that the most vulnerable, the poor and rural women, will benefit from its services. Concerted efforts will need to be made to strengthen health systems and to improve socioeconomic situations in developing countries. Moreover, serious attention should be given to the improvement of women's position in society, promoting gender equality, education, and legal recourse, to address determinants of ANC use generally, and gender-based violence specifically.

The refocusing of ANC from maternal mortality reduction to maternal health facilitates providing health services that have a great impact on maternal and neonatal morbidity, as well as neonatal mortality. It allowed for a flexible adaptation to new realities when HIV became the major indirect cause of maternal mortality. For the immediate future, this flexibility is

required to take into account the burden of noncommunicable diseases in pregnancies, as developing countries are facing the double burden of noncommunicable diseases and deaths caused by infectious diseases and reproduction related causes.

Even though the FANC might bring advantages of burdening women with less ANC visits, a note of caution needs to be given with regard to LMIC where perinatal mortality seems to have increased. Moreover, ANC visits have become more time-consuming because of counseling, and health staff are not adequately trained to provide this service.

As ANC provides the entry point to offer services to many women whose first contact with formal health services is their very first antenatal care visit and because of its high uptake, we tentatively conclude that ANC has been a success. Further quality and accessibility improvements need to be made in order to reach its full potential, however.

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