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Understanding Maternal Mortality and Developing Effective Approaches

Zaneta Yeungjoo Chung

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Understanding Maternal Mortality and Developing Effective Approaches

Haiti as a Case Example

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UNDERSTANDING MATERNAL MORTALITY AND DEVELOPING EFFECTIVE APPROACHES

HAITI AS A CASE EXAMPLE

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Every minute around the world, 380 women become pregnant, 190 face unplanned or unwanted pregnancies, 110 women experience pregnancy-related complications, forty women have unsafe abortions, and one woman dies.[1]

INTRODUCTION AND OVERVIEW

This thesis addresses maternal mortality in developing countries. It will first provide a description of the problem: the definition of maternal death, the epidemiology, and the significance of the issue. The second chapter is a discussion of the working background of the issue: major analytical models, the measurement of maternal mortality, and the evolution of strategies of intervention. Interest in this subject stemmed from the author’s exploratory research project on the causes of maternal mortality in a rural region of Haiti; the third chapter is a description of the study and its findings. The author will draw from these experiences to support a concluding discussion on local and global applications, including the use of skilled birth attendants, and general recommendations about reducing maternal deaths.

Definition of Maternal Death

According to the International Classification of Diseases (ICD-10) [2], a maternal death is defined as “the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its
management but not from accidental or incidental causes.” There are two groups of maternal deaths: direct obstetric deaths, resulting from obstetric complications of the pregnant state (pregnancy, labor, delivery, postpartum), from interventions, omissions, incorrect treatment, or from a chain of events resulting from any of the above; and indirect obstetric deaths, resulting from previous existing disease or disease that developed during pregnancy and which was not due to direct causes, but which was aggravated by physiologic effects of pregnancy. Examples of such diseases include malaria, anemia, HIV/AIDS, and cardiovascular disease. The ICD-10 also includes a category for “late maternal death,” which is defined as: “the death of a woman from direct or indirect obstetric causes more than 42 days but less than one year after termination of pregnancy.” The category, “pregnancy-related death,” is used for deaths in which cause is unclear. It is defined as “the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the cause of death.”

**Epidemiology**

Maternal mortality results in more than 500,000 women’s deaths per year, 99% of which occur in developing countries. This number is considered too low by many sources, and some estimates by global organizations are 2-3 times higher. Maternal deaths are underreported due to misclassification, absence of registration system, error, or inability to identify maternal mortality according to the definition; abortion complications may not be reported if abortions are illegal. There is also bias from selectivity in access to facilities and record keeping sources. There are relatively
few examples in which maternal mortality has been thoroughly investigated in
developing countries.

The maternal mortality ratio (MMR) is defined as number of maternal deaths
in one year per 100,000 live births during the same period, whereas the maternal
mortality rate is maternal deaths per 100,000 reproductive aged women. The terms
"rate" and "ratio" are often used interchangeably, but most discussions imply deaths
per 100,000 live births (ratio). The lifetime risk of maternal death expresses the risk
for the individual woman to die a maternal death and is derived from the ratio and the
fertility rate in a given country. The ratio, unlike the rate, will remain constant even
when fertility declines if the risk for the woman, once pregnant, is unchanged.

Levels of maternal mortality vary widely both within and between developing
countries. The difference in maternal mortality ratios between developing and
developed countries is large and growing wider, indicating that deaths could be
avoided if resources and services were more available. While deaths have been
decreasing in developed countries with the increased use of blood transfusions and
antimicrobial drugs, better maintenance of fluid and electrolyte balance, and better
anesthetic techniques, the rates in poorer countries still remain high. An estimated
88-98% of maternal deaths can be prevented with appropriate health care.[3]

The lifetime risk that a woman will die of maternal causes in Africa is 1 in 19;
in Asia, 1 in 132; in Latin America, 1 in 188; and in more developed countries, 1 in
2,976.[4] In northern Europe, the risk is as low as 1 in 4000.[5] The risks are
compounded by the fact that women in developing countries bear more children than
those of developed nations (each pregnancy carries independent risk burdens).

The relative risks of childbearing vary between different age-parity groups and also from location to location. Women under twenty years old and over thirty-five years, first pregnancies, and high parity (>4-6 children) have higher risks. The reasons include less physical maturity, less experience, and poorer general states of health. In addition, some of the main causes of death, such as eclampsia (described below) are more prevalent in those specific age-parity groups for unknown reasons. However, women in the twenty to thirty-five year age group have the largest proportion of births, and thus the largest absolute number of maternal deaths.

Clinical Factors

Maternal causes account for between a quarter and half of all mortality among women in developing countries. The main clinical causes of maternal deaths worldwide are hemorrhage (25%), sepsis (15%), preeclampsia/ eclampsia (12%), abortion (13%), and obstructed labor (8%). Hemorrhaging, or excessive bleeding, can happen at any time during pregnancy and can be related to abnormalities in placentation, trauma, drug use, medical comorbidities, medical mismanagement, coagulopathies (blood disorders), ectopic pregnancies, uterine atony (failure of the uterus to contract after delivery), retained products of conception, lacerations, and surgical complications.[6] Women can go into shock, the underperfusion of vital end organs, from massive blood volume loss. This results in a range of consequences, from reversible to irreversible damage to various organs, including the brain, and of course, death. Treatment is replacement of vascular volume and the achievement of
stable hemodynamics with a variety of medications.

Sepsis is the clinical picture of the body’s response to systemic infection caused by the multiplication of pathogenic organisms and/or the presence of their toxins in the bloodstream. Severe sepsis can lead to a state of shock from the body’s intrinsic inflammatory response and directly from the toxins effect on the tissues. Treatment includes antibiotics and the achievement of stable hemodynamics with the replacement of vascular volume and/or use of various medications.

Preeclampsia and eclampsia are hypertensive states of pregnancy. Preeclampsia is the presence of edema (extravascular accumulation of fluid often causing swelling), hypertension (high blood pressure), and proteinuria (protein in urine). Although there is no definite cause, the underlying pathophysiology involves generalized constriction of arterioles and depletion of intravascular volume that can lead to underperfusion, necrosis, and hemorrhage of tissues and organs. Effects on the fetus include prematurity and decreased blood flow to the placenta. There are variations in the degree of preeclampsia, from the mild to severe. Eclampsia is the occurrence of grand mal seizures in a preeclamptic woman not attributed to other causes. Women with severe preeclampsia are at greater risk of developing seizures, but women can develop seizures with only mild preeclampsia. General treatment for preeclampsia and eclampsia include blood pressure management, seizure prophylaxis, and delivery of the fetus when viably possible (ie. lung maturity).[7]

Elective abortions are another major cause of death related to pregnancy, primarily due to complications of hemorrhage and sepsis, especially in areas where
people are untrained in safe and clean techniques and where abortions are illegal, making it difficult to have access to trained professionals and post-abortion care. In addition, in many areas, practices in terminations are dominated by traditional methods that can be very dangerous.

Prolonged or obstructed labor is often caused by cephalopelvic disproportion (when the infant’s head cannot pass through the pelvis) or abnormal lie (when the infant is poorly positioned for transit through the birth canal). Indirect causes account for about 20%.[8] An example of an indirect cause is mitral stenosis, a defect of a heart valve, for which the symptoms can be aggravated by the physiological demands of pregnancy. Other examples of indirect causes include pregnancy with infectious diseases such as malaria, HIV/AIDS and tuberculosis.

The conditions of poverty are the major factors putting women of developing countries at risk for maternal death. Malnutrition causes maternal growth stunting, predisposing to obstruction; severe vitamin A deficiency increases vulnerability to obstetric complications; iodine deficiency leads to stillbirths, spontaneous abortion, and maternal hypothyroidism, which may lead to death; and lack of dietary calcium increases risk of preeclampsia and eclampsia. Anemia can also result from inadequate intake, but also parasitic infections and malaria. Anemia can exacerbate effects of hemorrhage and sepsis, leading directly to shock and cardiac arrest. Many of the deaths following cesarean sections can be attributed more to maternal illness and malnutrition than the surgery itself. Other health problems like hepatitis, heart disease, and HIV/AIDS are also common in women of childbearing age.
In addition to death, childbearing women experience more than 50 million maternal health problems annually, [9] and as many as 300 million women suffer from short or long-term illnesses and injuries related to pregnancy and childbirth, such as chronic pain, impaired mobility, damage to the reproductive system, and infertility.[10] Pregnancy and maternity cause the majority of disabilities in women of reproductive age in developing countries.

**Significance**

In addition to the tremendous loss of life among women at the peak of their productive lives, there are other social and economic consequences to maternal mortality. Maternal death is related to child death. As many as half of all motherless children under the age of five will die.[11] In addition, the same factors contributing to a woman’s death, such as poor nutrition, infection, and obstruction are the same factors leading to neonatal morbidity and mortality. It is estimated that nearly two-thirds of the 8 million infant deaths each year result largely from poor maternal health and hygiene, inadequate care, poor management of delivery, and lack of essential care of the newborn.[12] Improvements made in maternal health care will also support survivability for their children.

Family economic resources are also affected. At least a quarter of male-headed households rely on female earnings for more than half the total income. It estimated that women are sole earners in up to a third of all families below the poverty line. The household roles lost as a consequence create a large burden on the rest of the family.[13] Communities lose important resources and are stunted in their
development as a consequence of losing their members. Women are family stabilizers, educators of children, caretakers of young and old, laborers, and cultural keepers.

The state of maternal health represents the overall state of women’s rights in health, social, and economic realms. If indeed the causes of death can be addressed and mortality and morbidity can be prevented with appropriate care, then the fact that there have not been significant improvements is indicative of negligence on the part of those entities that do have power to implement changes. Any improvements in maternal mortality and morbidity will be associated with improvements in women’s status and the recognition of their rights to care and attention, and thus are indicators of social progress.
LITERATURE REVIEW AND BACKGROUND

While major improvements have been made in infant mortality and total fertility rates over the past few decades, this has not been the case for maternal mortality. Maternal mortality and morbidity began to receive more attention in the late 1980’s with the publication of an article by Maine and Rosenfield, “Where is the M in MCH [Mother-Child Health]?“[14] and the introduction of the Safe Motherhood Initiative in 1987. The International Conference on Safe Motherhood Conference (1987), the World Summit for Children (1990), the International Conference on Population and Development (1994), and the Fourth World Conference on Women (1995) all identified the goal of reducing maternal mortality by 50% by the year 2000. Needs for the monitoring and measuring of progress were also identified.

More recently, the United Nations at the Millennium Summit (2000) committed the international community to reducing the 1990 maternal mortality ratio levels by 75% by the year 2015.[15] Within the Latin American and Caribbean (LAC) region, the 26th Pan American Sanitary Conference adopted a medium-term goal for decreasing maternal mortality ratios to less than 100 maternal deaths per 100,000 live births. The Regional Interagency Coordinating Committee Task Force on Maternal Mortality uses this goal to diminish the gap at regional and national levels. [16]

While the increased attention has clarified which interventions are more effective than others and promoted critical assessments of strategies, the main
challenge remains the delivery of the interventions to those areas of greatest need. The difficulties in optimizing global and regional initiatives to create changes to save the lives of individual women affirm the complexity of the problem and demand the understanding of the determinants of deaths.

**Major Analytical Models**

A clear understanding of the relative contributions of the determinants of maternal mortality is required for effective interventions. There are two important models for examining maternal mortality. McCarthy and Maine present a general framework for analyzing maternal mortality and morbidity (shown in Appendix A) and describe the array of distant determinants, intermediate determinants, and outcomes.[17] Importantly, the framework illustrates the complexity of the problem and the required depth and breadth of points of intervention. This model is helpful in its comprehensiveness and specificity.

Barnes-Josiah et al. also present a way to regard the same issue by describing a model of three delays leading to maternal mortality: delay in deciding to seek appropriate medical help for obstetric emergencies, delay in reaching an appropriate obstetric facility, and delay in receiving adequate care when a facility is reached. [18] They focus on the country of Haiti, but the broad delays model is applicable in all regions of the world. The three delays model is helpful in permitting an easier examination of the chronological sequence of events leading up to the death of a woman. However, both models allow inclusion of the same determinants and serve as the main frameworks for this discussion.
Another model of relevance for maternal mortality is Becker’s Health Belief Model in Appendix B.[19] In many developing areas where there is limited access to scientific advances and technical resources, the guides for treatment are those of cultural traditions or severely outdated Western practices. However, the main variables and resulting perceptions of susceptibility, severity, benefits, and barriers follow the same general framework as many other health problems. Becker’s model is such an example to help understand the general factors related to maternal death; it is often used as a basis for developing public health interventions.

In approaching the causes of maternal death, the most basic levels of determinants must also be evaluated— the very first barriers: the status, power, and roles of women, underlying reproductive and health beliefs, awareness and understanding of obstetrical needs and danger, concept of accessibility to sources of help (time; distance; personal, family, and community wealth), conceived notions of available care, and traditional and cultural beliefs in modes of care.

Measurement

In addition to developing theoretical models for identifying the specific determinants of maternal deaths, it is also necessary to have accurate measurement tools. This has been impeded by the vast array of social, cultural, and economic factors influencing women’s health care and the lack of access to information related to women’s health care. In many areas of the developing world, women have little political or social power, and reproductive issues are not viewed as a priority for analysis.
However, now that the issue of maternal risk is considered more seriously, research and measurement are also receiving more attention. In order to accurately track current status and progress, better obstetric record keeping is being emphasized as well as the rigorous application of data for project development. Older methods of study include verbal autopsies (discussions with families about events before the deaths leading to a tentative cause of death) and clinical audits (record analyses), both of which are still used and combined for a systematic exploration of deaths.

G. Pison discusses diverse levels and methods of assessment in “Assessing maternal morality in developing countries.”[20] In some countries all deaths are registered but the cause of death remains unknown. Often, any indication of pregnancy status is unavailable. WHO (World Health Organization) applies a model integrating various characteristics such as life expectancy at birth, per capita GNP, average level of education, sanitary and medical context, fertility rates, etc. The number of maternal deaths is then obtained by applying the proportion generated by the model to the number of deaths of women of childbearing age provided by the country’s registration data.

Some countries that do not have reliable statistics on causes of death, such as China, India, Egypt and Tunisia, have implemented ad hoc surveys to assess maternal mortality. Other countries, which have neither complete vital registration nor reliable cause-of-death statistics, like Brazil or Côte d’Ivoire, have not yet carried out specific studies on maternal mortality.

Surveys of the general population in some countries have provided the
opportunity to ask questions related to maternal mortality. These were addressed to women and their sisters: How many sisters do they have? How many were born of the same mother? How old is each sister? If these sisters are deceased, at what age, since when, in what circumstances? In particular, was this death related to childbirth? Was the sister pregnant when she died, or had she given birth within the two months preceding her death? This “sisterhood method” was developed in the 1980s. By combining this information with the more classical information on births, it is possible to directly calculate the maternal mortality ratio for various periods preceding the survey.[21] Its weaknesses include the dependence on the memory of the respondents and the surveyors’ level of training.

A last group of countries identified by Pison, which includes Bangladesh and Burkina Faso, offers no source of information whatsoever. In this case, WHO estimates the proportion of maternal deaths among the total number of deaths of women of childbearing age by using the above-mentioned model, and applies the proportion to the mortality estimates established for these countries by the UN. The results are far from reliable, but the other estimates obtained by WHO are not certain either.

During the 1990s, new ways of measuring maternal mortality were developed that consider the needs and data constraints of developing countries. These systems use intermediary, process, or proxy variables that are closely correlated with maternal mortality, but are simpler to measure, easier and cheaper to collect, more sensitive to change, and therefore useful for regular and short-term
monitoring. In response to the International Conference on Population and Development (ICPD) conventions, the United Nations Children’s Fund (UNICEF), the World Health Organization (WHO), and the United Nations Population Fund (UNFPA) formed a task force that developed a series of process indicators on access, use, and availability of obstetric services, using data collected and analyzed at the health facility level. Appendix C provides examples of some of these indicators. Although these indicators are widely accepted, the sources of data and the information to calculate are not always available at the local level for program managers and health planners.

Evolving Strategies of Intervention

The advancement of more scientific and quantitative measurement methods has allowed the development of more evidence-based intervention strategies in mortality reduction. Strategies have shifted from the first paradigm that was based on prenatal care, risk assessment, and traditional birth attendant (TBA) training in the 1980s to a focus on the improvement of emergency obstetric services and access in the 1990s. Most recently (early 2000s), the incorporation of skilled birth attendants with the improvement of emergency obstetric care has been advocated.

Historically, maternal health programs concentrated on improving service and access to prenatal care and the training of traditional birth attendants. Major studies have shown that prenatal care does not prevent maternal death, although most agree that antenatal support provides valuable education, support, and nutrition supplementation and can monitor progress of gestation. The shift away from
labeling prenatal care as a method of maternal care helped to distinguish the differences between care of the fetus and preparation of the expectant mother.

Risk factor assessment as a component of antenatal care was found to have low predictive power for maternal complications, leading to unnecessary referrals and high costs; “low-risk” pregnancies were not guaranteed to be safe. The risk assessment approach included evaluation of a woman’s state of health (presence of comorbidities, nutritional status, and progression of gestation), age, and past pregnancy history resulting in a risk category designation for each pregnant woman.

There was also a re-evaluation of the professional caregiver system for home deliveries in developing areas. There is a continuum of possible attendants for a woman during birth based on training and skill. Besides a nonprofessional, such as a family member, the traditional birth attendant (TBA) has the least amount of formal training. For the most part, a TBA accumulates understanding and skills through experience and cultural tradition. An attendant with any amount or quality of additional formal training is considered a trained birth attendant. The skills of this broad category of people are highly variable and unstandardized; a traditional birth attendant with additional “formal” training can be considered a trained birth attendant. A higher level of birth attendants approaches that of, and can include, obstetric-trained physicians and nurses. These skilled birth attendants differ from trained birth attendants by their more rigorous and standardized training and their ability to recognize and deal with more complicated situations. Skilled birth attendants will be discussed later.
It was found that training TBAs had little correlation with reduction in deaths and morbidity. Barnes-Josiah et al.’s findings in Haiti supported the weaknesses of the traditional birth attendant system. The practices of TBAs are governed by complex series of cultural beliefs and vary with experience and training. While many may refer complicated cases to more modern sources of care, many TBAs perceive aggressive referrals as lack of self-confidence. They may feel their roles and livelihoods to be threatened and be conflicted about their participation in the larger network. Thus, they cannot necessarily be considered reliable and cohesive components in the sequence of effective care.

It was recognized that most maternal deaths are attributed to emergency causes that cannot be predicted. However, the recognition that most obstetric complications can be treated had profound implications for maternal mortality programs.[24] Thus, most experts in the field by the late 1980’s through the 1990’s agreed that improvements in resources for emergency care offered the greatest potential for reducing maternal deaths. Attention was focused on improving hospital facilities and increasing their accessibility. Community level interventions such as pooling of resources and creating cooperative emergency transportation systems were developed and implemented. Maternal waiting homes, where expectant women would stay just prior to delivery, were built near hospitals for “at-risk” women.

The types of obstetric care were stratified and prioritized. “Essential obstetric care,” (EOC) is comprised of surgical obstetrics (cesarean section, hysterectomy, laceration repair, etc.), anesthesia, blood replacement, management of
high risk pregnancies (anemia, hypertension, etc), medical treatment (oxytocics, antibiotics, sedatives, anticonvulsants), manual procedures (manual vacuum aspiration, vacuum extraction, manual removal of the placenta, removal of retained products of conception), monitoring of labor, and neonatal special care (thermal regulation, resuscitation, optimal breast feeding, eye and cord care). EOC also includes early detection and treatment to prevent progression of problems so they do not become emergencies.

Emergency obstetric care (EmOC) is a subset of EOC and responds to complications such as hemorrhage and obstructed labor; it does not include the management of problem pregnancies, monitoring of labor, or neonatal care. EmOC was initially promoted as the best combination of services.

Since maternal mortality is one of the few major public health problems for which medical treatment is the key [25], the more modern, Western approach of emergency care helped promote the use of obstetric medical interventions to prevent and reduce complications in developing areas. For example, the use of safer abortion alternatives such as misoprostol has already been helpful in many countries. Misoprostol is a prostaglandin that induces uterine contractions and is also given to help induce and manage labor. However, it can be costly and cause adverse effects on the fetus. Availability and use of magnesium sulfate for the management of eclampsia has also been increasing. Magnesium sulfate is a seizure prophylaxis that stabilizes cells and raises the seizure threshold.[26]

However, by 1999, it was apparent that some of the strategies focusing on
obstetric emergencies were not being used and interventions were too complicated to be feasible in the areas of greatest need [27]; the maternal waiting homes were found to have mixed efficacy and cost-benefit results because of the complexity of identifying “at-risk” women. The combination of emergency services was refined. “Basic EOC” includes all the elements of EOC except surgery, anesthesia, and blood replacement and can be provided at first level referral facilities, such as a health center, or maternity or basic hospital. Basic EOC was advocated as the most reasonable approach to meeting the most common needs.

There was subsequently increased inclusion of more fundamental, preventive approaches aimed at the community level in maternal mortality reduction planning: better care of emergencies is a must, but so is increasing age at first births, improvements in family planning, especially for adolescents, and addressing unsafe abortions. The role of quality skilled attendants at birth, either at home or in basic facilities, was more recently re-established as a key for long-term reduction of deaths. These approaches could be implemented in already established community health networks. They would create a solid basis for future progress without too many drastic proposals to communities that were not ready.

In addition, the neglect of postpartum care was recognized. Li et al.[28] discussed the importance of postpartum care in reducing deaths. In both developing countries and the U.S., greater than 60% of maternal deaths occurred in the postpartum period. Forty-five percent of postpartum deaths occurred within one day of delivery, greater than 65% within one week, and greater than 80% within two
weeks. Main causes cited were (developing countries/U.S.): hemorrhage 50.2%/25.7%, infection 29.9%/9.4%, pregnancy-induced hypertension 12.9%/27.9%, embolism 0.4%/31.8%, and cesarean section complications 1.3%/5.2%. The authors advocated diligence in primary prevention (during delivery or earlier), early detection (immediate postpartum period), and secondary prevention (close observation/treatment).

New developments in related concerns such as nutrition and domestic violence are being integrated into the care of mothers. For example Vitamin A and iron supplementation is increasing; reducing iron deficiency reduces maternal risk of dying from postpartum hemorrhage. Malaria prevention and treatment is also being recommended for anemia reduction, and strategies for maternal mortality reduction in Africa and Asia now require the consideration of HIV/AIDS.

Improvements in the general standard of services were addressed, as was the use of maternal mortality as an indicator for accessible and functional health services. For example, China, Sri Lanka, and Malaysia dramatically reduced maternal deaths after improving the coverage and quality of their health services, while in Zimbabwe, the deterioration of the general standard of health services has been associated with increased maternal deaths. These observations were important in showing that maternal death reduction is significantly impacted by broad-based approaches in general health care improvement; they provided more options in intervention approaches.

The question of funding intervention programs remains a constant in maternal
health. Goodbum and Campbell [29] discuss some of the main options for funding maternal health and strategies for mortality reduction: vertical maternal health projects, specifically focused designation of funds to one aspect of intervention; reproductive health programs; and sector-wide approaches. Of the three, the last is the one advocated as the most efficient and effective approach and is also supported by the World Bank. Vertical projects run the risk of being duplicative and are not as sustainable, while reproductive health programs often focus on family planning services rather than obstetric care.

Goodbum and Campbell point out that sector-wide approaches are more sustainable because they are able to tap into larger fund resources for general health service use. Health sector reforms inevitably have large implications for maternal mortality reduction and the sustainability of maternal care advances. However, they also point out that key activities that are essential to improving maternal mortality may not be covered by such broad approaches to funding. Such key activities include updating obstetric-specific protocols and curricula, training in specific skills, record keeping, and obstetric quality control measures.

In recent years, advocacy for reduction of maternal deaths has increasingly taken on a human rights perspective in order to place more pressure on governments.[30] This perspective has played a role in a wide range of women’s rights surrounding pregnancy, such as education, health and reproductive care access, abortion, and violence against women. Deaths during pregnancy have often been viewed as an inevitable risk of women’s utilitarian, child-bearing roles.[31] The low
social status of women in many countries limits their access to economic resources and education and their ability to make decisions related to their own health; the lack of access to obstetric services, lack of decision making power concerning child bearing, and excessive physical labor and poor nutrition contribute to maternal deaths.
Arguments centered on rights are framed around life, liberty and security of the person; the foundation of families and family life; health care and the benefits of scientific progress, including health information and education; and equality and nondiscrimination.[32]
CASE STUDY: HAITI

To illustrate the determinants of maternal mortality and provide an understanding of interventional approaches, a preliminary study of maternal risk and mortality performed in a small area of Haiti will be described. This study was conducted in the year 2000 with the Haitian Health Foundation (HHF), a community based health program. The objectives of the study were to determine the main causes of maternal deaths in the area served by HHF and to develop an understanding of the health beliefs of the people regarding pregnancy, childbearing, and modes of intervention for complications. Funding for the two-month study was provided through the University of Connecticut School of Medicine.

Country Background

Haiti is one of the least developed and poorest countries in the Western Hemisphere, sharing an island with the more developed Dominican Republic (see Appendix D). Haiti has a violent and turbulent history, which is outlined in Appendix E. The population is almost 8 million people, with a GDP per capita of about $230 US. The country is divided into nine districts; water supply and basic sanitation are deficient. Deforestation is a major ecological problem. The major trends in the economy include a steady decline in the actual GDP and a net rise in unemployment and population growth rate. Seventy percent of inhabitants live in rural areas. The main languages are French and Creole, with the latter being the everyday language. The literacy rate is about 45%. [33]

The life expectancy at birth is fifty-five. The infant mortality is 74 per 1,000
live births; mortality for children under age five is 131 per 1,000 live births; and the number of live births in 1999 was approximately 225,000. The maternal mortality for Haiti is estimated to be between 500 and 1,000 deaths per 100,000 live births (compared to 8 deaths in the United States). There is one physician for every 13,000 people and eight hospital beds for every ten thousand people.[34]

Since the 1980’s there have been attempts to decentralize Haiti’s health care through the development of health districts, however, the political troubles of the early 1990’s led to the disintegration of the public sector. This favored the non-profit private sector programs supported by the non-governmental organizations (NGOs), which increased aid during the period of the economic embargo. In 1994, the collaborative project for the creation of Communal Health Units was introduced; it sought to regroup and form tighter networks to ensure optimal provision of services. However, the tendency toward verticalism has impeded effectiveness.[35]

Between 50-60% of Haitian healthcare is provided by missionaries or other NGOs with services disproportionately located in Port-au-Prince. In a national survey, 64% of women reported at least one prenatal care visit during their last pregnancy, and only 15% delivered in medical facility, reflecting uneven access and limited use of existing care. The hospitals outside of Port au Prince provide limited obstetric care; in rural and semi-rural areas, prenatal care is performed by outreach teams or received from small clinics. Two national referral maternity hospitals are over-utilized while rural maternity beds are poorly utilized (probably due to low quality of care).[36]
Haiti has the widest spectrum of folk medicine practitioners in the Caribbean. There are five different types of folk healers: the houngan (voodoo priest), docteur-feuille (leaf doctor), occoucheuse (midwife), docteur zo (bonesetter) and docteur sangsure (bloodletter through worms). One person may be considered adept at more than one of the specialties. The voodoo priest, in addition to healing physical problems, also acts as a folk psychiatrist. The voodoo priest uses divination to find the nature of the illness, such as by reading cards; he or she may take a medical history, inquire of the condition, and touch the “patient,” and check the blood from the finger for any signs. The voodoo priest, in addition to relieving pain, can also inflict pain through hexes.

**Haitian Health Foundation**

The Haitian Health Foundation (HHF) is a U.S.-registered private voluntary organization founded in 1986 to “serve the poor in the isolated western portion of Haiti’s Department of the Grande Anse.” Its volunteer board of directors is based in the United States and oversees the distribution of funds. HHF’s activities began in 1987 and include facility-based services through its clinic and office complex in the town of Jeremie and primary health care outreach to village areas in the greater county of Jeremie.

The clinic’s services include medical and dental outpatient care, an ophthalmology center for examinations and eyewear, a pre-natal program, pharmacy, laboratory, and a radiology center with x-ray, EKG, and sonogram equipment. The primary health care outreach program includes 34 activities and serves a population
that has gradually expanded from 28,700 to 200,000. Project villages are selected for their commitment to implementing primary health care objectives and their remoteness from other health services; they are primarily in isolated, mountainous areas. The population served by HHF is poor and about 70% are non-literate. There is an emphasis on community participation and the sharing of knowledge and information to better the care and services provided and to improve health behaviors.

Health agents are trained by HHF to provide basic primary health care services and to report births, deaths, migrations and utilization of services. They are members of the villages they work for and live in the villages. Data collected are computerized in HHF’s custom-programmed Health Information Services (Health Track), which has been used since 1989.

Currently, the census has been completed for 150,000 people and there are primary health care activities in 93 villages with 40 health agents and 6 auxiliary nurse supervisors. There are 3000 members in the mother’s and father’s and youth groups. One hundred and seventy-five midwives are supervised. The primary health care field activities of HHF’s Child Survival Project for women and children include vaccinations, growth monitoring and counseling, perinatal care, breast feeding promotion, family planning, referrals, STD/HIV programs, deworming, nutrition, oral rehydration, infection control, and community meetings.

Other programs include a family assistance program, a latrine building project, a collaborative rural housing project with Rotary Clubs, a nutritional recuperation program providing educational and hunger relief to children with marasmus and
kwashiorkor, a nutritional supplementation program for pregnant and nursing mothers, specialized care from visiting professionals, clinical practicums for health professional students, individual sponsorship and coordination of travel for patients brought to the US for specialized medical treatment and surgery unavailable in Haiti, a goat project, various road and infrastructure projects, and an upcoming project to distribute indigo seeds and plants for farming.

With specific regard to maternal care, HHF provides women with access to prenatal care, as mentioned above, and in November 2002, opened Haiti’s first maternal waiting home near the government hospital based on a model developed in Cuba. Another arm of HHF’s maternal care is the midwives. The midwives are at the level of trained birth attendants but are not considered skilled birth attendants. Many claim to receive the calling and experience to be a midwife from God, while the role can also be passed on through family members or be given by dreams. There are few nurse-midwives, but they are staff members at the hospital.

HHF has trained midwives in techniques for delivering the baby in a clean manner, starting breastfeeding, and delivering the placenta (distinguishing them from untrained traditional birth attendants). The training received is mainly in aseptic techniques and the midwives go through the Ministry of Health’s 17-lesson program. They have training sessions once a month where they are taught and tested on various topics ranging from their roles in the community to basic reproductive biology and anatomy. Their midwifery kits, provided by HHF, are checked and restocked with supplies. They report details about any deliveries they may have
performed and are given a soda, crackers (or chewing tobacco), and thirty gourdes (US $1.50). The kits include a plastic sheet to lay on the floor, an apron for the midwife, soap and nail brush, a sterile kit with sterile gauze for the umbilical cord areas, a sterile single edge razor to cut the cord, and two pieces of string to tie the cord. There is also triple dye to dry the cord and tetracycline eye ointment for the newborn.

**Research Methods**

*Group Interviews*

In order to better understand the determinants related to maternal deaths, group interviews were conducted. Four Mothers’ Club groups were interviewed, representing villages of varying distances from the hospital. These interviews were coordinated with other HHF campaigns that traveled to the villages; health agents gave prior notice to the women about the group interviews. A group of HHF midwives and a group of HHF health care agents were also interviewed. The midwives represented various villages. Health care agents were interviewed as part of their monthly meeting. Initial questions were developed to encourage discussion. Interviews were conducted through an interpreter, usually one of the health care agents or a higher-level worker. Appendix F includes a descriptive table of the groups and the original lists of questions.

*Facility Visits*

An assessment of available maternal health services is crucial to the development of intervention approaches. Prenatal days at HHF and in the villages
were observed. Site visits to the hospital and a nearby Methodist clinic at Gebeau, which provides some health care, were also performed. Interviews with a hospital epidemiologist and the director of the hospital maternal services were contributory; official statistics were obtained from the hospital statistician.

**Surveys/Verbal Autopsies**

The method of verbal autopsies was chosen to investigate specific deaths. A rough survey was created prior to arrival to the site. HHF’s database system was used to identify women who had died between 1997 and 1999 who were of ages 15 through 49, the standard maternal, childbearing age. An EpiInfo template was created and the data for each case was entered.

Deaths which occurred during pregnancy, the day of a delivery, or up to 8 weeks after delivery according to the Full Data Report were marked for visits by nurses. The other deaths, in which the report did not indicate she was pregnant, were reserved for health care agent visits to clarify the cause of death; these visits were included for general inquiry into other types of death causes and possible and unreported pregnancy.

There was an initial total of 20 cases of deaths with recorded pregnancies (nurses) and 58 with no record of pregnancy (health care agents). Because there were two groups of women that were to be investigated, two slightly different survey questionnaires were constructed. Both included questions that confirmed information on the Full Data Report and more specific questions on obstetric and medical history. The forms for the nurses (for women in pregnant, labor, or
postpartum stage) asked questions on perceived risk and the role of the pregnancy in the death. The forms for the health agents asked whether the woman was pregnant and also questions about the woman’s own perceptions of health status. Both also asked the informants their perceptions on the woman’s health status, causes for the death, and what could have been done to prevent the death. (See Appendix F for questionnaires.)

The questionnaires were written in French but conducted in Creole by the health care agents and nurses. The initial emphasis on questions about perceived risk shifted to more diagnostic questions to clarify cause and circumstances surrounding the death, because perceived risk would have been difficult to ascertain from the informant for cultural and practical reasons. Cases related to pregnancy were assigned a code for cause of death based on the World Health Organization’s International Statistical Classification of Diseases and Health Problems (10th Revision).

Seventy-eight surveys were distributed to agents and nurses (recorded pregnancy= 20, no recorded pregnancy= 58). Seventy-five were returned. Of these, 65 were usable; the remaining 10 cases were eliminated due to errors (such as reporting or clerical errors in the initial database). Data was entered into EpiInfo and analyzed with SPSS. Of the 65 usable interviews, 14 were from the group originally with a recorded pregnancy and 51 were from the group without. Of the latter 51, three women were found to have been pregnant at the time of death. Of the former 14, one woman was not actually pregnant. In total, 16 women died during pregnancy
or soon after delivery. (See Appendix F for an outline.)

Results

Group Interviews

Mothers’ Clubs

Haitian women view themselves as having equal power in the home, and there is seemingly little difference between men and women in general health-seeking behavior. Yet, women can not or do not refuse intercourse with their husbands even though they may be in their fertile period and do not want to become pregnant. According to the women, it is God that decides and gives or does not give children. Preferred child spacing among the Haitian women ranged from two-and-a-half to five years. Women know of artificial options in family planning such as Norplant and Depo-Provera; however, many husbands are resistant, although reasons were not explained. In general, the Haitian women do “nothing” to keep from getting pregnant. At most, women are highly conscious of their fertile periods as noticed by characteristic vaginal discharge.

In order to understand delays in seeking care, the people’s own understanding of danger signs, preventive measures and risk factors, and the concept of “time to wait” was explored. Such health beliefs represent the level of understanding of medical problems and of their own risk. Women listed headaches, swelling of legs and feet, vomiting, and blood and water loss as problems and concerns that are common during pregnancy. Heaviness, difficulty in movement, dizziness, and fatigue were also listed. Women also mentioned anemia, cramps, and spitting up. Other specific
complaints were bloody vomit and frequent urination; acid reflux and upset stomach, painful urination, stars in the eyes, vaginal itching, sexually transmitted diseases, and appetite loss; fever, convulsions/ eclampsia, high blood pressure, toxemia, gas, and fainting; and difficulty breathing. There was no further distinction between normal pregnancy discomforts and dangerous warning signs. (Note: Clinical terms are those used by the interpreter during translation.)

Reported possible problems that could be encountered during the labor process were breech babies or cesarean sections, retained placenta, prolonged labor; transverse babies, weakness and backaches, and fistulas; vaginal tearing, hemorrhage, eclampsia, death; water loss and “small pelvis.” Problems and complaints after delivery included prolapsed uterus, contracted uterus, fever, afterpains, and death; hemorrhage, infection, and mastitis; cramping and eclampsia. Other problems associated with the infant were anemia and congenital defects (such as a split head); difficulty breastfeeding, neonatal tetanus, jaundice, and stillbirths.

In the remote village of Campagne, women attributed deaths to not following the doctor’s orders, having AIDS, and poisoning by voodoo or by the husband’s mistress. After 1986, when President Duvalier left the country and the witches of the village were killed, one elderly woman reported seeing fewer pregnancy-related problems. Bwadom participants listed more medical causes such as eclampsia, convulsions, hemorrhage, fever, infection, and poison as reasons for maternal deaths; they also mentioned transportation barriers. One man’s wife died because they could not travel to the hospital in the rain. Women in Carrfour Prince listed waiting too long
to go to the hospital, uterine rupture, and voodoo as reasons for death; many also admitted not knowing any reasons.

The majority of participants from the Women’s Club interview groups said women should go to the hospital to prevent death when problems arise; some said to go to the hospital at the expected delivery time to avoid complications. Predispositions to pregnancy problems included anemia and poor diet. Women listed listening to the doctor, going to prenatal care every month or at least three times, avoiding lifting heavy objects, eating a lot, eating yellow vegetables, taking vitamins and iron, and getting tetanus vaccination and laboratory tests as ways to avoid complications. They also mentioned family planning, personal hygiene, and staying calm during pregnancy.

In the Campagne group, five out of 41 (12%) had delivered at least once in the hospital. Thirteen women had delivered alone with no assistance and others used a voodoo priest or herbalist or midwife for their deliveries. The midwife usually instructs the woman when to go for additional help during labor. A woman usually goes to a herbalist/midwife with her problems then she may go to the hospital. However, prior to going to the hospital, the family often calls a voodoo priest who “opens a book, lights a light, and calls the spirit Erzulie.” The priest may massage the belly because someone is holding the baby inside.

In general, problems in labor are community crises, and anyone who can help is called. When asked about the decision point when it is evident that help outside the village is required, one woman said two to three days of pain; one trained male
midwife said twenty minutes of hard pushing. When asked if they liked the hospital, the women answered yes. When asked why they did not go, their reason was lack of money. Other considerations that prevented women from going to the hospital included no place to stay, distance, transportation, bad roads, laziness, confidence in own experience, husbands’ opposition (one woman’s husband blames the hospital for her stillbirths and prefers midwives), and too many household responsibilities. It was noted that a woman’s mother would not prevent her daughter from going to the hospital. Various situations were posed. With malposition women would go to the herbalist (midwives can also be herbalists); if a woman falls during pregnancy, she would go to the herbalist; if a woman has a vaginal infection, she would go to the herbalist; and if a woman feels hot in her belly, she would drink coconut milk and teas, sometimes prescribed by a herbalist.

Lack of money and place to stay were the predominant reasons in Bwadom for women not seeking hospital help even if they were referred by a health care worker from the local dispensary. (The dispensary itself is a two-hour walk from the village.) One-third of the women had delivered by themselves with no assistance. The point at which women decide to seek outside help was twelve hours to three days of labor. Many women resort to local teas and massage. When the midwife is making no progress, the family calls the voodoo priest. Either the voodoo priest or midwife refers women to the hospital, but it is often too late-- the woman is beyond help or is too weak to travel.

In Carrfour Prince, a village closer to Jeremie’s hospital, participants gave six
hours as the amount of hard labor before a woman should go to the hospital. Of the
18 women present in the group, ten (56%) had delivered at least once in a hospital,
for specific concerns. Overall, the women claimed that they preferred home delivery;
some said they go to Port-au-Prince around their expected delivery date for delivery
care. If they had concerns during their pregnancy they reported drinking teas
(“encouci gouave,” “majolan,” “bwapain”) and going to the herbalist. Some women
also made concoctions of nuts, raw eggs, or ginger to alleviate problem symptoms.
This village is known to be devout in Protestantism, thus it was not a surprise to hear
that voodoo priests were not used to a significant extent in the village; if they were, it
was not openly admitted. If a woman encountered a problem, she would go to the
herbalist or midwife and then usually to the hospital. As a last resort, some do use
the voodoo priest who prepares a bottle of a remedy. One reported that they had
had a very good midwife in the village who would tell the woman where she should
deliver; the midwife died, however, and now many women are deciding to go to the
hospital. Women listed lack of money, lack of shoes and transportation, and the need
to wait for the husband’s decision as barriers and sources of delay in going to the
hospital.

Women in Jeremie town gave reasons for not choosing hospital services that
were focused on comfort and psychological factors (however, lack of money still
remained as a major reason), instead of distance and transportation. They explained
that if a woman was used to having normal deliveries, she would have fewer worries
and be less inclined to seek extra help. Most women were more comfortable
delivering at home and found it difficult to prepare for a hospital stay (the women felt they needed certain things such as food, clothing, pillowcases, etc).

There were also certain expectations that differed from women from the villages-- if a woman had not sought prenatal care, she would feel embarrassed to go to the hospital. The women also felt embarrassed about other people watching the delivery; they expressed modesty about displaying their genital area. Many were uncomfortable or afraid of hospital instruments and apparatuses, such as stirrups, which are not comfortable; women who deliver at home use a wooden block ("choukette") as support. Half of the women had delivered by themselves at home with no attendant present. Others women would seek help from were the health agents, midwives, and herbalists; the latter two are sometimes also able to do repositioning of the fetus. If losing blood, women may also go to the herbalist and get something to stop the blood, such as a concoction of Argo starch, honey, and sugar, or other ingredients.

Voodoo plays a significant role in many aspects of Haitian culture, including health care, as evidenced by the unsolicited comments on their contributions in the villages. When asked specifically about its role in pregnancy, one woman said that no one but a real doctor should help. Some believed both the mother and child would die if a voodoo priest was used. However, others said that a voodoo priest can “tie” the baby into the uterus so it does not abort and can give magic for the baby. The voodoo priest can also give and take away voodoo poison if there are feelings of jealousy involved. Voodoo priests can also deliver infants and refer the woman to the
hospital. One woman was pregnant with twins but thought her difficulties with labor were because of a voodoo spell by her husband’s mistress. She went to the voodoo priest and was given medicine. The woman delivered and the children were healthy, but the voodoo priest also sent the woman to the hospital for follow-up.

When asked what a woman would do with an unwanted pregnancy, women listed various abortion methods such as eating leaves and drinking teas and Coca-Cola, making teas from unripened coconut, overdosing on chloroquine, Tylenol, or other drugs, getting a shot at the hospital, having a doctor perform a dilatation and curettage, and inserting objects into the vagina. Women also mixed unripe coconut water, clairin (cane alcohol), and an alkali pill; they also added that nurses also perform abortions at the woman’s home with catheters. Women in town also described a set of three pills that is sold for $50 that induces abortion. The women of Carrfour Prince indicated that although they would not abort an unwanted pregnancy because of their devoutness, they alluded to the fact that young women who do choose abortion use teas [“campeche” (logwood) leaves and “vetivert” root] and chloroquine. The women were familiar with several of the types of leaves for the abortions but said that the herbalists had more extensive knowledge.

In general, the major barriers to care appeared to be financial and logistical (distance, roads, and cost). There was also an estimation of personal risk based on perceived quality of care. There were reports of women coming back to their villages from larger towns and cities for family support during delivery. Families must balance time lost in domestic labor and childcare, costs of transportation, services,
meals, bribes and fees, and the emotional stresses of travel, with the dubious benefits of unproven care. Crucial decisions on expenditure of scarce resources were made under the influence of poverty.

Midwives

Midwives listed fever, vaginal discharge, pedal edema, and bleeding as potential problems during pregnancy. During labor, midwives listed stillbirths and transverse and breech babies, for which they said they would send the woman to the hospital. After delivery, some problems identified were hemorrhage, headaches, and fever. Other general problems included abuse during pregnancy and voodoo spells (*coute poude*). One midwife reported she does not see any problems during her deliveries.

The midwives also listed *coute poude*, along with anemia, as things that make a woman more susceptible to pregnancy problems. They also said they would prescribe therapies, such as tea, especially for *coute poude*, before suggesting the dispensary or hospital for the woman. One said that after nine hours of complications they would seek other help (the hospital); no other midwives suggested another time span. All the midwives present were herbalists also and one man was a voodoo priest. The midwives agreed that voodoo could help and usually suggest voodoo before the hospital if there was suspicion of *coute poude*. If a woman does not want the baby, the midwives say they try to discourage the woman from having an abortion but list teas and injections in the hospital as methods women use.

When midwives were asked about personal experiences with the hospital,
there were only positive responses. They listed continued education and health agent support as things that would help them become better midwives. They said that by teaching women self-care and encouraging women to utilize facilities and vaccines, women could decrease chances of pregnancy complications. Many midwives commented on the positive impact of education on women in self-care during pregnancy and breastfeeding.

*Health Care Agents*

Many health care agents believed that a major reason for pregnancy related complications is that the woman does not seek a physician’s help. There is often a delay in recognizing danger signs, and when they are recognized and a referral is made, many women do not follow the referral because of lack of money and distance to the referred facility. Fatal abortions were described as common; a woman who was pregnant by a man who was not her husband died from hemorrhage in an attempted abortion. One woman was deserted by her husband and died hemorrhaging from delivery complications. Some danger signs that were elicited from the agents were pedal edema, headaches, general edema, fever, blood loss, water loss, and hypertension.

The agents reported that women were afraid to go to the hospital because it is dirty, does not have a friendly atmosphere, and nurses yell at the patients. Also, agents said that women needed to make preparations to go to the hospital for which there was rarely the time. Women’s weakness during the pregnancy and labor process was another major barrier in traveling and hospital utilization.
Health care agents had difficulty suggesting roles that the government or hospital could play in reducing maternal mortality. Most agents felt there was neither political will nor any concern for the people by the government. There were few expectations since the government was not even supplying the basics in facilities and supplies. According to the agents, if a person did not have money, he or she was “treated like dirt” by government and hospital officials. Village-level staff listed the need for more supervised health agents and nurses and a better work structure for government health agents. One said the hospital should be given to the Cubans. (In recent years, Cuban medical and nursing personnel have been assigned to the St. Antoine government hospital in Jeremie to reduce the high doctor to patient ratio.)

The health care agents suggested more education about danger signs and increasing the support and encouragement to follow up on referrals as ways HHF can reduce maternal mortality. Youth education on sex and abortion was also suggested, along with encouragement of family planning. One agent suggested efforts directed at male youth; he noted that most men are not held accountable for pregnancies that result from their sexual relationships. Agents stressed inclusion of husbands and other family members in pregnancy related outreach. Also, ways to organize community monetary support for obstetric emergencies were desired. Some suggested expanding their prenatal care into other villages that lack health agents. They indicated that the HHF prenatal health posts have had a large impact on pregnancy awareness and introducing concepts of danger signs and risk factors. It is of note, however, that no agent mentioned the work of midwives.
Assessment of Maternal Services in Jeremie

The general theme of the group interviews was access to advanced health care facilities. Most participants stated that hospital intervention and following Western-based instruction were the best ways to prevent death, although they also included a significant amount of traditional resources. However, what motivated such a response supporting the benefit of hospital care is unclear, especially since many had not had any personal experiences with the hospital, and of those who had, many did not like it. The groups were self-selected and had at least some interest and awareness in maternal health. To understand the true health situation of a population, the advocated maternal services—the hospitals and other advanced health care resources, must be examined.

HHF

In addition to the previously described services provided by HHF, two days per week at HHF are primarily for prenatal visits (estimated 80 women per day). At the visit, individual information, such as pregnancy and medical history, are confirmed or gathered, and routine physicals are performed, along with group education and distribution of supplements. All services are ambulatory and no invasive procedures are performed.

Hospital

The only facility for inpatient care in the area is Jeremie’s St. Antoine hospital. It is government funded and supplies four basic services: internal medicine, obstetrics and gynecology, pediatrics, and surgery. Orthopedics is available.
sporadically. The hospital serves a population of 400,000 people. The original structures built in 1915 by Americans are still used for patient care (outpatient clinic as well as 38 beds at full capacity). The newer facilities contain about 80 beds and hold the administrative offices, laboratories, and operating facilities.

Despite adequate operating space, there was no anesthesia available at the time of visit because of lack of money; the dispensary also lacked essential pharmaceuticals. There were no gloves in stock; patients’ family members had to buy gloves in town. Neither were there sutures or syringes. A caesarian section, which would cost about US $15, is very difficult to perform due to lack of supplies; during the time of visit, all cesarean sections were being referred to Port-Au-Prince. Financial problems were attributed to an eleven-month delay in government allocation.

According to the director of maternal services, Dr. Robert Saliba, many women arrive at the hospital too late for adequate intervention. Uterine rupture is most commonly seen, leading to hemorrhage and death. The hospital also sees many cases of eclampsia and hypertensive problems, as well as sepsis and infection which often lead to death. Commenting on the general state of maternal care facilities in the area, Dr. Saliba concluded that prenatal care was adequately offered in multiple places, and the most serious weaknesses were in materials for essential and emergency obstetric care. This was despite adequate to over-staffing; at the time of visit, there were two obstetrician-gynecologists and two obstetric anesthesiologists. He also noted that, although a health center can refer a woman for obstetric care, the
woman might not follow the referral.

Despite immense frustration, informants noted some progress throughout the years. When asked about the major changes needed to improve maternal services and reduce maternal deaths, Dr. Saliba listed large education campaigns and better training, improvement in transportation, and more medical materials and medicine.

*Other Clinics*

In addition to the hospital and HHF, there are other clinics that serve the area. Of these, the one in Gebeau is one of the largest after HHF. Gebeau is a Methodist community that, in addition to providing health care, also runs agricultural projects. The clinic is outpatient and provides preventive and curative care, with special work in ophthalmology (some eye surgery is performed) and a reputation for tuberculosis treatment. There is a separate TB center next to the main clinic. Gebeau does not receive many prenatal visits from women since most women go to HHF; there is no specific prenatal day. A health care worker at Gebeau estimated that the clinic may see only 30 pregnant women per month. There was no full-time physician at the time of visit; the physician had recently been promoted to be director of the whole community, thus restricting his clinical time.

*Surveys/ Verbal Autopsies*

While the group and individual interviews provided a better understanding of the health practices of Haitians in pregnancy and childbearing, the verbal autopsies provided the quantitative information on the deaths of women of reproductive age who were pregnant (N=16) and not pregnant (N=48) during 1997-1999. The most
common ICD-10 classifications for causes of deaths given to the pregnancy related cases were sepsis, eclampsia, and hemorrhage. See Appendix G.

Women in both groups had a mean walking distance to the nearest hospital of 5.6 hours; to a clinic, it was 2.4 hours. The mean age of the women was 34 years. The majority of all the women (83%) died at home. The most commonly reported medical conditions of the women were tuberculosis (14%) and asthma (8%). Thirteen of the 14 women who were originally identified as pregnant were not concerned about the pregnancy, as reported by the informant, and 12 of the 16 women who were actually pregnant did seek prenatal care. All the women originally identified as pregnant had at least 2 tetanus shots, indicating regular health care visits (8/14 had all five tetanus shots). Out of the other group (no pregnancy originally recorded), 40 of 51 had a least one shot. The mean number of shots for all women was 3.3; 83% of all women had at least one shot.

About 48% of the informants believed that the woman was in excellent to good health; 42% believed she was in poor health, and the rest replied, “I don’t know.” Forty-nine percent of the informants believed that the woman was aware of her own health status (whether healthy or not); 22% believed that the woman was unaware, with the rest replying, “I don’t know.” Of the informants for the women originally identified as pregnant, most (13/14) did not know whether the woman herself was aware about potential complications concerning her pregnancy. Only four in this same group of informants believed that the pregnancy caused the woman’s death; all 3 of the informants in the cases that were later deemed pregnancy-
related (with no original record of pregnancy) believed that the pregnancy caused the death.

Almost 18% of the informants indicated that at least one child of the deceased mother had died after the death of the mother.
DISCUSSION

Review and Applications

The interviews with the Haitian women and health care providers and facility visits illustrate the determinants and delays that lead to death. Maternal deaths appear to be the result of a cyclical dilemma where the lack of access and absence of appropriate emergency care are confounded by lack of appreciation for the severity of conditions, prevalence of unattended home delivery, and reliance on traditional sources of care, such as voodoo.

There are also other considerations in the decision-making process, such as a woman’s sense of shame or fear related to the specific situation (such as with abortion complications), the husband’s authority, and family responsibilities. Satisfaction with outcomes and service affect utilization of advanced facilities, and there is a stark dichotomy between institutional and home cultures in care. The traditional beliefs about the etiology of illness and maternal complications clash with the institutional procedures specific to childbirth that women dislike and fear.[38]

The women in Haiti were able to list signs and symptoms in pregnancy, but knew little else to differentiate the normal ones from the potentially dangerous. Women must be educated not only to recognize crude signs and warnings of danger but also of their biological significance. By tailoring education to include an appropriate level of understanding, the time before seeking help will be reduced and potentially improve outcomes. More attention needs to be paid to danger signs during labor, during the postpartum, and for the neonate. There is a stark lack of
educational messages for these periods of time. The education of husbands and other family members is also important, since they often represent significant barriers to women seeking care or are the main decision-makers and action-takers when a woman is incapacitated by her condition.

Another barrier to seeking care is the lack of ancillary caregivers for women’s families. The development of a system of pooling community resources for emergencies is one solution. Women could share duties of another woman who has gone to the hospital or is bedridden; such support would relieve significant burdens and obstacles to seeking care. In countries like Haiti, rarely do families have savings for urgent situations. Communities could pool funds for support, not only for maternal related needs but any medical emergencies; the funds could be designed as loans for repayment to avoid corruption and abuse. Village committees could be appointed to ensure fund creation and proper allocation; these committees could be overseen by a larger organization, such as HHF. Since a major obstacle to seeking treatment is transportation through the mountainous terrain to distant facilities, vehicles for travel and road improvements are also essential and can be obtained and maintained through community-wide efforts and the solicitation of aid from outside sources. Emergency transport services could also be contracted with other villages.

It is sometimes incorrectly assumed that use of health center or hospital care will automatically prevent deaths. Although a woman’s chances of surviving certain conditions are usually higher in a health facility, that is not always the case if the resources are not all that different from home. The fact that Jeremie’s hospital lacked
basic materials and was not able to provide cesarean sections gave little incentive to surmount the barriers to get there. There should be a tangible benefit in seeking care if this is being advocated to prevent deaths—or else, the rhetoric of recognizing danger signs, referring, and community collaboration to improve access to facilities will be futile.

Improvements in advanced health facilities depend on structural and institutional changes, which require the prioritization of local and national governments to invest funds and effort in providing material goods, reorganizing policies and infrastructure, and properly training health workers both in medical and interpersonal skills. These changes also require the allocation of funding and support from outside sources, especially in those areas already dependent on non-governmental support, such as Haiti.

In countries like Haiti, with unstable political backgrounds and poor economies, the strength of health interventions should first be rooted at the community level. This might create the demand for the simultaneous improvement of advanced services. The results of the study in Haiti indicate success of village level education and involvement when services are made more easily accessible, for example, through health campaigns brought to the villages. There is usually not enough force to make progress through top-to-bottom, broad sweeping political efforts because of governmental inertia.

To create continuity between communities-level and advanced medical services, the barriers presented need to be eliminated. One way to accomplish this is
to implement a system of skilled birth attendants. The use of skilled birth attendants has become the current focus of intervention in many maternal mortality reduction campaigns.

**Skilled Birth Attendants**

Women have a spectrum of environments for delivery: delivery alone, delivery with an untrained person, delivery by one with brief training, delivery at home with a professional, delivery in a basic essential obstetric care facility with professionals, and delivery in a comprehensive essential obstetrics care facility with professionals. Of these, for women in Haiti and most other developing countries, delivering with a trained professional at home is the most realistic and safest alternative. Currently, based on the level of material sources for transportation and obstetrical care, and based on the habits and health beliefs of the women, a skilled birth attendant who is accessible and trusted by the community is the best link towards safer pregnancies and deliveries and better postpartum care.

Individuals from the communities with essential lifesaving skills and established trust can recognize and act quickly to prevent death. Such skilled birth attendants can provide immediate and effective medical interventions, offer effective referrals and access to appropriate facilities, and mobilize the support of community members to reduce mortality and morbidity. As physicians are not available in poorer and more rural areas, skilled birth attendants play a critical role in meeting needs, providing continuity, comprehensiveness, and sustainability.

Skilled attendants are nurses, midwives, and other health professionals who
have been specially trained in midwifery skills; obstetric-trained physicians are also considered skilled attendants. They are able to recognize complications during and after delivery and are able to treat or immediately refer women to facilities. They also provide education for the women and prenatal and postnatal care. They are distinguished from traditional birth attendants (TBAs) who are community members who deliver infants according to local customs and beliefs.

Although many TBAs (such as those working for HHF), have received training in safer birth practices (trained birth attendants), many still do not fulfill the requirements for management of normal pregnancies and births and for identification, management, and referral of complications. Their practices may still be conditioned by strong traditional and cultural norms (such as the Haitian midwives who are also herbalists and/or voodoo priests), which may render their involvement ineffective or even more harmful under the guise of additional training. In addition, without implementation of strict standards for skills and quality assurance and emergency back-up support, training TBAs does not decrease a woman’s chance of dying in childbirth. [39]

The use of skilled birth attendants addresses many of the barriers to preventing maternal deaths. Ideally they live in and are part of the community they serve and thus can interact with individuals and families with an understanding of the background health conditions, practices and beliefs. They are familiar with the nuances of the traditional health providers and alternative types of care and can form partnerships to work with them. The use of a skilled attendant is appealing, since
women without complications do not need to suffer from the inconveniences of going
to the hospital and leaving their homes, but are reassured by the presence of a more
knowledgeable and connected person who will not be hesitant about treating or
referring. The attendants, by virtue of their proximity, are also capable of prenatal
and postpartum care and monitoring. They are able to treat adequately or start
interventions before arrival at a more advanced facility, helping to reduce barriers of
distance and transport, providing more precious time for the women.

Many advocate that the most important way to reduce maternal deaths is to
ensure the presence of a skilled health professional at every birth. The proportion of
births attended by skilled personnel has become a marker of maternal and neonatal
mortality and the movement of services closer to the people.[40] In 1999, the United
Nations set skilled attendance at birth as a benchmark for the improvement of
maternal healthcare.[41]

In Africa, 43% of births are attended by a skilled attendant (42 neonatal
deaths per 1,000 live births); 52% of births in Asia are attended (neonatal mortality
rate of 34); 86% of births in Latin America and the Caribbean (neonatal mortality rate
of 17); and 99% in more developed countries are attended (neonatal mortality rate of
5).[42] About 53% of births in the developing world were attended by a skilled
attendant in 1996.[43] Most attendants with midwifery skills work in hospitals and
urban areas and are scarce in rural areas, where they are most needed and where 80%
of the developing countries' population live.[44] At least one skilled attendant for
every 200 births per year is recommended; some developing countries have one per
15,000 births. In areas where skilled attendants are not routinely available, the goal is to have skilled attendants at 90% of births by 2015.[45]

The use of properly equipped and supported skilled attendants has demonstrably led to reductions in maternal deaths. (See Appendix H.) Sweden’s maternal mortality decreased by more than half over less than twenty years as a result of a national policy favoring professional midwifery care for all births, coupled with established standards of care. Other similar results have occurred in Denmark, Japan, Netherlands, and Norway. The United States still had high mortality rates compared to European counterparts in the early 1900’s when strategies focused on hospital deliveries—it was difficult to establish adequate regulatory frameworks and mechanisms to ensure quality of care. More recently, Sri Lanka experienced significant reductions of deaths, from 1500 per 100,000 live births to 30 in fifty years due to the introduction of a system of hospitals, clinics, nurse-midwives, and the encouragement of family planning. By the end of the 1980’s over 85% of all births were attended by trained personnel. Maternal mortality reductions have also occurred in China, Cuba, and Malaysia with the implementation of community-based maternal health care systems and improved systems of referral.[46]

Specifically, skilled birth attendants have the potential to implement measures to prevent deaths and complications. Properly trained and adequately equipped, they can provide such services even at the woman’s home or the local health center. According to Dr. Peter Schnatz, of Hartford Hospital Obstetrics and Gynecology, via e-mail communication (1/20/2003): “Although little can be done with a non-delivered
woman who is bleeding, as it is possible that the woman has an abruption, placenta previa, or vasa previa and needs more advanced care, women who have delivered can be given oxytocin and/or methylergonovine (uterotonics) to prevent hemorrhage. Uterine massage, dilation and curettage, and uterine packing can also be done in the field. Such simple care can provide time to reach a facility for transfusions or surgery. Attendants will also be trained in clean deliveries, the recognition and treatment of STDs (sexually transmitted diseases) and urinary tract infections and be able to give postpartum care, including laceration care and antibiotics, to prevent infection and sepsis.

In many places, skilled birth attendants could be trained in intravenous therapy. “The skill in placing IV catheters and setting up IV bags and medications would be lifesaving measures for the treatment of sepsis in providing fluids and antibiotics. IV interventions also include magnesium sulfate and antihypertensives in the treatment of pre-eclampsia and benzodiazepines and other anti-seizure medications for eclampsia. Obstructed labor would be difficult to treat in the field and would likely need operative delivery,” according to Dr. Schnatz (e-mail communication, 1/20/2003).

Essential to personal attention during birth is the adequacy of drugs and supplies to the skilled attendants to provide good quality care and the appropriate supervision. Health care posts should be supplied with basic intervention supplies such as IV fluid therapies, antibiotics, anticonvulsants, and pro- or anti- uterine-stimulants. An emergency transport system must be in place and hospitals and other
health centers still need to be prepared for patients with high quality services available.

Currently existing health workers lack the skills needed to save the lives of women who experience emergency complications such as shock, hemorrhage, sepsis, eclampsia, and abortion complications; curricula used to teach midwifery skills are often out of date, while many are also adapted from developed country models and do not reflect the limited resources of poorer conditions. Supervision and refresher training in family planning and maternal health are often inadequate and many midwives and physicians have no training in traditional belief systems, communication, and community organizing, which are necessary for acceptance into the community to be served. [47]

The major initial step towards increased involvement of skilled attendants is to increase their number, especially in under-served areas and to train, authorize, and equip the midwives, nurses, and community physicians to provide obstetric services, especially emergency services. Individuals can be recruited from health care agents, nurses, or community members with interest and recognized potential. Systems need to be established for training and linking them with higher levels of support for referral and advanced treatment in addition to training and legislating their ability to carry out procedures. They must also be adequately compensated to encourage them to remain in their communities with advanced skills.

Clearly defined protocols need to be created for routine care and management of complications. [48] The economics must also be addressed; women should not
have to consider financial barriers in the use of an attendant; women and communities must also be educated about the services and benefits of having the presence of a skilled birth attendant. Again, most importantly, the proper facilities to which the attendants refer must be in place—there must be places prepared for further monitoring, treatment, transfusion and surgical procedures.

The presence of skilled attendants, in addition to promoting prenatal, postnatal, and postpartum care, also promotes the importance of women’s health and the ability to coordinate other community health care workers in the prevention, detection and treatment of sexually transmitted diseases, other infectious diseases such as tetanus and tuberculosis, and other conditions prevalent in child bearing women. Such sector-wide approaches can create long standing changes in the improvement of issues such as nutrition of girls and women and the promotion of family planning and reproductive health awareness.

With the presence of an already trusted network of health care representatives and prenatal programs, established health care organizations should consider adding this group of skilled workers that maintain continuity and a higher level of care in individual communities. With organizations that already are utilized by the people, support and trust in skilled attendants will be easier to establish. Skilled attendants can approach the main causes of mortality and allow more time to overcome decision and travel barriers if further hospital care is required.

However, implementation of skilled attendants requires funds, training programs, the support of communities, and the establishment of incentives for the
skilled workers to remain in the areas designated for service. This is not an easy task for organizations at the local level. In the countries where skilled birth attendants have proven themselves, it was the prioritization and influence of larger powers such as the national governments or international health organizations that helped make them successful. Thus, while the intervention works at the micro level, it requires the support of those able to generate the resources and efforts; it also requires the incorporation of experiences from other countries.

**Conclusion**

The Health Belief Model describes the types of factors that influence people’s health care practices all over the world. McCarthy and Maine and Barnes-Josiah et al.’s models are more specific to developing countries and identify the elements leading to higher risk of death and disability in pregnancy. The issue of maternal mortality is complex since the problem is rooted in biology and medicine, culture and tradition, and politics and economics.

What is evident from the review of strategies and the results of the study in Haiti is that maternal mortality requires intervention at multiple levels. Maternal mortality reduction requires long-term commitment by those who can share their diverse strengths: government, nongovernmental organizations, including women’s groups, international assistance agencies, donors, academic institutions, and others. Networks of inter-agency resources can provide critical links in the chain of care, and even with limited resources, the strengths of communities and health care groups can be tailored to optimize effectiveness. The involvement of families and communities is
crucial to the success of any intervention attempt.

The factors that influence a woman’s decision must be understood, such as material resources and practicality, power relations, responsibilities and pressures applied on the woman to seek or not seek care, cultural factors, and perceptions of health service options. Designers of intervention programs need to critically examine these issues.

In many situations, women’s status proves to be a limiting factor in access to care. The decision for the woman may be made by another, for there is often need for permission to travel from the husband or concern about household duties. More often, the woman’s own experience and confidence, or the experience of others present, prove to be confounders in the timeline of seeking care. Women should know the difference between normal and abnormal complaints of pregnancy, as well as which health providers, from the traditional healers to the modern, to seek for which types of care.

Again, it is the emergency and unexpected complications that cause the majority of deaths and morbidities; the majority of “high-risk” women deliver without complications and most women with complications belong to “low risk” groups.[49] Abortion practices are also significant in mortality and should be addressed through policy changes and community education that eliminate the stigma of abortion and the inclusion of abortion and post-abortion care facilities in the push for better maternal care facilities.

Targeted, evidence-based interventions, such as the provision of essential
obstetric care (EOC), pregnancy health promotion, skilled attendance at birth, and community action to avoid obstetric complications, identify problems early, and respond adequately should be the main strategies. Community resources, such as transportation, money, and family care, should be pooled to make seeking care easier for women. Collaborative efforts should be made to clarify roles and educate midwives, traditional healers, and other caregivers at their own levels and with respect for their own importance. Skilled birth attendants should be seen as effective players in death and morbidity reduction. In addition, educational resources should be made available and accessible to educate community members on health and medical issues related to pregnancy and childbearing. Even simple provisions, such as giving home delivery kits to women at prenatal visits, could prevent some complications.

There must be changes in legislation and policy in order to ensure proper care and access for maternal health care and abortion services. National and local efforts must be directed toward improving data collection and recording systems for all health measures related to pregnancy, the postpartum period, and family planning by expanding the registry, collection, and use of information at all levels. National epidemiological surveillance systems on women of childbearing age should be established to collect data on causes and social determinants of maternal deaths. Maternal mortality reduction committees at the regional, national, and local levels should also be developed and held accountable for their work and level of advocacy. Some countries have set up such epidemiological surveillance systems and
monitoring committees; these could be evaluated for their use as models for other countries.[50]

Broader-based approaches are also important in the overall improvement of services for women of reproductive age. Very effective approaches would be in family planning, health and sex education for adolescents and children, weakening of social barriers to access (status and power of women and poor), regulation and standardization of medical practices, studies in utilization patterns, and decentralization of services. In addition, general health facility improvements, personnel training, and persistent petitioning to governments and agencies for improvements in overall health care would all contribute to the goal of maternal mortality reduction in the long term.

Comorbidities need to be addressed as significant factors in the progression to death. The inclusion of pregnancy complications and maternal deaths can help drive the urgency of addressing such conditions such as HIV, STDs, tuberculosis, malaria and other infectious diseases, heart and kidney disease, and asthma. Nutrition can be reinforced by education and supplementation in childhood and adolescence. The cause for maternal mortality reduction can conversely benefit from these other well-established issues for advocacy.

The large, umbrella issues of global rights for women and health care access give durability and potency to the specific cause for reduction of deaths related to pregnancy. Many advocate shifting the emphasis from individualized vertical interventions for maternal mortality to a more holistic and integrated life cycle
approach giving focused attention to reproductive health care. Although this approach can offer sustainability and broad-based support for maternal mortality reduction, it does not provide specific recognition. There are many important intervention measures specific to maternal complication reduction that would be neglected if maternal mortality was subsumed under another cause.

As discussed, skilled birth attendants can be helpful in tying together the targeted and the broad-based approaches. Skilled care during childbirth can be a highly resource-effective, sustainable strategy with respect to the reality of many developing countries. The effectiveness of skilled birth attendants has been demonstrated. They can be a worthwhile investment in resource-limited areas, but many things need to be in place for the creation of a strong and stable base for this intervention.

The task of reducing maternal deaths grapples with a multitude of challenges from the sociological to the economical, political, logistical, and medical. Despite increased recognition of the issue after a history of neglect, the significance of the issue continues to be under-appreciated. The success of many actions requires the change of seemingly intractable conditions. However, progress has been made since the first interventions and more ideas are continually being evaluated, refined, and implemented. As with most public health problems, maternal mortality continues to be needlessly high because of poverty, lack of technology, and ineffective and/or corrupt governments. Continued work, persistence, and advocacy are required to effect change and improve outcomes for women and their families.
APPENDICES AND REFERENCES
APPENDIX A: A DETAILED FRAMEWORK FOR ANALYZING THE DETERMINANTS OF MATERNAL MORTALITY AND MORBIDITY [51]

Distant Determinants

Women’s Status
- Education
- Occupation
- Income
- Social/Legal Autonomy

Family’s Status
- Income
- Land
- Education of others
- Occupation of others

Community’s Status
- Aggregate wealth
- Community resources

Intermediate Determinants

Health Status
- Nutrition
- Infections
- Other chronic conditions
- Prior pregnancy
- Complications

Reproductive Status
- Age
- Parity
- Marital status

Access to health services
- Location of services
  - Family planning
  - Prenatal care
  - Other primary care
  - Emergency OB care
- Range of services
- Quality of care
- Access to info about services

Health care behavior/use of services
- Use of family planning
  - Prenatal care
  - Modern OB care
  - Harmful traditional practices
  - Illicit induced abortion

Outcomes

Pregnancy

Complications
- Hemorrhage
- Infection
- Preg ind HTN
- Obstruction
- Ruptured Uterus

Death and disability

Unknown or unpredicted factors
APPENDIX B: THE HEALTH BELIEF MODEL [52]

Demographic Variables
(Age, sex, race, ethnicity, etc.)

Sociopsychological variables
(Personality, social class, peer and reference group pressure, etc.)

Structural Variables
(Knowledge about the disease, prior contact with the disease, etc.)

Perceived Susceptibility to Disease “X”
Perceived Seriousness (Severity) of Disease “X”

Perceived Threat of Disease “X”

Likelihood of Taking Recommended Preventative Health Action

Perceived benefits of preventive action
minus
Perceived barriers to preventive action

Cues to Action
Mass Media Campaigns
Advice from Others
Reminder postcard from physician or dentist
Illness of family member or friend
Newspaper or magazine article
### APPENDIX C:
EXAMPLES OF INDICATORS FOR THE ACCESS, USE, AND AVAILABILITY OF OBSTETRIC SERVICES [53]

<table>
<thead>
<tr>
<th>Maternal Health Indicator</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maternal Morality Ratio</td>
<td>Measures progress in providing maternal health care</td>
</tr>
<tr>
<td><strong>Coverage and Access</strong></td>
<td></td>
</tr>
<tr>
<td># of Service Delivery Points (SDPs) per 500,000 population providing basic EOC</td>
<td>Measures access to basic EOC</td>
</tr>
<tr>
<td>% of SDPs able to provide basic EOC</td>
<td>Measures availability of basic EOC</td>
</tr>
<tr>
<td>% of first-level referral hospitals that have provided caesarean sections in the past 6 months</td>
<td>Measures availability of comprehensive obstetric services</td>
</tr>
<tr>
<td>% of pregnant women attended at least once during pregnancy for reasons related to pregnancy</td>
<td>Measures coverage of antenatal Care</td>
</tr>
<tr>
<td>% of deliveries in health institutions</td>
<td>Measures coverage of safe delivery</td>
</tr>
<tr>
<td>% of births attended by health personnel trained in midwifery (excluding TBAs)</td>
<td>Measures access to and utilization of skilled delivery care</td>
</tr>
<tr>
<td><strong>Quality of Care</strong></td>
<td></td>
</tr>
<tr>
<td>% of pregnant women attending antenatal clinics screened for syphilis</td>
<td>Measures quality of maternal health care</td>
</tr>
<tr>
<td>% of institutional deliveries that are by caesarean section</td>
<td>Measures coverage and quality of comprehensive EOC</td>
</tr>
<tr>
<td>% of pregnant women attending antenatal services who took iron and/or folate</td>
<td>Measures quality of antenatal care</td>
</tr>
<tr>
<td>% of pregnant women attending antenatal services who were immunized against tetanus (TT2 or booster)</td>
<td>Measures quality of antenatal care</td>
</tr>
</tbody>
</table>
December 5, 1492: Columbus discovers Haiti (the island of Hispaniola).

1697: The Spaniards cede the western third of Hispaniola to the French crown at the Treaty of Ryswick. Haiti is now called "Saint Domingue".

1697-1791: Saint Domingue becomes the richest colony in the world. Its capital, Cap Français, is known as the Paris of the New World. It is also a regime of extraordinary cruelty; the 500,000 slaves taken by the French are flogged, starved, and buried alive for minor offenses.

August 1791: the first major black rebellion takes place, initiated by Boukman, a voodoo houngan. This begins the markings of civil war between the black dominated north and the mulatto dominated south.

1796: Toussaint L'Ouverture, an educated herb doctor and military man, emerges as the leader of the former slaves in the north. He restored order, ended the massacres, and restored some of Saint Domingue's former prosperity.

1801: Napoleon Bonaparte dispatches an army of 34,000 to try to subdue the slave armies and retake the colony for France; this mission was unsuccessful. The leader of the army Leclerc ultimately had Toussaint L'Ouverture seized and deported to France. He died within a year.

May 1802: Convention in Paris reintroduces slavery, which brings on more rebellions and massacres.

January 1804: Jean Jacques Dessalines proclaimed the independent black Republic of Haiti in the northern half of the island. Dessalines was unpopular with the mulattos and was assassinated in 1806. His death led to civil war again between the south (under General Petion) and the north (under Henry Christophe).

1820: Henry Christophe commits suicide by shooting himself with a silver bullet; he had been a tyrannical ruler, crowning himself "king", and building a palace and citadel (at Cap Haitien in the north) at great cost to Haitian lives. At his death Haiti was taken over by General Boyer, and civil war ceased. Boyer obtained official Haitian independence from France at the price of 150 million French francs.

1843 to 1915: Haiti sees 22 heads of state, most of who leave office by violent means. Rivalry continues among the whites, the mulatto elite, and the blacks.

1915: President Guillaume Sam is dismembered and the Americans invade the country. They remain for 19 years. Despite improvements made to the infrastructure by the Americans, the Haitians opposed their presence.

1934: The Americans leave Haiti, which is now prospering once again.

1957: François Duvalier, a doctor and union leader, was elected president. Duvalier, also known as 'Papa Doc', terrorized the country, rooting out any and all opponents to his administration. He was a practicing vodunist, his loa being Baron Samedi, the guardian of cemeteries and a harbinger of death. He ensured his power through his private militia, the tontons macoutes (which means in kreyol, "uncle boogeyman").

1964: Duvalier changes the constitution so that he can be elected president for life.

1971: François Duvalier dies and is succeeded by his son Jean Claude, age 19 (also known as 'Baby Doc'). By this time Haiti is the poorest country in the western hemisphere (and remains so to this day).

February 1986: The Duvalier regime collapses under Operation Deschoukay and Baby Doc flees to France.

December 1990: Jean-Bertrand Aristide (a religious priest) is elected in a landslide victory. Military coup deposes Aristide's government; Organization of American states imposes an embargo lasting three years.

1994: Aristide returns to Haiti to serve out his term of office, facilitated by the US military and UN troops.

December, 1995: René Préval elected in a landslide victory.

2000: Aristide re-elected to be current president.
APPENDIX F: METHODS OUTLINE

GROUP INTERVIEWS

<table>
<thead>
<tr>
<th>Mothers’ Club Village</th>
<th>Distance from HHF</th>
<th>Composition</th>
<th>Ave age (range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bwadom</td>
<td>2 h drive</td>
<td>70 Women*</td>
<td>39 years (16-67)</td>
</tr>
<tr>
<td>Campagne</td>
<td>1.5 h drive</td>
<td>41 W*</td>
<td>35 (19-50)</td>
</tr>
<tr>
<td>Carrfour Prince</td>
<td>1 h drive</td>
<td>18 W</td>
<td>37 (19-48)</td>
</tr>
<tr>
<td>Jeremie</td>
<td>(Central town)</td>
<td>25 W</td>
<td>35 (19-50)</td>
</tr>
</tbody>
</table>

Midwives

HHF Health Agents

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>8W; 7Men</td>
<td></td>
<td>59 (45-74)</td>
</tr>
<tr>
<td></td>
<td>5W; 20M</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Several men were also present. They were midwives, husbands of deceased women, or interested observers.

GROUP INTERVIEW QUESTIONS

Mothers’ Group Questions

1. What are some common problems pregnant women face during pregnancy? During labor? After delivery?

2. Have any women you have known died from pregnancy complications?

3. What do you think are some reasons why a woman would die from a pregnancy?

4. Do you think most complications are preventable?

5. Do you think most deaths are preventable?

6. What can be done to prevent complications and death?

7. What can a woman do to prevent complications during her own pregnancy?

8. If a woman was worried that she may have complications what would she do? Where would she go?

9. What are some signs that a woman may have complications?

10. What do you think predisposes a woman to have complications? (What kind of conditions would make it easier for a woman to have problems?)

11. What are some traditional treatments used when a woman has problems with her pregnancy?

12. Do you feel comfortable going to clinics and hospitals?

13. How does a woman determine if, when, where to go for help?

14. What are some reasons a woman might not seek help?

15. Who do you go to? Who is the best to help a woman in labor?

16. Do voodoo priests have a role?

17. If a woman does not want a baby, what, have you heard, is done?
18. What are your opinions on the status of women?
19. Did any of you lose a baby that died within three days after delivery?
20. How is the decision to have children made?
21. What is the time interval preferred between children?
22. Would you like to have a child within the next two years?
23. If no, how do you prevent pregnancy?

**Midwife Group Questions**

1. How does a person become a midwife?
2. What changes have you seen in your profession over the years?
3. What kind of problems would a woman have during her pregnancy, during labor, and after delivery?
4. Why do you think a woman may die from a pregnancy?
5. What do you do when a woman is having difficulties during labor? Do you send for help? Do you tell the woman to go somewhere?
6. What period of time would pass before you think there is a serious problem?
7. Are you a herbalist? Describe how being a herbalist helps in midwifery.
8. How does voodoo help?
9. Tell me about your experiences with the hospital.
10. What would help you be a better midwife?
11. What can a woman do to prevent problems related to pregnancy?

**Health Agent Group Questions**

1. What was your opinion of the surveys?
2. Why do you think women die of childbearing causes?
3. What kind of things can help reduce maternal mortality?
4. Specific interventions?
5. What do you think of the hospital?
SURVEYS/VERBAL AUTOPSIES

1997-1999 Deaths of Maternal Aged Women (15-49 years)

20 women with record of pregnant status or 6-8 wks post delivery at death—for Nurses

78 surveys distributed

75 surveys complete and returned

14 Nurse surveys

1 actually not pregnant

16 deaths around pregnancy

51 Health Agent surveys

65 usable

3 actually pregnant at death

8 deaths with no record of pregnancy—for Health

10 discarded due to error
QUESTIONNAIRES

HHF Questionnaire des Mortalités des Femmes: Juillet 2000
Forme pour les agents de santé (HEALTH AGENT QUESTIONNAIRE)

1. Identification de la personne décédée: Nom ____________________________, Prenom
   Age ________ Village ________________________ # HHF ____________________________
   Record ID ____________________________ Date du décès ____________________________
   Statut matrimonial de la personne décédée: mariée placée concubinage divorcée célibataire
   Religion: ____________________________ Langue parlée: ____________________________

   Savoir lire: Oui Non Savoir écrire: Oui Non
2. Distance à pied pour aller à l'hôpital: __________ pour arriver au dispensaire le plus proche
3. Quantité de personnes vivant dans cette maison ____________
4. Caractéristiques de la maison avant la mort de la personne:
   Chambre: 1 2 3 4+ Toit: Paille Tole Beton Sol: Terre battue Ciment
   Mosaique
   Radio: Oui Non Latrine: Oui Non
   Apprèvisionnement en eau: ____________________________
5. Identification de la personne interrogée: Nom ____________________________, Prenom
   Age ________ Affiliation avec la personne décédée: ____________________________
6. Antécédents obstétriques:
   Gestations ________ Avortements (à 1-3 mois) ________ Fausses couches (à 4-6 mois) ________
   Accouchements ________ Cesariennes ________ Enfants vivants ________
   Obites (à 7-9 mois) ________ Enfants décédés ________: age pour chaque décès
7. Date de naissance du dernier enfant avant la mort: ____________
8. Est-ce que la mère et l'enfant sont morts en même temps? Oui Non
9. Antécédents personnel de la personne décédée-- Était-elle une femme à risque:
   autrècribe Cesarienne TB asthmatique hypertendue diabétique
   Autre à préciser:
10. Lieux des accouchements: hôpital dispensaire domicile dans la rue au marché Lieu de la mort: ____________
11. Combien d'enfants qui sont mort après le mort de la mère? ____________
12. Était-elle enceinte pendant les cinq dernières années avant sa mort? Oui Non
13. Est-ce que la femme était enceinte pendant qu'elle était morte? Oui Non
   Est-ce qu'elle était en "perdition"? Oui Non
14. Est-ce qu'elle était morte au moins 42 jours après son accouchement? Oui Non
15. Est-ce qu'elle était morte à cause de sa grossesse? Oui Non
16. Qu'est-ce que tu penses de la santé de cette dame?
   1 Convenable 2 Tres bonne 3 Bonne 4 N'est pas en bonne santé 9 Je ne sais pas
17. Combien est-ce que tu penses que cette dame était au courant de sa santé?
   1 Avisé 2 3 4 N'est pas au courant 9 Je ne sais pas
18. Est-ce qu'elle faisait partie du groupe de mère? Oui Non
19. Description de la mort (détails sur les circonstances de la mort):
   Signes et symptômes:
20. Est-ce qu'elle était allée au dispensaire ou l'hôpital? Oui Non
   Si c'est oui: lieu
21. Combien de temps elle a passé avec cette maladie avant d'être succombée?
22. Qu'est-ce que tu penses de sa mort? (La cause?)
23. Qu'est-ce qu'on devait faire pour prévenir sa mort?
HHF Questionnaire de Mortalité Maternelle : Juillet 2000
Forme pour les infirmières (NURSE QUESTIONNAIRE)

1. Identification de la personne décédée: Nom ____________________________, Prenom
   Age ________ Village ____________________________ # HHF__________________________
   Record ID__________________________ Date du décès __________________________
   Statut matrimonial de la personne décédée: mariée placée concubinage divorcée célibataire
   Religion: ____________________________ Langue parlée:
   Savoir lire: Oui Non Savoir écrire: Oui Non

2. Distance à pied pour aller à l'hôpital: ________ pour arriver au dispensaire le plus proche

3. Quantité de personnes vivant dans cette maison ____________________________

4. Caractéristiques de la maison avant la mort de la personne:
   Chambre: 1 2 3 4+ Toit: Paille Tôle Béton Sol: Terre battue Ciment Mosaicque
   Radio: Oui Non Latrine: Oui Non
   Approvisionnement en eau: ____________________________

5. Identification de la personne interrogée: Nom ____________________________, Prenom
   Age ________ Affiliation avec la personne décédée: ____________________________

6. Antécédents obstétriques:
   Gestations ________ Avortements (à 1-3 mois) ________ Fausses couches (à 4-6 mois)
   Accouchements ________ Cesariennes ________ Enfants vivants ________
   Obites (à 7-9 mois) ________ Enfants décédés ________; âge pour chaque décès ________

7. Date de naissance du dernier enfant avant la mort: ____________________________

8. Est-ce que la mère et l'enfant sont morts en même temps? Oui Non

9. Antécédents personnels de la personne décédée-- Était-elle une femme à risque:
   courte Cesarienne TB asthmatique hypertendue diabétique
   Autre à préciser: ____________________________

10. Lieux des accouchements: hôpital dispensaire domicile dans la rue au marché
    Lieu de la mort: ____________________________

11. Combien d'enfants qui sont mort après le mort de la mère? ________

12. Était-elle enceinte pendant les cinq dernières années avant sa mort? Oui Non

13. Pense-tu que sa mort était survenue à cause de sa grossesse? Oui Non

14. Est-ce qu'elle était inquiète pour sa grossesse? Oui Non
    Si oui, quelle a été son inquiétude?

15. Est-ce qu'elle a été au courant des complications de sa grossesse?
    1 2 3 4 Tres conséquente 9 Je ne sais pas

16. Qu'est-ce que tu penses de la santé de cette dame?
    1 Convenable 2 Tres bonne 3 Bonne 4 N'est pas en bonne santé 9 Je ne sais pas

17. Combien est-ce que tu penses que cette dame était au courant de sa santé?
    1 Avisé 2 3 4 N'est pas au courant 9 Je ne sais pas

18. Est-ce qu'elle faisait partie du groupe de mère? Oui Non

19. Description de la mort (détails sur les circonstances de la mort):
    Signes et symptômes:
    Grosseur suivie? Oui Non
    Si c'est oui: lieu ________ par qui ____________________________

20. Combien de temps elle a passé avec cette maladie avant d'être succombée?

21. Qu'est-ce que tu penses de sa mort? (La cause?)

22. Qu'est-ce qu'on devait faire pour prévenir sa mort?
APPENDIX G: CAUSES OF DEATHS OF PREGNANT WOMEN (1997-1999)
Accidents and Homicides Excluded

<table>
<thead>
<tr>
<th>Village</th>
<th># of Investigated Deaths</th>
<th>Determined Causes*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bellevue</td>
<td>2</td>
<td>Eclampsia</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hemorrhage (early pregnancy)</td>
</tr>
<tr>
<td>Betouze</td>
<td>1</td>
<td>Postpartum sepsis</td>
</tr>
<tr>
<td>Bwadom</td>
<td>5</td>
<td>HIV w/ multiple infections</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Intrapartum hemorrhage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Postpartum sepsis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Postpartum complication NOS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Eclampsia</td>
</tr>
<tr>
<td>Campagne</td>
<td>2</td>
<td>Postpartum sepsis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fever of unknown origin (determined not related to</td>
</tr>
<tr>
<td></td>
<td></td>
<td>pregnancy, labor, or delivery)</td>
</tr>
<tr>
<td>Cochoix</td>
<td>1</td>
<td>Postpartum complication NOS</td>
</tr>
<tr>
<td>Gobin</td>
<td>2</td>
<td>Postpartum hemorrhage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Eclampsia</td>
</tr>
<tr>
<td>Lassisse</td>
<td>1</td>
<td>Postpartum sepsis</td>
</tr>
<tr>
<td>Milfort</td>
<td>1</td>
<td>Venous complication</td>
</tr>
<tr>
<td>Sassier</td>
<td>1</td>
<td>Eclampsia</td>
</tr>
</tbody>
</table>

* Based on review of history from verbal autopsies and clinical audits by HHF nurses.
APPENDIX H: SKILLED ATTENDANTS AND THE REDUCTION OF MATERNAL MORTALITY [56]
References


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