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Community Awareness of Maternal and Perinatal Danger Signs in Rural Haiti.

Chia-Yu Kuo

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COMMUNITY AWARENESS OF MATERNAL AND PERINATAL DANGER SIGNS IN RURAL HAITI

Chia-Yu Kuo

BS, Fu Jen Catholic University, 2002

A Thesis
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COMMUNITY AWARENESS OF MATERNAL AND PERINATAL DANGER SIGNS IN RURAL HAITI

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2006
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Introduction

The causes of maternal death and perinatal death as well as danger signs during pregnancy and childbirth are now well-understood and effective interventions have been developed. Yet, women in many developing countries still die from the same causes that affected women in the industrialized world in the early twentieth century. There are over 500,000 maternal deaths each year and 99% occur in developing countries. Many governments and organizations have recognized the importance of maternal health. Effective safe motherhood programs have demonstrated that significant reductions in maternal and perinatal mortality can be achieved in low resource countries.

Improving maternal and perinatal mortality is dependent upon multiple factors. Despite the development of general guidelines for reducing maternal and perinatal mortality, socio-cultural backgrounds and scientific environments complicate the implementation of the guidelines. Every region, country and locality has unique qualities which must be observed and taken into consideration. Before the problem can be addressed the following questions should be answered: What is the most efficient way to reduce maternal and perinatal mortality in this locality? What could have the greatest impact? What assets are available and how can we best use these limited resources? To answer these questions, an understanding of local circumstance is crucial.
Women need to reach emergency care without delay if complications arise during pregnancy and delivery. In many developing countries, women deliver alone or with a relative. Therefore, it is important that people are trained to recognize danger signs and develop plans for emergencies that include transport to hospitals or skilled care, access to financial resources and community support. Informing, educating, and mobilizing people regarding danger signs and working with communities to improve access would help reduce maternal mortality (WHO, 1999).

Haiti provides an excellent case study because it represents the situation of many countries in Africa and Asia. With a national maternal mortality rate of 523 per 100,000 live births (WHO, 2004) and more than 80% of deliveries at home with unskilled care (PAHO, 1998), the need to mobilize around danger sign recognition and community level access to emergency care is apparent. In particular, Jeremie and the Grand Anse Region are illustrative because of the rural and mountainous terrain and limited health care resources. The Haitian Health Foundation (HHF) has been providing community based primary care to rural villages since 1988. While it has been able to demonstrate improved child health outcomes, the maternal and newborn mortality rates have remained high. Prior to the implementation of an intervention program, HHF conducted a community survey about danger signs as part of its 2000 census. This data and the data from focus
groups with community members provide the data for this thesis.

This thesis organized the information that was gathered from the people in rural Haiti. The data resources were from Community Awareness of Maternal, Perinatal and Newborn Danger Signs Survey database held by Haitian Health Foundation (HHF) and two focused group discussions. The information in the database includes the respondents' demographic information and knowledge of maternal and newborn danger signs. The focus group discussions were conducted to capture more in-depth understanding of obstetric concepts and behaviors of the community level. The purpose of this study is to explore further people's awareness and knowledge of the danger signs during pregnancy, during childbirth, after children birth and on newborn in rural Haiti. It also contributes general knowledge about community awareness of danger signs on mothers and newborns. The information should help researchers to explore the dangers that people face in rural villages in order to improve intervention strategies and to evaluate the effectiveness of new interventions.
Background

Pregnancy is not a disease—it is a natural life process. However, in many developing countries, having children is a major health risk for the mother. Thousands of women and newborns die every year. Almost all the mortality causes related to pregnancy and childbirth are known and most are preventable and treatable. Women with obstetric complications usually die within 48 hours (PAHO, 2002). Complications during birth such as prolonged labor and fetal malpresentation are common causes of perinatal death (WHO, 2006).

Access to appropriate medical care and treatment is the key to reducing maternal and perinatal mortality and morbidity when complications arise. Many factors such as health seeking behavior and utilization of appropriate care are dependent on individual and community recognition of illness and warning signals. Results of a study conducted in India showed that 54% of the maternal mortality cases were not referred to a hospital because family members were not aware of the severity of the symptoms (Kumar, 1995). Social stigma associated with seeking care and the lack of awareness about illnesses that require care have been identified as major problems (Dixon-Mueller, 1991).

Complications can arise suddenly and cause immediate harm if there is no appropriate medical care and treatment. Therefore, understanding early warning signs and actions to
take when complications occur are crucial steps to reducing maternal and newborn morbidity and mortality.

**Maternal Mortality**

Maternal death is defined by ICD-9 as “death while pregnant or within 42 days of the 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.” Approximately 210 million women become pregnant every year, and about 15% develop complications. According to estimates by the World Health Organization (WHO) in 2000, the number of maternal mortalities was 529,000—more than 1,400 mothers die each day from pregnancy-related causes (WHO, 2004). The Maternal Mortality Rate (MMR) is expressed by number of deaths per 100,000 births. There is considerable variation by geographical region, economic status, urban/rural residence, and maternal education. The socio-economic and developmental impact on maternal mortality is most dramatically demonstrated by the fact that more than 99% of maternal deaths occur in developing countries. Maternal Mortality represents the greatest disparity in health statistics between developing and developed countries (WHO, 2006). The MMR is 20 in developed regions, compared to 440 in developing regions. The gap is
even larger between the most and least developed countries. For example, in 2000, the MMR was 11 in the United States but was 523 in Haiti (compared to a low of 1 in Sweden; 1,132 in the Central African Republic; and a high of 1,900 in Afghanistan (WHO, 2004).

The regions with the highest maternal deaths are Africa and Asia. The 529,000 maternal deaths in 2004 were almost equally divided between Africa (251,000) and Asia (253,000), with about 4% (22,000) occurring in Latin America and the Caribbean (WHO, 2004).

Thirty million women developed complications of pregnancy and childbirth in 2004. The most common causes of maternal morbidity and mortality were hemorrhage (25% of deaths, often associated with anemia as a result of poor nutrition or malaria); unsafe abortion (13% of deaths due to a variety of severe complications including sepsis, hemorrhage, uterine trauma and poisoning); high blood pressure (12% of deaths due to eclampsia during pregnancy); obstructed labor 8% of deaths; resulting in long-term complications for the mother, and newborn death or disability) (WHO, 2005). These five conditions account for 70% of MMR. Inadequate health care, poor health status and inadequate nutrition are the major underlying causes (PAHO, 2002; WHO, 2004). With limited resources and deficient health care systems, many preventable emergencies occur because of lack of treatment or a delay in care (Debora, 1998). Maternal mortality is used as an indicator of the status of women and access to health care.
Maternal deaths not only cause human suffering but also result in losses to social and economic development. Women play many roles in societies. They generate income; grow and prepare food; educate the young; care for children; the elderly and the sick and are responsible for the health and well-being of their families. Also, the impact of maternal death directly affects children. According to a 2004 WHO report, an estimated 1 million children die as a result of their mothers’ death every year. The responsibility for large numbers of orphans and infants shift to their families and communities (WHO, 2004).

**Perinatal Mortality**

According to WHO, perinatal mortality is defined as “Deaths occurring during late pregnancy (at 22 completed weeks gestation and over), during childbirth and up to seven completed days of life.” The perinatal mortality rate refers to the number of perinatal deaths per 1,000 births.

There were more than 6.3 million perinatal deaths in 2000 (WHO, 2006). The rate in developing regions was five times higher than in developed regions. Almost 98% of deaths occurred in developing countries with 27% of these in the least developed countries. Africa had the highest regional perinatal death rate (62), followed by Asia (50), Oceania (42), the Caribbean (31) and Latin America (20) (WHO, 2006). However, in reality the
situation is even worse. In developing countries, many infants who die in the womb or soon after birth are not reported (Zupan, 2003). Under-registration of perinatal mortality has been estimated as high as 20% of perinatal deaths (Richardus, 1998; Zupan, 2003).

The causes of perinatal mortality are also well understood. The most commonly recorded medical causes of perinatal death are: unexplained intrauterine death in pregnancy, intrauterine death due to maternal complications, intrapartum death due to obstetrical complications, inadequate management of birth, birth asphyxia’ preterm birth, sepsis, congenital anomalies and low birth weight. Deaths in the early neonate period (during the first week of life) are largely the result of inadequate or inappropriate care during pregnancy, childbirth, or the first critical hours after birth (Zupan, 2003; Kuit 2003).

Perinatal mortality is generally high in most developing countries because of the low socio-economic conditions and the poor standard of obstetric and neonatal services (Kuit, 2003). The perinatal mortality rate is used as an indicator of the quality of antenatal and perinatal care access to care, and the general health status of pregnant women, new mothers and newborns (Richardus, 1998). This indicator is a major marker of maternal care and of maternal health and nutrition as well; it is also affected by the availability and the quality of in-hospital care for neonates (WHO, 2006).
Perinatal mortality also varies by country and region. Some developing countries have reduced the perinatal mortality rate by regular mortality review and auditing of practice. (Kuit, 2003) Effective technical and community interventions are important to reduce the incidence and severity of major complications associated with pregnancy and childbirth, including perinatal mortality (WHO, 2004). Furthermore, it is crucial to know which interventions are the most effective for mothers and children. Therefore, it is important to understand and identify the community behaviors that contribute to the identification of problems and initiation of care of women and newborns. This is a first step toward reducing perinatal mortality at the community level.

A study in 2002 identified five paths to improve newborn outcomes: (1) use of routine maternal and newborn care and good-quality services; (2) response to maternal danger signs; (3) response to the non-breathing newborn; (4) care for the low birth weight baby; and, (5) response to newborn danger signs, particularly those of infection (Marsh, 2002). Furthermore, there are several studies which indicate that maternal and perinatal mortality can be reduced by improving the capacity of women to recognize danger signs and seek prompt emergency obstetrical care (Koblinsky, 1997; Maine 1991; Marsh, 2002).
Global Awareness of Maternal and Perinatal Mortality

In the past century, there have been advances in modern medicine and health care that have improved maternal and child health. Until recently, it was considered normal that mothers and children died due to pregnancy and child birth. General improvements in nutrition, sanitation, hygiene, and access to basic needs contributed to better overall health which, combined with medical advances, led to the dramatic decline in MMR and infant mortality rate (IMR), most notably in high income countries.

The global public health community has focused attention on reducing maternal death for almost 20 years. In 1987, the first International Safe Motherhood Conference took place in Nairobi, Kenya. Seven international agencies, including the United Nations Children’s Fund (UNICEF), the United Nations Development Programme (UNDP), the United Nations Population Fund (UNFPA), the World Bank, and the World Health Organization (WHO), as well as two non-governmental organizations, the International Planned Parenthood Federation and the Population Council, established the Safe Motherhood Inter-Agency Group after the 1987 conference. They set as their goal of a 50% reduction of maternal mortality by the year 2000. The objective was adopted by national governments and other international conferences. Other agencies that adopted the objective included the World Summit for Children in New York in 1990, the International

By the early nineteenth century, because of the availability and practice of midwifery care, maternal mortality in the now-developed world had been reduced about half from approximately 1,500 deaths per 100,000 live births (Inter-Agency Group for Safe Motherhood, 1997). Since that time, the progress varied in different countries and regions. Due to government-sponsored midwifery care in Sweden in the nineteenth century, MMR successfully dropped to 230 compared to 500 in Europe in the mid-1800s. While Sweden reached the 250-300 level, England had a slower decline to 400-450, and the United States was 600-800 between 1900 and 1940. With improved techniques, monitoring systems and enhanced access to quality of care, maternal mortality steeply declined in all developed countries after the mid-1930s (Inter-Agency Group for Safe Motherhood, 1997). Since the 1940s, maternal deaths in developed countries have become increasingly rare. However, maternal mortality remains a persistent threat to women in developing countries. At present the MMR in many countries is still far below that of Sweden in the nineteenth century (Chamberlain, 2003).

Research has demonstrated the effectiveness of specific interventions to improve
maternal health. Among the methods that have been adopted by many governments and organizations are: 1) access to good quality family planning (including medical and surgical abortion); 2) skilled care during childbirth; 3) access to emergency obstetrical care (EMOC) at the local hospital when complications arise; and 4) increasing knowledge and awareness of pregnancy and childbirth and skills to respond to danger signs (Marsh, 2002; Ahluwalia, 2003). In addition, it is important to increase awareness of the rights and needs of women, and this should be a part of any intervention. Society should improve quality of care, linkages and social support for women, men, families and communities (WHO, 2003).

A large proportion of perinatal mortality is due to complications of childbirth (Troedsson, 2002). Perinatal and maternal mortality are closely linked and it has been estimated that there are ten perinatal deaths for every maternal death (Andersson, 2000). However, only recently has perinatal mortality has received global attention.

In 1999, the Society for Pediatric and Perinatal Epidemiologic Research meeting in Baltimore, Maryland brought perinatal and neonatal mortality to international attention, stimulating many research projects and interventions. In 2001, the WHO Division of Child and Adolescent Health and Development, Save the Children Federation’s (SCF) Saving Newborn Lives (SNL) Initiative (sponsored by Bill and Melinda Gates Foundation), and
the Child Health Research Project of the United States Agency for International Development (USAID) convened a meeting in Katmandu, Nepal to discuss and plan research to implement community neonatal survival interventions to reduce perinatal and neonatal deaths. The primary objectives of the meeting were to review the results of recent research on neonatal health and to enhance the coordination of planned community-based research by sharing basic information on study design, evaluation instruments and implementation (Troedsson, 2002).

Many governments and organizations have been working to identify the most effective and cost-efficient methodologies for reducing maternal deaths. Although advanced technology undoubtedly plays an important role in saving mothers' lives, the lessons of the past decade demonstrate this is not the only way to prevent maternal deaths. Even though many developing countries lack advanced obstetrical and neonatal technology, training can improve outcomes. For example, maternal and child problems can be reduced with health education as the following examples demonstrate. Diarrhea can be reduced if the mother boils drinking water and washes her hands before preparing and serving food. Tetanus can be prevented by vaccinating the mother and using sterile tools to cut the umbilical cord. Malnutrition could be reduced if parents understood how to incorporate nutritious foods already available in their villages (Williams, 1994).
While safe motherhood programs take a broad-based approach incorporating health, social and economic factors, many policy makers think about the problems strictly in terms of available resources; “Problems can be solved once we have enough money to get adequate medical services.” Some use this argument as a justification not to do anything until the resources are available based on the link between low Gross National Product (GNP) and high maternal mortality. However, there are numerous examples of exceptions to this rule, as shown in Figure 1. Countries with a per capita GNP of $1,000 or less have maternal mortality ratios ranging from as low as 70 to as high as 1,400 (Figure 1) (Inter-Agency Group for Safe Motherhood, 1997). This suggests that there are many ways to improve maternal mortality without high technology.

Figure 1. Maternal Mortality by Income Levels, Selected Countries
The long term reduction in maternal mortality must be addressed at all levels, family and community, society, and national health systems and policies (WHO, 1999). At the individual level maternal healthy is the foundation of a health pregnancy. Other diseases and illnesses increase the risk of maternal deaths. One example is HIV/AIDS control and treatment; others include malaria, venereal diseases, and other infectious diseases. Insufficient food and lack of micronutrients can lead to nutritional deficiencies and poor health. Other society and community level factors include increasing awareness and support of maternal and newborn health with the involvement of a wide range of groups and individuals including community and religious leaders, women’s groups, youth groups, other local associations and healthcare professionals. Another issue is the identification and coordination of resources to implement safe motherhood strategies such as referral, emergency transport, deployment and support of healthcare providers and cost-sharing. Also, the community must play a role in monitoring and evaluating the effect of these interventions. Legislative and policy actions are essential to create sustainable and comprehensive programs in the whole country. Danger sign awareness is a key foundation for all these levels of mobilization (WHO, 1999).
Danger Signs in Maternal and Newborn Care

Overview of Danger Signs

Pregnancy brings women some discomforts. It is crucial to know how to differentiate normal discomforts and signs and symptoms of potentially dangerous conditions (Fig. 2). Before more recent improvements in social and economic conditions and scientific medical care, it was common for infants and young children to die. In 460-375 B.C., Hippocrates started observing and documenting some of the symptoms contributing to child illnesses such as vomiting, cough, sleeplessness, terrors, inflammation of the umbilicus/abdomen, fevers, and convulsions. In 1545, The Book of Chyldren was the first book to focus attention on a number of symptoms of children who might have a problem requiring immediate attention. For example, stiffness of the limbs, watering eyes, scabbiness or itch, fever, consumption, feebleness of the stomach, and vomiting were described. The list included many symptoms of medical conditions that were later identified by modern science as medical conditions and diseases, and that children in many developing countries still experience. Then, as now, the children who were most affected were those whose parents had low educational and socioeconomic status.

Two hundred years before there was an understanding of germs and bacteria, some people began to realize the importance of hygiene and sanitation in prevention of disease.
Between 1709 and 1789, two British doctors, John and George Armstrong, relied on better nutrition, good hygiene, cleanliness and improvements to the environment to bring down the children mortality from 50% to less than 5% in their dispensary. Unfortunately, broader adoption of these practices did not occur for almost two hundred years (Williams, 1994).

Beginning in the 1980s, public health professionals developed a risk identification approach for maternal and child health care. Factors that had been demonstrated to put women at risk for morbidity or mortality included mother’s age (too young or too old), short stature, previous perinatal deaths, chronic infections, multiple births and conditions such as vaginal bleeding, eclampsia, prolonged pregnancy, diabetes, anemia, and poor weight-gain. This was the beginning of the danger sign approach. Risk factors were organized by immediate or potential danger, and health policies were developed for interventions to provide better services with specific attention to those who most needed them (Backett, 1984). At this early stage of the risk approach, it was thought that women could be categorized by degree of risk and intervention would prevent the complications.

This rigid risk approach was not used after the early 1990s because it became clear that many pregnancy complications could not be predicted. The danger sign approach incorporates a recognition of signs and symptoms of potential problems with action plans
to respond. Maternal and perinatal mortality can be reduced when communities are informed about danger signs and symptoms, and quality health services are available and accessible including a referral system to manage complications at a higher level of the health care system (Kwast, 1996). With improved awareness, women are able to recognize problems that might lead to complications that endanger their lives and those of their babies. Research has demonstrated the importance of improving the capacity of women to seek appropriate care in time by empowering pregnant women, their caregivers and their communities to recognize danger signs and symptoms (Perreira, 2002; Maine, 1991).
### Danger Signs

<table>
<thead>
<tr>
<th>During Pregnancy</th>
<th>During Childbirth</th>
<th>After Childbirth</th>
<th>On Newborns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vaginal bleeding</td>
<td>Waters break and</td>
<td>Vaginal bleeding</td>
<td>Difficulty breathing</td>
</tr>
<tr>
<td>Convulsions/unconscious</td>
<td>not in labor after 6 hours</td>
<td>Convulsions</td>
<td>Convulsions</td>
</tr>
<tr>
<td>Severe headaches</td>
<td>Labor</td>
<td>Fast or difficult breathing</td>
<td>Fever</td>
</tr>
<tr>
<td>Blurred vision</td>
<td>pain/contractions continue for more than 12 hours</td>
<td>Fever and too weak to get out of bed</td>
<td>Convulsions</td>
</tr>
<tr>
<td>too weak to get out of bed</td>
<td>Heavy bleeding after delivery</td>
<td>Severe abdominal pain</td>
<td>Bleeding</td>
</tr>
<tr>
<td>Abdominal pain</td>
<td>Bleeding increases</td>
<td>Abdominal pain</td>
<td>Diarrhea</td>
</tr>
<tr>
<td>Fast or difficult breathing</td>
<td>Placenta not expelled 1 hour after birth of the baby</td>
<td>Feels ill</td>
<td>Very small just born</td>
</tr>
<tr>
<td>Fever</td>
<td></td>
<td>Breast swollen, red or tender breasts, or sore nipple</td>
<td>Not feeding at all</td>
</tr>
<tr>
<td>Stiff neck</td>
<td></td>
<td>Urine dribbling or pain on micturition</td>
<td>Difficulty feeding</td>
</tr>
<tr>
<td>Feel ill</td>
<td></td>
<td>Pain in the perineum or draining pus</td>
<td>Pus from eyes</td>
</tr>
<tr>
<td>Swelling of fingers, face, legs</td>
<td></td>
<td>Foul-smelling lochia</td>
<td>Yellow skin</td>
</tr>
<tr>
<td>Epigastric abdominal pain</td>
<td></td>
<td></td>
<td>A cord stump which is red or draining pus</td>
</tr>
<tr>
<td>Labor pain/ ruptured membranes</td>
<td></td>
<td></td>
<td>Feed&lt;5 times in 24 hours</td>
</tr>
<tr>
<td>Severe pallor</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Pregnancy, Childbirth, Postpartum and Newborn Care: A guide for essential practice (WHO, 2006)

**Figure 2. WHO Danger Signs for Pregnancy, Childbirth, After Childbirth and Newborns**

**Importance of Danger Sign Knowledge and Awareness**

Recognition of unexpected complications is essential to receiving appropriate care in case of emergency. Any woman can develop life-threatening complications at any stage of pregnancy, delivery, postpartum period as can the newborn, especially in the first few days post-delivery. Women who develop unexpected complications have usually been
identified as low risk during prenatal care visits if they have access to prenatal care (Perreira, 2002). There is no reliable way to predict which individual women will develop complications or when they will develop them. WHO statistics demonstrate that although the maternal mortality rates vary significantly between developed and developing countries, the causes of maternal deaths are similar. The core causes are hemorrhage, sepsis and hypertensive disorders of pregnancy, but the outcomes depend on whether women can be referred in time to receive proper medical care including antibiotics, blood transfusions, caesarean section delivery, and other interventions. For example, while the prevalence of sepsis was similar among countries, women do not die from sepsis in Canada and France, whereas the mortality rate from sepsis in Nigeria and South Africa ranges from 50%-72% (Minkauskiené, 2004). Outcomes depend upon whether women can have obtained a referral in time or receive proper medical care. Furthermore, the availability of technology such as antibiotics, banked blood, and caesarean section, may determine whether the complications can be brought under control.

Danger sign knowledge provides a pregnant woman and her baby with several advantages. First, recognition of danger signs before complications occur can help people prepare and give them time to seek assistance from skilled attendants, arrange transportation to the hospital, and raise money for health care or other emergency actions.
Second, knowledge of danger signs will improve people’s awareness when they need to seek health services. Many danger signs do not frighten mothers and their families. For example, swollen face, blurred vision, severe headache or high blood pressure are not the same as symptoms such as heavy bleeding or severe cramps, which catch people’s attention immediately. Knowledge and awareness of danger signs can increase people’s confidence and willingness to seek care. Third, danger signs can alert people to take immediate and appropriate actions for preventing and minimizing the development of complications. In combination with education about appropriate community level emergency actions, recognition of symptoms can give people tools to intervene.

Women should not face the responsibility and risks of having a child alone. Her family, society and community should be mobilized to provide safe motherhood for every woman. Research has demonstrated the importance of empowering individuals to recognize danger signs for obstetric complications as the first step to helping women seek appropriate care (Tsui, 1997; PAHO, 2002). Therefore, many safe motherhood programs and interventions have emphasized educating people in communities about danger signs because complications are difficult to predict. It is important for women, caregivers and medical decision-makers to be able to recognize the danger signs and take action.

Cultural barriers might influence women’s care seeking behavior even if the symptoms
are recognized (Kowalewski M, 2000). For example, women might not have the ability to seek and receive care, especially if others such as their husband or mother-in-law make medical decisions for them and they either are not aware of the danger or lack the confidence to seek their own care. Therefore, women’s empowerment is a key strategy for maternal mortality reduction through danger sign education and early intervention because it provides them with the capacity to make critical decisions about their own health. It enables them to seek care when they think they need it, to follow medical procedures and to participate in health activities and education programs (PAHO, 2002).

Danger sign education about pregnant women and newborns should be combined with other interventions to have a significant impact. Several studies indicate that recognition of danger signs alone has limited influence on people’s decisions to seek medical care. Low perceptions of risk and inappropriate household measures, geographical distance from care, financial barriers, lack of medical service (Barnes-Josiah, 1998), care seeking from untrained providers (Marsh, 2002) and fear of discrimination (Kowalewski, 2000) have been identified as important determining factors for women and newborn referral to medical care when danger signs have been identified.
Pathways to Care Based on Danger Sign Education

Knowledge of danger signs of obstetric complications is the essential first step in the appropriate and timely referral to essential obstetric care (Perreira, 2002). Similarly, because most babies are born at home or are discharged from the hospital in the first 24 hours, increasing community awareness of the danger signs of newborn complications is of critical importance for improving newborn survival. However, increasing knowledge is just the initial part of improving maternal and perinatal mortality. In some countries, awareness of danger signs was found to have limited influence on people’s care seeking behavior (Kowalewski, 2000; Kyomuhendo, 2003).

In order to comprehensively and efficiently promote maternal and newborn health in developing countries, especially for the women who deliver at home, four steps have been identified to ensure maternal and newborn survival (Tsui, 1997):

**Step 1:** Recognizing a life-threatening complication by the woman, her family, traditional birth attendant, or others in attendance;

**Step 2:** Deciding to seek care, typically by family members if the woman is in poor condition;
Step 3: Reaching quality services, which often involves overcoming impediments such as distance, cost of or lack of transport, cost of the services, geographical or weather constraints, and perceived poor quality or attitude of the providers; and,

Step 4: Obtaining appropriate care for obstetric complications.

If these steps could be practiced in time and accurately, maternal and newborn survival would dramatically improve. However, many factors, from individual to environmental, can influence or obstruct the implementation of these processes. In fact, knowing a danger sign does not guarantee that an individual will recognize it in practice. The measurement of knowledge does not fully equal ability to respond to problems or follow treatment plans when the need occurs. Even if people are aware of the danger signs, inability to determinate the severity of the problem, geographical and financial barriers, lack of appropriate treatment services and untrained providers may prevent appropriate action (Kowalewski, 2000; Barnes-Josiah, 1998; Marsh, 2002). Women often have limited decision-making ability. In many countries, women have to get permission from their husband or other family members to access care. In addition, social stigma such as being intimidated and humiliated by health workers or pressured to accept treatment that conflicts with their beliefs affects women’s willingness to seek health care (Kowalewski, 2000; Liljestrand, 2002).
The Situation in Haiti

Maternal and perinatal mortality are serious problems in Haiti. Haiti has one of the highest rates of maternal mortality in the Caribbean at 523 per 100,000 live births (WHO, 2000), compared to the MMR of 106 in Jamaica and 7.5 in the United States (PAHO, 2002; McCaw-Binns, 2001; CDC, 1999). The MMR in Haiti in 2000 had increased by 15% compared to the 1995 rate. The perinatal mortality rate (PMNR) is 54 per 1000 births, compared to 17 in Jamaica and 7 in the United States. High MMR and PMNR have been associated with high levels of poverty, deficiencies in the health system, and HIV/AIDS. Maternal causes of death included problems related to arterial hypertension and eclampsia, as well as complications of labor (PAHO, 2002).

Information on the Study Area

Overview of Haiti

Haiti, officially the Republic of Haiti, occupies one third of the Caribbean island of Hispaniola, which is located between the islands of Cuba, Jamaica, and Puerto Rico. Haiti covers a territory of 10,714 square miles (27,750 km²) (Appendix I); it includes part of Hispaniola, which it shares with the Dominican Republic, and many smaller islands. The country is divided into nine departments, 133 municipalities, and 561 districts. The capital
is Port-au-Prince (PAHO, 1998).

The current population is approximately 8.3 million people (CIA, 2006). Kreyòl Ayisyen (Haitian Creole) is the official language which is spoken by all Haitians. French is the other official language but this is used by people with higher levels of education and for many official documents.

**Political Situation**

Haiti is a former French colony. In 1804, Haiti was the second country to declare its independence in the Americas (the United States was the first). It was the first independent black republic in modern times (The World Bank, 2004). However, Haiti has a history of political violence and turbulence which has resulted in instability and impoverishment.

Political stability was maintained during the long and repressive dictatorship of the Duvalier's (Papa Doc, 1957-1971, and Baby Doc, 1971-1986); their corruption resulted in further impoverishment of the people as their personal wealth increased. Since 1986, there have been multiple elections and coups with few governments lasting more than a few years. Recently, Haiti has undergone a state of transition following an uprising and the resignation of President Jean-Bertrand Aristide on February 29, 2004. He had been re-elected in 2000 in an election which several parties boycotted due to disputes with the
vote-counting of a previous parliamentary election. In February, 2006, after months of increasing violence, René Préval was elected president, and took office in May.

**Economic Conditions**

Haiti is a country with extreme disparity between the rich and the poor. A very small percentage of the population earns over 60% of the national income. Despite the remarkable achievement of the country as the first and the only slave colony to gain national independence, the way to democracy did not lead to economic development. Since 1970, real per capita GDP fell an average of 2.4% per year (The World Bank, 2004). In the 1990s, it continued declining at an average annual rate of 2.6%, which was worse during the U.S. imposed embargo (1992-1994), when the country suffered an estimated 25% loss in economic activity. Haiti is the most impoverished nation in the Western Hemisphere; 67% of Haitians lived below the poverty line between 1999 to 2000 (PAHO, 2002), and about 80% of the rural population live below the poverty line (The World Bank, 2004; CIA, 2006). The average income in 2001 was approximately US$480 per capita (The World Bank, 2004).

Less than half (46%) of the total economically active population are employed workers. About 51% work in the informal and 45% in the agricultural sectors, which are the
mainstay of the economy in Haiti (PAHO, 2002). However, the condition of the land appears to be inadequate to support large populations. Most of the farmers in Haiti work subsistence plots of land that produce small amounts of crops. Coffee, the major agricultural export, mangoes, sugarcane, rice, corn, sorghum and wood are the agriculture products (CIA, 2006). Soil erosion and overworked land are major agricultural problems. In addition, deforestation, primarily for charcoal production, is a common problem, and it results in further soil erosion. The most common livestock is chicken, although pigs and some cattle and goats are also raised.

Health

In Haiti, the depressed economy and unstable political system also limit the development of the health system and improvement in human health. The life expectancy in Haiti is 53.2 years and the median age is 18.2, compared to 77.9 and 36.5 years in the United States. Haiti has the worst health indicators of the Americas: the highest number of persons living with HIV/AIDS, the highest malnutrition rates and the highest infant and maternal mortality rates.

The estimated prevalence of HIV/AIDS was 4.5% in 2004 (WHO, 2004); 20.5% of registered deaths of women in reproductive age were caused by AIDS. This means there
are 13,000 pregnant women who are HIV positive and 30% of their children will be infected. HIV/AIDS was the leading cause of death in 1999. People who are infected and die are in the young and productive age group, and their deaths result in a large vulnerable population of children and elders (PAHO, 2002).

Approximately 67% of the population in Haiti suffered from malnutrition in 1995. Malnutrition ranks eighth among the causes of general mortality, with 76% of cases being in children under 5. Because the majority of Haitians live in extreme poverty and suffer from chronic malnutrition, children are born underweight and experience growth and developmental delays (PAHO, 2002).

From 1996 to 2000, the infant mortality rate (IMR) increased from 73.8 to 80.3. Infant mortality is impacted by the high prevalence of malnutrition and HIV/AIDS. In addition, the leading causes of death for infants and children in 1999 were acute diarrhea diseases (12.1%), infections of the perinatal period (10.2%), malnutrition (9.1%) and acute respiratory infections (6.9%) (PAHO, 2002).

In terms of maternal mortality, the MMR in 2000 (523) showed a 15% increase relative to 1995 (457). It was the second leading cause of death in women of reproductive age (the first was AIDS) (WHO, 2004). The leading causes of maternal deaths are: obstructed labor (8.3%), toxemia (16.7%), and hemorrhage (8.3%). The high maternal mortality rate is
mainly the result of inadequate prenatal care. The EMMUS-II (Survey of Mortality, Morbidity and Service Utilization conducted by the Child Health Institute in 1994–1995 in Haiti) reported 80% of pregnant women had given birth to their last child at home. In Port-au-Prince, 50% of women give birth in a hospital; however, other urban areas had 31% hospital deliveries and this rate was only 9% in rural areas (PAHO, 1998). The fertility rate was 4.7 children per woman, with variations by rural (5.8) and urban areas (3.2 in Port-au-Prince) (PAHO, 2002).

Health and living conditions are closely linked. In Haiti, adequate and clean water supply, food security and basic sanitation services are still very deficient. No city has a public sewerage system, and there only are isolated wastewater treatment units throughout the country. Solid waste management is a serious problem; bad excreta disposal practices are polluting almost all 18 water sources supplying Port-au-Prince. The growing numbers of motor vehicles and their inadequate maintenance have created a serious air pollution problem in Port-au-Prince (PAHO, 1998).

Even though Haiti has these serious problems, the situation seems to be improving recently. External aid from the US and other countries as well as remittances from Haitians living abroad between 1994 and 2000 have assisted in a gradual increase in public works and health interventions in Haiti. Several social indicators such as the net school
enrollment rate, the literacy rate, infant malnutrition, and access to safe water have begun to improve (The World Bank, 2004).

**Health System**

The public sector, the semi-public sector, non-governmental organizations (NGOs) and the private sector are the four health systems in Haiti. One-third of the country’s 663 health institutions belong to the government. The public sector has very limited resources and faces chronic human resource shortages. Government programs receive subsidies from international health and human development agencies. The semi-public sector is mainly managed by the private sector and supported by NGOs, but the staff is paid by the public sector. NGOs provide the majority of health services in Haiti and the private (for-profit) health sector is found primarily in cities. Another important source of health care is the traditional healer.

Public health services in Haiti consist of a variety of levels of care; there are 371 health posts, 217 health centers and 49 hospitals. Since 1998, nine recognized nursing schools have educated professional nurses to deliver health services and a dozen public sector hospital administrators and directors are also trained every year. In 2000, a school for nurse-midwives was opened to address the maternal health problem. However, the lack of
funding remains an obstacle to the development of new health professionals. On average, there is a ratio of 2.4 physicians, 1 nurse and 3.1 auxiliaries 10,000 people. This actually does not represent the reality because most of the resources, especially physicians and other highly trained professionals, are in capital and other major cities, but not in rural areas. It has been estimated that between 40 to 60% of the population have access to public services. Public funding for health represents only 0.8% to 1% of the GDP. Due to the country’s political problems, there has been no recent progress in health legislation.

The private, profit-making sector is comprised of physicians, dentists, and other private practice specialists who mostly work in Port-au-Prince and in private health care facilities. Public and private establishments function completely independent of one another. Differences in access to adequate health care are further magnified by the uneven geographical distribution of centers and hospital beds. Primary health care is the strategy that serves as the basis for national health programs. Although it is not yet institutionalized in the health services, it provides a minimum package that includes health care for children, adolescents and women; emergency medical and surgical care; communicable disease control; public health education; environmental health; water supply; and the supply of essential drugs. The second strategy is the reorganization of the health system, which includes the still incipient functional decentralization of the Ministry based on the UCSs
In rural areas, it is estimated that 40% of the population relies on traditional medicine and treatment. According to a study in 1983, there are five levels of healers that are recognized in the Haitian system: (1) shamans, (2) herbalists, (3) traditional birth attendants (TBAs), (4) bonesetters, and (5) injectionists (Coreil, 1980). TBAs play an important role in childbirth (WHO, 2004). Shamans include practitioners of voudaun, also known as voodoo, a syncretic religious practice based on African religions and Catholicism.

About 50 to 60% of health services are provided by missionary or other non-government organizations. Nine UN agencies, six of them working in health, have offices in Haiti. Other important health stakeholders are the Inter-American Development Bank, the European Union, the United States Agency for International Development (USAID), the Canadian International Development Agency (CIDA) and the development agencies of France, the Netherlands and Japan. When Haiti joined the Caribbean Community, regional integration was strengthened (WHO, 2004). For the Haitian government, the ability to maintain health services are limited (Harvard Center, 1993).
Jeremie

Subsistence level farming, charcoal production and other small crops provide the major sources of income in rural Jeremie. One meal a day is common in most families. In the town, children often scavenge for food in garbage, at beaches or at the side of the road. Their average income per capita is between $90 and $300 per year. Extremely poor conditions cause many hardships (e.g., due to limited living space, people may have to take turns to sleep, and children are often sent to the care of relatives). One ship transports people, supplies and goods from Port-au-Prince to Jeremie and return twice a week. Ground transport to and from Port-au Prince is also available but it is a 12-16 hour trip over rough mountain roads.

Haitian Health Foundation

The Haitian Health Foundation (HHF) is a non-governmental health and human services organization with headquarters in Norwich, Connecticut. HHF began in 1982 as a volunteer effort of Connecticut based health professionals in Haiti. The mission of the Haitian Health Foundation is to improve the health and the well being of the poor and infirm of the greater Jeremie area, with a focus on women and children. Since 1987, HHF has provided outpatient medical and dental care and a primary care public health program.
to rural villages in the commune of Jeremie, in the Grand Anse Region of western Haiti. HHF currently serves 104 mountain villages with a population of approximately 200,000. HHF is supported by grants (30% of HHF support is from USAID) and private foundations and donors. Over the almost 20 year period it has worked in Jeremie, HHF has developed a number of programs. Some of these will be described to provide an overview of the range of services provided. This section will close with a description of the maternal newborn initiatives since 2000.

A major component of HHF has been a child survival project funded through the Haiti Mission of USAID. This population based primary care program began in 1987 and currently provides health care and tracks services and health outcomes for over 130,000 people through a sophisticated computer health information system (Health Track). It provides access to medical services to approximately 70,000 others. Residents of Jeremie Rural, Moron, Bonbon, Abricots and Roseaux are registered in the Health Information Database utilizing family and individual identification codes. The census is conducted every 5 to 6 years to update the registration. This system allows for population monitoring and program improvement. Community participation has been a critical component of this program, beginning with the development of village health committees, which then identified community members to be trained as community health agents. Feedback and
discussion of the data collected through Health Track provides the community with opportunities to problem solve about difficulties and celebrate improvements. The development of Mothers’ Clubs for health education and support led to the further development of Fathers’ Clubs and, more recently, Youth Clubs (at the latter’s request)—these are all important ways of enhancing community support and commitment. Another recent development is the creation of a girls’ empowerment program through the Responsible Sexuality ABC Youth Soccer Program which has also resulted in a Girl’s Road to Health Card.

Clinical services include medical, dental and eye care at the HHF Clinic in Jeremie, periodic medical and dental teams to go to village health posts, and regular health posts by HHF nurses and community health workers who provide prenatal care, growth monitoring, treatment of common illnesses and immunizations through the public health program. HHF also provides clinical practice experience for Haitian health professions students.

HHF also provides housing, sanitation, schooling and support of US based specialized medical treatment for those in need. This includes a collaborative rural housing project with the Rotary Club of Jeremie and other Districts; The Save-A-Family Program, which builds “Happy Homes” for families that are selected by the community; a family assistance program for tuition and other school-related expenses, housing and medical
costs for over 450 of the poorest families (2,100 children) in the urban neighborhoods of Jeremie; a latrine building project; sponsorship of patients brought to US for surgery and other specialized treatment; agricultural projects supplying chickens, pigs, and goats to rural families; and various road and infrastructure projects.

In 2000, construction began on the Center of Hope, a building to house Haiti’s first maternal waiting home, a nutrition recuperation center, a maternal/infant breastfeeding and nutrition program, and a clinic for prenatal care. The Center of Hope was built on HHF property located near the provincial hospital, St. Antoine. The nutrition and breastfeeding program provides food to pregnant and lactating women, who also receive their pre and postnatal care at the Center of Hope. The Maternal Waiting Home (MWH) and the Nutrition Recuperation Program opened on December 8, 2001. The MWH provides residential care, including treatment, health education and food, for high risk mothers who live more than a one hour walk from the Hospital St. Antoine. The MWH now is at capacity (30 beds) most of the time. Reasons for admission include HIV, eclampsia, gestational diabetes, young and older age (<18 and >40), multi-gravida and severe anemia. The specific objectives of the MWH include saving the lives of high risk pregnant women who live in UCS2 (Counties of Jeremie, Roseaux, Bonbons, Abricots, and other areas of the Grand Anse), reduce vertical transmission of HIV, facilitate hospital
care for high risk pregnant women who live in isolated areas, make hospital care accessible for high risk women and diminish the number of obstetrical emergencies that arrive at Saint Antoine Hospital of Jeremie too late for effective intervention.

The most recent program to focus on maternal and newborn health is a USAID funded Child Survival Grant (2004-2009). KOMBIT (Communities Organized for Mothers and Babies with Innovative Technology) focuses on reducing maternal and newborn mortality through new services and expanding successful community participation, natural family planning and breastfeeding programs to non-HHF areas by partnering with the Ministry of Health (MSPP) and the Sisters of the Good Shepherd (SGS). The emphasis of this grant is 60% maternal newborn, 20% child spacing, and 20% breastfeeding.

KOMBIT (pronounced Kum-bee’t) is a Haitian Creole word which means an assembly of people who have come together for a common goal. The common goal is for the partners, other agencies and programs, and the community to come together to improve maternal and newborn health.

KOMBIT has a target population of 171,703. In the first two years, KOMBIT focused on conducting a baseline assessment, developing a coordinated plan to address these findings, and implementing new services, including Home based Life Saving Skills (HBLSS), in the county of Jeremie. The strategy is to improve the managerial and
technical capabilities of the local partners including a focus on danger sign education, and community and family level preparation to take immediate and appropriate action. Other improvements focused on prenatal care, documentation and referral processes.

Major training activities in the first two years included the Standard Day Method (SDM), which was taught by Georgetown University Center for Reproductive Health; Home Based Life Saving Skills (HBLSS), taught by the American College of Nurse Midwives; and community emergency evacuation planning.

KOMBIT education and community mobilization programs are energetic and lively, and often use lively songs to convey information. Such methods are important because much of the rural population is non-literate. For instance, the danger signs specific to pregnancy are taught through a song that is accompanied by a dance to illustrate an obstetrical emergency. Group discussion is another active method for health workers to discuss traditional concepts, action, scientific methods and conflicts. Health agents also provide health education through pictures and other teaching materials, songs, and activities; and nurses are also involved in health promotion and community teaching. A strong component of the program is feedback based on progress toward program objectives which is provided back to the community. The information is based on operations research, periodic population census, and health report and health track data.
Some Pre-KOMBIT activities were implemented with funding from the local USAID mission and the Johns Hopkins Program for International Education in Gynecology and Obstetrics (JHPIEGO) (HHF, 2005):

- A formal technical alliance among providers of the Jeremie Commune which offered training in the JHPIEGO Birth Preparedness Complication Readiness Matrix of Shared Responsibilities.

- The Maternal Mortality Investigation of the Grand Anse, a process that included the Reproductive Age Mortality Survey, Verbal Autopsy, and Mortality Review.

- A 3-day Obstetrical Emergency Training for Nurses and Auxiliaries in all 9 dispensaries held in 2003.
Methodology

Study design

There were two major sources of data for this research: a survey of 800 community residents that had been conducted as part of the census in 2000-2001 and two focus groups conducted in 2006, one with mothers and one with health agents and nurses. The survey included men and women and asked open-ended questions about danger signs during pregnancy, childbirth, post-delivery and for the newborn. It also included questions on respondent village, age, gender, number of children and person who cut the cord at the last delivery (for those with children). The survey was conducted in Haitian Creole and had already been entered, coded and edited in an Excel database. It was translated into English, and the data was de-identified and analyzed in SPSS V. 12.5. The purpose of the survey was to gain an understanding of community knowledge prior to the development of community education as part of the new maternal newborn initiatives that were in the planning stages. At this point in time only danger signs of pregnancy had been addressed. Two focused group discussions, one with 4 mothers from rural villages and one with 12 HHF health agents and nurses, were conducted and the questions were framed around the responses obtained from the survey. These discussions were conducted in Haitian Creole by a bilingual Creole/English HHF staff person with the participation of the author. The
purpose was to explore the meaning of danger signs and local beliefs and practices around pregnancy and delivery.

Survey Sampling

The survey was conducted as part of the 2000-2001 HHF Census. A census is conducted every 5-6 years to update the HHF registration. The Danger Sign Survey was included and administered to every 10th household based on the HHF registration number. Households that were randomly selected had the Danger Sign Survey affixed to the census data sheet. Respondents were randomly selected within the selected households.

Interviewer Training

Census and Danger Sign Interviewers were HHF health agents and nurses. All interviewers received a one day training which included the format of the survey, the interview process and the recording of responses. Interviewers practiced interviewing with each other and learned how to minimize leading questions and accurately record open-ended answers.

Demographic information included gender, age, locality, number of living children and the person who cut the umbilical cord at the last delivery (type of person: traditional birth
attendant, nurse midwife, and doctor). The open-ended questions addressed danger sign knowledge. Respondents were asked to give as many answers as possible for each period. The survey was conducted in Haitian Creole (Appendix II) and all answers and descriptions were recorded by investigators without personal judgment. The following questions pertaining to danger signs covered the four major periods:

1. Describe all danger signs for the mother during delivery

2. Describe all danger signs for the mother after delivery up until one month

3. Describe all danger signs for the baby from the time of delivery up until the 7th day (1 week)

4. Describe all danger signs for pregnant women

Focus Group Discussions

Two focused group discussions were conducted in March 2006. The first group was with four mothers in a rural village. The second focus group was with twelve HHF nurses and health agents.

The discussions included an exploration of the definitions of specific words respondents used in the survey, descriptions of beliefs, sequences of symptoms, and causes
of danger signs, as well as an exploration of the relationships and meanings of some of the
problems identified.

Data Coding

Some categories fit within medical guidelines for danger signs and others were more
locally defined. Those that were similar were given the same code. Single or infrequent
responses were categorized as other.

Data Analysis

The SPSS V. 12.5 was used to calculate frequencies, analyze relationships between
independent variables and danger sign knowledge, and perform multivariate analysis. P
values <=.05 were accepted as statistically significant for chi-square, comparing means
and regression analysis.
Results

Socio-demographic Characteristics of Respondents

A total of 810 people were interviewed for the Community Awareness of Maternal, Perinatal and Newborn Danger Signs Survey. About 84% of them were female and 16% were male. More than 80% of respondents were aged 20-49, and their mean age was 34.3 years. The respondents were from 19 villages. Some villages had been enrolled in HHF since the program started in 1988 and others were enrolled more recently. Villages enrolled prior to 1997 were classified as “Old” and those enrolled from 1997 to the present were classified as “New.” Forty-two percent of respondents were from the old villages and 58% were from the new. The percentage of skilled attendance during childbirth was very low (5%) and this variable was not used in further analysis. More than 80% of respondents had at least one child, and the mean number of children was 3.7 (Table 1).
<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Number of Respondents</th>
<th>Percentage of Respondents (N=810)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>681</td>
<td>84.1</td>
</tr>
<tr>
<td>Male</td>
<td>129</td>
<td>15.9</td>
</tr>
<tr>
<td>Age</td>
<td>(n=808)</td>
<td></td>
</tr>
<tr>
<td>Below 19</td>
<td>77</td>
<td>9.5</td>
</tr>
<tr>
<td>20-29</td>
<td>223</td>
<td>27.6</td>
</tr>
<tr>
<td>30-39</td>
<td>239</td>
<td>29.6</td>
</tr>
<tr>
<td>40-49</td>
<td>219</td>
<td>27.1</td>
</tr>
<tr>
<td>50 and above</td>
<td>50</td>
<td>6.2</td>
</tr>
<tr>
<td>Mean of age</td>
<td>34.3</td>
<td></td>
</tr>
<tr>
<td>Locality</td>
<td>(N=810)</td>
<td></td>
</tr>
<tr>
<td>New HHF Areas</td>
<td>338</td>
<td>41.7</td>
</tr>
<tr>
<td>Old HHF Areas</td>
<td>472</td>
<td>58.3</td>
</tr>
<tr>
<td>Skilled Attendance during Childbirth</td>
<td>(n=661)</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>34</td>
<td>5.1</td>
</tr>
<tr>
<td>No</td>
<td>627</td>
<td>94.9</td>
</tr>
<tr>
<td>Number of Children</td>
<td>(N=808)</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>144</td>
<td>17.8</td>
</tr>
<tr>
<td>1-2</td>
<td>185</td>
<td>22.9</td>
</tr>
<tr>
<td>3-4</td>
<td>162</td>
<td>20.1</td>
</tr>
<tr>
<td>5-6</td>
<td>180</td>
<td>22.2</td>
</tr>
<tr>
<td>7-8</td>
<td>95</td>
<td>11.8</td>
</tr>
<tr>
<td>9 and above</td>
<td>42</td>
<td>5.2</td>
</tr>
<tr>
<td>Mean Number of Children</td>
<td>3.7</td>
<td></td>
</tr>
</tbody>
</table>

**Danger Signs**

The responses resulted in 92 possible danger signs (after the elimination of “other” category). These included 18 danger signs during pregnancy, 27 during childbirth, 25 after childbirth and 24 for newborns. In addition to the 92 medically recognized danger signs, 20 local Haitian danger signs were recorded (Table 2).
Table 2. Danger Signs and Traditional Beliefs Reported for Pregnancy, Childbirth, After Childbirth and Newborns

<table>
<thead>
<tr>
<th>Danger Signs During Pregnancy</th>
<th>Frequency</th>
<th>Percent of Responses N=810</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hemorrhage</td>
<td>503</td>
<td>62.1%</td>
</tr>
<tr>
<td>Fluid leaking</td>
<td>485</td>
<td>59.9%</td>
</tr>
<tr>
<td>Swollen feet</td>
<td>461</td>
<td>56.9%</td>
</tr>
<tr>
<td>Headache</td>
<td>437</td>
<td>54.0%</td>
</tr>
<tr>
<td>Fever</td>
<td>195</td>
<td>24.1%</td>
</tr>
<tr>
<td>Eclampsia</td>
<td>128</td>
<td>15.8%</td>
</tr>
<tr>
<td>Misstep and falling</td>
<td>38</td>
<td>4.7%</td>
</tr>
<tr>
<td>Baby not moving in womb</td>
<td>29</td>
<td>3.6%</td>
</tr>
<tr>
<td>Anorexia</td>
<td>21</td>
<td>2.6%</td>
</tr>
<tr>
<td>Stomach ache</td>
<td>20</td>
<td>2.5%</td>
</tr>
<tr>
<td>Weakness</td>
<td>18</td>
<td>2.2%</td>
</tr>
<tr>
<td>Anemia</td>
<td>18</td>
<td>2.2%</td>
</tr>
<tr>
<td>Inflammation</td>
<td>10</td>
<td>1.2%</td>
</tr>
<tr>
<td>Infection</td>
<td>9</td>
<td>1.1%</td>
</tr>
<tr>
<td>Waist pain</td>
<td>6</td>
<td>0.7%</td>
</tr>
<tr>
<td>Vomiting</td>
<td>4</td>
<td>0.5%</td>
</tr>
<tr>
<td>Miscarriage</td>
<td>2</td>
<td>0.2%</td>
</tr>
<tr>
<td>Tetanus</td>
<td>1</td>
<td>0.1%</td>
</tr>
<tr>
<td><strong>Traditional Beliefs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Getting very upset</td>
<td>10</td>
<td>1.2%</td>
</tr>
<tr>
<td>Hyper ventilation</td>
<td>7</td>
<td>0.9%</td>
</tr>
<tr>
<td>Carry heavy load</td>
<td>6</td>
<td>0.7%</td>
</tr>
<tr>
<td>Arrested fetal growth</td>
<td>5</td>
<td>0.6%</td>
</tr>
<tr>
<td>Tooth ache</td>
<td>4</td>
<td>0.5%</td>
</tr>
<tr>
<td><strong>Danger Signs During Childbirth</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prolonged labor</td>
<td>410</td>
<td>50.6%</td>
</tr>
<tr>
<td>Malpresentation</td>
<td>145</td>
<td>17.9%</td>
</tr>
<tr>
<td>Eclampsia</td>
<td>127</td>
<td>15.7%</td>
</tr>
<tr>
<td>Hemorrhage</td>
<td>91</td>
<td>11.2%</td>
</tr>
<tr>
<td>Stomach ache</td>
<td>43</td>
<td>5.3%</td>
</tr>
<tr>
<td>Weakness</td>
<td>37</td>
<td>4.6%</td>
</tr>
<tr>
<td>Water broke long before childbirth</td>
<td>33</td>
<td>4.1%</td>
</tr>
<tr>
<td>Waist pain</td>
<td>29</td>
<td>3.6%</td>
</tr>
<tr>
<td>Fever</td>
<td>19</td>
<td>2.3%</td>
</tr>
<tr>
<td>Headache</td>
<td>18</td>
<td>2.2%</td>
</tr>
<tr>
<td>A lot of fluid</td>
<td>16</td>
<td>2.0%</td>
</tr>
<tr>
<td>Severe pain</td>
<td>16</td>
<td>2.0%</td>
</tr>
<tr>
<td>Baby died before labor</td>
<td>15</td>
<td>1.9%</td>
</tr>
<tr>
<td>Faint</td>
<td>14</td>
<td>1.7%</td>
</tr>
<tr>
<td>Vomiting</td>
<td>14</td>
<td>1.7%</td>
</tr>
<tr>
<td>Tetanus</td>
<td>8</td>
<td>1.0%</td>
</tr>
<tr>
<td>Swollen feet</td>
<td>8</td>
<td>1.0%</td>
</tr>
<tr>
<td>Infection</td>
<td>6</td>
<td>0.7%</td>
</tr>
<tr>
<td>Placenta doesn't come out</td>
<td>5</td>
<td>0.6%</td>
</tr>
<tr>
<td>Placenta previa</td>
<td>4</td>
<td>0.5%</td>
</tr>
<tr>
<td>Premature labor</td>
<td>3</td>
<td>0.4%</td>
</tr>
<tr>
<td>Danger Signs During Pregnancy</td>
<td>Frequency</td>
<td>Percent of Responses</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>-----------</td>
<td>----------------------</td>
</tr>
<tr>
<td>Disease</td>
<td>3</td>
<td>0.4%</td>
</tr>
<tr>
<td>Shaking chills</td>
<td>3</td>
<td>0.4%</td>
</tr>
<tr>
<td>Anorexia</td>
<td>2</td>
<td>0.2%</td>
</tr>
<tr>
<td>Swollen hands, face, body</td>
<td>2</td>
<td>0.2%</td>
</tr>
<tr>
<td>Diarrhea</td>
<td>1</td>
<td>0.1%</td>
</tr>
<tr>
<td>Unclean razor</td>
<td>1</td>
<td>0.1%</td>
</tr>
<tr>
<td>Traditional Beliefs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fetus sits on mother's heart</td>
<td>6</td>
<td>0.7%</td>
</tr>
<tr>
<td>Not referral</td>
<td>4</td>
<td>0.5%</td>
</tr>
<tr>
<td>Voodoo</td>
<td>3</td>
<td>0.4%</td>
</tr>
<tr>
<td><strong>Danger Signs After Childbirth</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hemorrhage</td>
<td>273</td>
<td>33.7%</td>
</tr>
<tr>
<td>Fever</td>
<td>199</td>
<td>24.6%</td>
</tr>
<tr>
<td>Placenta stays in womb</td>
<td>120</td>
<td>14.8%</td>
</tr>
<tr>
<td>Stomach ache</td>
<td>104</td>
<td>12.8%</td>
</tr>
<tr>
<td>Pieces of placenta left in womb</td>
<td>94</td>
<td>11.6%</td>
</tr>
<tr>
<td>After pains</td>
<td>93</td>
<td>11.5%</td>
</tr>
<tr>
<td>No milk in breast</td>
<td>77</td>
<td>9.5%</td>
</tr>
<tr>
<td>Strong headache</td>
<td>66</td>
<td>8.1%</td>
</tr>
<tr>
<td>Infection</td>
<td>54</td>
<td>6.7%</td>
</tr>
<tr>
<td>Eclampsia</td>
<td>49</td>
<td>6.0%</td>
</tr>
<tr>
<td>Pain</td>
<td>45</td>
<td>5.6%</td>
</tr>
<tr>
<td>Anemia</td>
<td>33</td>
<td>4.1%</td>
</tr>
<tr>
<td>Anorexia</td>
<td>28</td>
<td>3.5%</td>
</tr>
<tr>
<td>Cough and cold</td>
<td>19</td>
<td>2.3%</td>
</tr>
<tr>
<td>Swollen feet</td>
<td>19</td>
<td>2.3%</td>
</tr>
<tr>
<td>Abscess on breast</td>
<td>14</td>
<td>1.7%</td>
</tr>
<tr>
<td>Stiff body</td>
<td>14</td>
<td>1.7%</td>
</tr>
<tr>
<td>Swollen hands, face and body</td>
<td>13</td>
<td>1.6%</td>
</tr>
<tr>
<td>Vomiting</td>
<td>9</td>
<td>1.1%</td>
</tr>
<tr>
<td>Diarrhea</td>
<td>7</td>
<td>0.9%</td>
</tr>
<tr>
<td>Weakness</td>
<td>5</td>
<td>0.6%</td>
</tr>
<tr>
<td>Tetanus</td>
<td>3</td>
<td>0.4%</td>
</tr>
<tr>
<td>Vaginal discharge</td>
<td>3</td>
<td>0.4%</td>
</tr>
<tr>
<td>Shaking chills</td>
<td>2</td>
<td>0.2%</td>
</tr>
<tr>
<td>Traditional Beliefs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Getting cold</td>
<td>22</td>
<td>2.7%</td>
</tr>
<tr>
<td>Strong emotion</td>
<td>15</td>
<td>1.9%</td>
</tr>
<tr>
<td>Not using herbal vapor</td>
<td>9</td>
<td>1.1%</td>
</tr>
<tr>
<td>Big belly</td>
<td>6</td>
<td>0.7%</td>
</tr>
<tr>
<td>Get a draft of air</td>
<td>6</td>
<td>0.7%</td>
</tr>
<tr>
<td>Not drinking herbal tea</td>
<td>3</td>
<td>0.4%</td>
</tr>
<tr>
<td><strong>Danger Signs for Newborns</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pneumonia, bronchitis, cold</td>
<td>260</td>
<td>32.1%</td>
</tr>
<tr>
<td>Not breast feeding</td>
<td>210</td>
<td>25.9%</td>
</tr>
<tr>
<td>Stomach ache</td>
<td>178</td>
<td>22.0%</td>
</tr>
<tr>
<td>Tetanus and tight jaw</td>
<td>157</td>
<td>19.4%</td>
</tr>
<tr>
<td>Fever</td>
<td>96</td>
<td>11.9%</td>
</tr>
<tr>
<td>No stool</td>
<td>90</td>
<td>11.1%</td>
</tr>
</tbody>
</table>
All reported danger signs were grouped to reflect specific complications (Table 3). This process was designed to simplify the analysis by identifying groups of danger signs for each of the 4 periods of pregnancy, delivery, after delivery and newborn. It allowed the researcher to examine knowledge of a specific complication by recognizing one or more of its danger signs. There were a total of 16 grouped danger signs for the four time periods. These complications were eclampsia, bleeding, infection and other problems during pregnancy. During childbirth the complications were eclampsia, bleeding, prolonged labor, infection and other problems. After childbirth eclampsia, bleeding, infection and other
problems were the complications. Newborn complications consisted of infection, malformation and other problems.

Table 3. Danger Signs Grouped into Complications by Pregnancy/Delivery Period

<table>
<thead>
<tr>
<th>Complication</th>
<th>Danger Sign</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>During Pregnancy</strong></td>
<td></td>
</tr>
<tr>
<td>Eclampsia</td>
<td>headache</td>
</tr>
<tr>
<td></td>
<td>eclampsia</td>
</tr>
<tr>
<td></td>
<td>swollen feet</td>
</tr>
<tr>
<td></td>
<td>stomach ache/waist pain</td>
</tr>
<tr>
<td>Bleeding</td>
<td>hemorrhage</td>
</tr>
<tr>
<td></td>
<td>miscarriage</td>
</tr>
<tr>
<td></td>
<td>anemia/weakness</td>
</tr>
<tr>
<td>Infection</td>
<td>tetanus</td>
</tr>
<tr>
<td></td>
<td>fever</td>
</tr>
<tr>
<td></td>
<td>infection/inflammation</td>
</tr>
<tr>
<td>Other Problems with pregnancy</td>
<td>fluid leaking</td>
</tr>
<tr>
<td></td>
<td>baby not moving</td>
</tr>
<tr>
<td></td>
<td>vomiting</td>
</tr>
<tr>
<td></td>
<td>anorexia</td>
</tr>
<tr>
<td></td>
<td>misstep and falling</td>
</tr>
<tr>
<td>Other symptoms not usually associated specifically with pregnancy</td>
<td>getting very upset</td>
</tr>
<tr>
<td></td>
<td>carry heavy load</td>
</tr>
<tr>
<td></td>
<td>hyper ventilation</td>
</tr>
<tr>
<td></td>
<td>toothache</td>
</tr>
<tr>
<td><strong>During Childbirth</strong></td>
<td></td>
</tr>
<tr>
<td>Eclampsia</td>
<td>headache</td>
</tr>
<tr>
<td></td>
<td>eclampsia</td>
</tr>
<tr>
<td></td>
<td>swollen hands, face and body</td>
</tr>
<tr>
<td></td>
<td>swollen feet</td>
</tr>
<tr>
<td></td>
<td>a lot of fluid</td>
</tr>
<tr>
<td>Bleeding</td>
<td>hemorrhage</td>
</tr>
<tr>
<td></td>
<td>placenta doesn’t come out</td>
</tr>
<tr>
<td></td>
<td>placenta previa</td>
</tr>
<tr>
<td></td>
<td>weakness/faint</td>
</tr>
<tr>
<td>Prolonged labor</td>
<td>dystocia</td>
</tr>
<tr>
<td></td>
<td>stomach ache</td>
</tr>
<tr>
<td></td>
<td>waist pain</td>
</tr>
<tr>
<td></td>
<td>malpresentation</td>
</tr>
<tr>
<td></td>
<td>severe pain</td>
</tr>
<tr>
<td>Infection</td>
<td>fever</td>
</tr>
<tr>
<td></td>
<td>water broke long before childbirth</td>
</tr>
<tr>
<td></td>
<td>shaking chills</td>
</tr>
<tr>
<td></td>
<td>infection</td>
</tr>
</tbody>
</table>
| Other Problems during childbirth | unclean razor  
tetanus  
disease |
|----------------------------------|----------------------------------|
| Other symptoms not usually associated specifically during childbirth | a lot of fluid  
baby died before it came out  
vomiting  
diarrhea  
anorexia |
| After Childbirth | fetus sits on mother's heart  
voodoo  
no referral |
| Complication | Danger Sign |
| Eclampsia | swollen feet  
wollen hands, face, and body  
stomach ache  
strong headache  
eclampsia |
| Bleeding | hemorrhage  
anemia  
placenta stays in womb  
pieces of placenta stay in womb |
| Infection | fever  
shaking chills  
vaginal discharge  
infection  
vomiting  
abscess on breast  
diarrhea  
cough and cold  
stiff body/tetanus |
| Other Problems after childbirth | pain  
after pains  
no milk in breasts  
anorexia  
get cold |
| Other symptoms not usually associated specifically after childbirth | strong emotion  
herbal vapor  
herbal tea  
big belly  
exposed to drafts of air |
| Newborns | Danger Sign |
| Infection | tetanus, stiff body  
unclean razor  
fever  
pneumonia, bronchitis, cold  
diarrhea  
vomiting |
Respondents’ General Knowledge of Danger Signs

Overall, respondents mentioned more danger signs on newborns followed by after childbirth, during pregnancy and during childbirth (Table 4.1).

| Table 4.1. Types of Danger Sign Complications by Pregnancy/Delivery Period |
|--------------------------------------------------|------------------|-------------------|
| Overall responses                                | Mean No. of Responses | Std. Deviation |
| During pregnancy                                 | 1.65              | 1.03             |
| During childbirth                                | 1.32              | 0.92             |
| After childbirth                                 | 1.69              | 1.16             |
| Newborns                                         | 1.79              | 1.12             |
Very few people had no knowledge of the grouped complications (3.6%), and more than 80% of respondents could identify one or more danger signs in each period; however, 60% of them could only report one to two for each period. Over 50% of respondents could identify fewer than half of the 16 possible complications. Almost a quarter of respondents had three or more danger signs for newborns; 20-23%, for after childbirth and during pregnancy; and only 9% of respondents reported 3 or more danger signs for childbirth (Table 4.2).

Table 4.2. Frequency of Danger Sign Complications

<table>
<thead>
<tr>
<th>Danger Sign Complications</th>
<th>Frequency</th>
<th>% (N=810)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Overall Responses</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>29</td>
<td>3.6</td>
</tr>
<tr>
<td>1-3</td>
<td>107</td>
<td>13.2</td>
</tr>
<tr>
<td>4-6</td>
<td>277</td>
<td>34.1</td>
</tr>
<tr>
<td>7-9</td>
<td>272</td>
<td>33.6</td>
</tr>
<tr>
<td>10-12</td>
<td>98</td>
<td>12.1</td>
</tr>
<tr>
<td>13 and Above</td>
<td>27</td>
<td>3.3</td>
</tr>
<tr>
<td><strong>During pregnancy</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>155</td>
<td>19.1</td>
</tr>
<tr>
<td>1-2</td>
<td>492</td>
<td>60.7</td>
</tr>
<tr>
<td>≥ 3</td>
<td>163</td>
<td>20.1</td>
</tr>
<tr>
<td><strong>During childbirth</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>150</td>
<td>18.5</td>
</tr>
<tr>
<td>1-2</td>
<td>585</td>
<td>72.2</td>
</tr>
<tr>
<td>≥ 3</td>
<td>75</td>
<td>9.2</td>
</tr>
<tr>
<td><strong>After childbirth</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>134</td>
<td>16.5</td>
</tr>
<tr>
<td>1-2</td>
<td>486</td>
<td>60.0</td>
</tr>
<tr>
<td>≥ 3</td>
<td>190</td>
<td>23.4</td>
</tr>
<tr>
<td><strong>Newborns</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>98</td>
<td>12.1</td>
</tr>
<tr>
<td>1-2</td>
<td>514</td>
<td>63.5</td>
</tr>
<tr>
<td>≥ 3</td>
<td>198</td>
<td>24.5</td>
</tr>
</tbody>
</table>
Although respondents identified more danger signs for the after childbirth and newborn periods, the answers were more dispersed (Table 4.1). The responses during pregnancy and during childbirth were more centralized on a few danger signs. Four danger signs during pregnancy (hemorrhage, fluid leaking, swollen feet, and head ache) and one during childbirth (prolonged labor) were reported by more than 50% of respondents (Table 5). Although almost a quarter of people mentioned 3 or more danger signs for the after childbirth and newborn periods, there was much less consensus about the danger signs reported.
Table 5. Most Frequently Reported Danger Signs

<table>
<thead>
<tr>
<th>Types of Danger Signs</th>
<th>n (N= 810)</th>
<th>% (N= 810)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>During Pregnancy</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>hemorrhage</td>
<td>503</td>
<td>62.1%</td>
</tr>
<tr>
<td>fluid leaking</td>
<td>485</td>
<td>59.9%</td>
</tr>
<tr>
<td>swollen feet</td>
<td>461</td>
<td>56.9%</td>
</tr>
<tr>
<td>head ache</td>
<td>437</td>
<td>54.0%</td>
</tr>
<tr>
<td>fever</td>
<td>195</td>
<td>24.1%</td>
</tr>
<tr>
<td>eclampsia</td>
<td>128</td>
<td>15.8%</td>
</tr>
<tr>
<td><strong>During Childbirth</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>prolonged labor</td>
<td>410</td>
<td>50.6%</td>
</tr>
<tr>
<td>malpresentation</td>
<td>145</td>
<td>17.9%</td>
</tr>
<tr>
<td>eclampsia</td>
<td>127</td>
<td>15.7%</td>
</tr>
<tr>
<td>hemorrhage</td>
<td>91</td>
<td>11.2%</td>
</tr>
<tr>
<td>stomach ache</td>
<td>43</td>
<td>5.3%</td>
</tr>
<tr>
<td>weakness</td>
<td>37</td>
<td>4.6%</td>
</tr>
<tr>
<td><strong>After Childbirth</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>hemorrhage</td>
<td>273</td>
<td>33.7%</td>
</tr>
<tr>
<td>fever</td>
<td>199</td>
<td>24.6%</td>
</tr>
<tr>
<td>placenta stays in womb</td>
<td>120</td>
<td>14.8%</td>
</tr>
<tr>
<td>stomach ache</td>
<td>104</td>
<td>12.8%</td>
</tr>
<tr>
<td>pieces of placenta left in womb</td>
<td>94</td>
<td>11.6%</td>
</tr>
<tr>
<td>after pains</td>
<td>93</td>
<td>11.5%</td>
</tr>
<tr>
<td><strong>Newborns</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>pneumonia, bronchitis, cold</td>
<td>260</td>
<td>32.1%</td>
</tr>
<tr>
<td>not breast feeding</td>
<td>210</td>
<td>25.9%</td>
</tr>
<tr>
<td>stomach ache</td>
<td>178</td>
<td>22.0%</td>
</tr>
<tr>
<td>tetanus and tight jaw</td>
<td>157</td>
<td>19.4%</td>
</tr>
<tr>
<td>fever</td>
<td>96</td>
<td>11.9%</td>
</tr>
<tr>
<td>umbilical stump doesn't fall</td>
<td>90</td>
<td>11.1%</td>
</tr>
<tr>
<td>no stool</td>
<td>90</td>
<td>11.1%</td>
</tr>
</tbody>
</table>

**Danger Signs During Pregnancy**

Approximately 50% to 60% of all respondents had knowledge of hemorrhage, fluid leaking, swollen feet and headache as danger signs during pregnancy. About one quarter of the respondents mentioned fever and 16% cited eclampsia as danger signs during pregnancy (Table 5). More than 75% of the respondents reported eclampsia as a
complication during pregnancy, 65% indicated bleeding and 69% mentioned other combined problems (Figure 3). On average people reported 2.4 complications from the total of 4 (Table 6).

**Danger Signs During Childbirth**

Prolonged labor was the most frequently reported danger sign during childbirth (50%). Although there were 27 types of danger signs people reported (Table 2), the frequency of all danger signs except prolonged labor was very low. In addition, people indicated fewer complications during childbirth than any other period. Except for prolonged labor (64%), other complications such as bleeding, eclampsia and symptoms of infections were cited by less than 20% (Figure 3). On average only 1.2 complications of a possible 5 were identified (Table 6).

**Danger Signs After Childbirth**

About one-third of the respondents had knowledge of hemorrhage and 25% mentioned fever. Between 11% and 15% of respondents had answers about the placenta staying in the womb, stomach ache and after pain (Table 2). About 30% reported one or more danger signs related to infection, eclampsia and other combined problems. More than half
mentioned bleeding as a complication after childbirth (Figure 3). On average, 1.5 from a total of 4 complications were identified (Table 6).

**Danger Signs For Newborns**

The danger signs for newborns identified were pneumonia (32%), not breast feeding (26%), stomach ache (22%), tetanus (19%), fever (12%), umbilical stump does not fall (11%) and no stool (11.1%) (Table 2). In total, respondents mentioned 24 kinds of danger signs; however, the average number of answers was 1.8. In general, people had low knowledge about newborn danger signs. The most frequently mentioned newborn danger signs were pneumonia and not breast feeding. Only 6% mentioned not crying at all and less than 1% mentioned prematurity as danger signs. However, 11% reported no stool and 6% no urine as danger signs (Table 2). The newborn complication that was most readily identified was infection (Figure 3). The average number of complications identified was 1.1 out 3 complications (Table 6).
Figure 3. Knowledge of Complications by Pregnancy, Childbirth, After Childbirth and Newborn

Table 6. Average Number of Complications

<table>
<thead>
<tr>
<th>Number of Complications per person Reported</th>
<th>Total (total=16)</th>
<th>During Pregnancy (total=4)</th>
<th>During Childbirth (total=5)</th>
<th>After Childbirth (total=4)</th>
<th>On Newborn (total=3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>6.1</td>
<td>2.4</td>
<td>1.2</td>
<td>1.5</td>
<td>1.1</td>
</tr>
<tr>
<td>Std. Deviation</td>
<td>2.6</td>
<td>1.2</td>
<td>0.6</td>
<td>1.0</td>
<td>0.8</td>
</tr>
</tbody>
</table>

Table 7 represents the danger signs based on traditional beliefs. Strong negative emotions were believed harmful for pregnant mothers (1.2%) and mothers after childbirth (1.9%). This was related to the newborn danger sign of drinking spoiled milk (strong emotion is believed to spoil the mother's milk). Being exposed to drafts of air was reported by 1-2% of respondents for all periods except during childbirth. Mothers getting cold was a danger sign after childbirth (2.7%) and 3% reported that a split head was a danger sign for newborns.
Table 7. Danger Signs Based on Traditional Beliefs

<table>
<thead>
<tr>
<th>Danger Signs</th>
<th>Frequency</th>
<th>% (n= 810)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>During pregnancy</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>getting very upset</td>
<td>10</td>
<td>1.2%</td>
</tr>
<tr>
<td>hyper ventilation</td>
<td>7</td>
<td>0.9%</td>
</tr>
<tr>
<td>carry heavy load</td>
<td>6</td>
<td>0.7%</td>
</tr>
<tr>
<td>arrested fetal growth</td>
<td>5</td>
<td>0.6%</td>
</tr>
<tr>
<td>tooth ache</td>
<td>4</td>
<td>0.5%</td>
</tr>
<tr>
<td><strong>During childbirth</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>fetus sits on mother's heart</td>
<td>6</td>
<td>0.7%</td>
</tr>
<tr>
<td>no referral</td>
<td>4</td>
<td>0.5%</td>
</tr>
<tr>
<td>voodoo</td>
<td>3</td>
<td>0.4%</td>
</tr>
<tr>
<td><strong>After childbirth</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>get cold</td>
<td>22</td>
<td>2.7%</td>
</tr>
<tr>
<td>strong emotion</td>
<td>15</td>
<td>1.9%</td>
</tr>
<tr>
<td>not using herbal vapors</td>
<td>9</td>
<td>1.1%</td>
</tr>
<tr>
<td>big belly</td>
<td>6</td>
<td>0.7%</td>
</tr>
<tr>
<td>get a draft of air</td>
<td>6</td>
<td>0.7%</td>
</tr>
<tr>
<td>not drinking herbal tea</td>
<td>3</td>
<td>0.4%</td>
</tr>
<tr>
<td><strong>On newborn</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>split head</td>
<td>24</td>
<td>3.0%</td>
</tr>
<tr>
<td>exposure to cold air</td>
<td>15</td>
<td>1.9%</td>
</tr>
<tr>
<td>drinking fluids during birth</td>
<td>5</td>
<td>0.6%</td>
</tr>
<tr>
<td>cold body</td>
<td>5</td>
<td>0.6%</td>
</tr>
<tr>
<td>water in baby's head</td>
<td>4</td>
<td>0.5%</td>
</tr>
<tr>
<td>drinking spoiled milk</td>
<td>2</td>
<td>0.2%</td>
</tr>
</tbody>
</table>

Comparison of Old and New HHF Areas

One area of study interest was whether knowledge was affected by length of time a village had been in HHF. This was measured by the categorical variable of villages in HHF prior to 1997 and those from 1997 on.

Selected socio-demographic characteristics for New HHF and Old HHF areas are found in Table 8. While the majority of respondents were female in both areas, the New areas had a smaller proportion of male respondents and this was statistically significant. There
were no significant differences in age, number of children and skilled attendance during childbirth.

Table 8. Selected Socio-demographic Characteristics of Respondents by Old and New HHF Areas

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>New HHF Areas (n=338) %</th>
<th>Old HHF Areas (n=472) %</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>88.8</td>
<td>80.7</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>11.2</td>
<td>19.3</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Below 19</td>
<td>7.1</td>
<td>11.3</td>
<td></td>
</tr>
<tr>
<td>20-29</td>
<td>30.8</td>
<td>25.3</td>
<td></td>
</tr>
<tr>
<td>30-39</td>
<td>28.1</td>
<td>30.6</td>
<td></td>
</tr>
<tr>
<td>40-49</td>
<td>26.0</td>
<td>27.9</td>
<td></td>
</tr>
<tr>
<td>50 and above</td>
<td>8.0</td>
<td>4.9</td>
<td></td>
</tr>
<tr>
<td>Mean of age</td>
<td>34.8</td>
<td>33.9</td>
<td></td>
</tr>
<tr>
<td>Skilled Attendances during Childbirth</td>
<td>3.4</td>
<td>6.5</td>
<td>NS</td>
</tr>
<tr>
<td>Yes</td>
<td>96.6</td>
<td>93.5</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Children</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>13.6</td>
<td>20.9</td>
<td></td>
</tr>
<tr>
<td>1-2</td>
<td>24.0</td>
<td>22.1</td>
<td></td>
</tr>
<tr>
<td>3-4</td>
<td>21.0</td>
<td>19.4</td>
<td></td>
</tr>
<tr>
<td>5-6</td>
<td>25.7</td>
<td>19.8</td>
<td></td>
</tr>
<tr>
<td>7-8</td>
<td>10.9</td>
<td>12.3</td>
<td></td>
</tr>
<tr>
<td>9 and above</td>
<td>4.7</td>
<td>5.5</td>
<td></td>
</tr>
<tr>
<td>Mean of Number of Children</td>
<td>3.8</td>
<td>3.6</td>
<td></td>
</tr>
</tbody>
</table>

* Significance p<0.05. NS=Not significant
Knowledge of Danger Signs by Old and New Areas

Means comparison tests were used to determine danger sign knowledge differences between the two areas. Table 9 shows that respondents in new HHF areas had significantly more responses than those in old HHF areas for all periods—pregnancy, delivery, post-natal and newborn. Overall, approximately a quarter of respondents (24.2%) in New HHF areas reported 10 or more danger signs compared with 9.2% people in Old HHF areas.

While there was a total of 92 possible danger sign responses in the survey, the mean number of reported danger signs was low in both New HHF (7.2) and Old HHF (5.9) areas. For each obstetric and newborn period, the average responses per person were 2 or less. In addition, knowledge in one period was correlated with knowledge in other periods.
Table 9. Danger Sign and Complication Knowledge in Old and New HHF Areas

<table>
<thead>
<tr>
<th>Number of Danger Signs</th>
<th>New HHF Areas (n=338)</th>
<th>Old HHF Areas (n=472)</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>During Pregnancy</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>16.9 %</td>
<td>20.8 %</td>
<td></td>
</tr>
<tr>
<td>1-2</td>
<td>48.8 %</td>
<td>69.3 %</td>
<td></td>
</tr>
<tr>
<td>≥ 3</td>
<td>34.3 %</td>
<td>9.9 %</td>
<td></td>
</tr>
<tr>
<td>Mean no. of Responses</td>
<td>1.9</td>
<td>1.5</td>
<td>p&lt;.001*</td>
</tr>
<tr>
<td><strong>During Childbirth</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>16.9 %</td>
<td>19.7 %</td>
<td></td>
</tr>
<tr>
<td>1-2</td>
<td>71.6 %</td>
<td>72.6 %</td>
<td></td>
</tr>
<tr>
<td>≥ 3</td>
<td>11.6 %</td>
<td>7.6 %</td>
<td></td>
</tr>
<tr>
<td>Mean no. of Responses</td>
<td>1.4</td>
<td>1.3</td>
<td>P=.024*</td>
</tr>
<tr>
<td><strong>After Childbirth</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>14.5 %</td>
<td>18.0 %</td>
<td></td>
</tr>
<tr>
<td>1-2</td>
<td>54.7 %</td>
<td>63.8 %</td>
<td></td>
</tr>
<tr>
<td>≥ 3</td>
<td>30.8 %</td>
<td>18.2 %</td>
<td></td>
</tr>
<tr>
<td>Mean no. of Responses</td>
<td>1.9</td>
<td>1.6</td>
<td>P&lt;.001*</td>
</tr>
<tr>
<td><strong>Newborns</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>12.1 %</td>
<td>12.1 %</td>
<td></td>
</tr>
<tr>
<td>1-2</td>
<td>55.4 %</td>
<td>69.3 %</td>
<td></td>
</tr>
<tr>
<td>≥ 3</td>
<td>32.6 %</td>
<td>18.6 %</td>
<td></td>
</tr>
<tr>
<td>Mean no. of Responses</td>
<td>2.0</td>
<td>1.6</td>
<td>P&lt;.001*</td>
</tr>
<tr>
<td><strong>Total Complication Knowledge</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>2.7 %</td>
<td>4.2 %</td>
<td></td>
</tr>
<tr>
<td>1-3</td>
<td>10.9 %</td>
<td>14.9 %</td>
<td></td>
</tr>
<tr>
<td>4-6</td>
<td>29.0 %</td>
<td>37.9 %</td>
<td></td>
</tr>
<tr>
<td>7-9</td>
<td>33.1 %</td>
<td>33.9 %</td>
<td></td>
</tr>
<tr>
<td>10-12</td>
<td>17.4 %</td>
<td>8.3 %</td>
<td></td>
</tr>
<tr>
<td>13 and above</td>
<td>6.8 %</td>
<td>0.8 %</td>
<td></td>
</tr>
<tr>
<td>Mean no. of Responses</td>
<td>7.2</td>
<td>5.9</td>
<td>P&lt;.001*</td>
</tr>
<tr>
<td><strong>Total Traditional Danger Signs</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>84.9 %</td>
<td>86.7 %</td>
<td></td>
</tr>
<tr>
<td>1-2</td>
<td>14.8 %</td>
<td>12.9 %</td>
<td></td>
</tr>
<tr>
<td>≥ 3</td>
<td>0.3 %</td>
<td>0.4 %</td>
<td></td>
</tr>
<tr>
<td>Mean no. of Responses</td>
<td>0.18</td>
<td>0.16</td>
<td>NS</td>
</tr>
</tbody>
</table>

* Significance p<0.05. NS=Not significant
Figure 4. Comparison of New and Old HHF Area Knowledge of Complications by Pregnancy, Childbirth, After Childbirth and Newborns
In general, New HHF Areas had higher levels of knowledge about complications than Old HHF Areas (Figure 4). However, in both HHF areas more than 60% of respondents reported at least one of the complications of eclampsia, bleeding, and other problems during pregnancy; prolonged labor during childbirth; and infection in newborns. In the New HHF Area respondents were more likely to report danger signs relating to bleeding, infection, other problems during pregnancy, bleeding during childbirth, eclampsia, bleeding after childbirth and malformation than those in Old HHF Areas.

Overall, people had lower awareness of complications during childbirth than during pregnancy and after childbirth. Eclampsia, bleeding and infection were more likely to be identified with pregnancy and after childbirth than with the childbirth period. Prolonged labor was the main complication that people identified during the childbirth period.

The female respondents in New HHF Areas had significantly more responses than women in Old HHF Areas in all periods (Table 9.1). Generally, women tended to mention more danger signs for newborns and fewer for during childbirth. A comparison of the mean number of complications reported in New and Old HHF Areas shows that women in the new areas reported bleeding, infection, and other problems during pregnancy, bleeding during childbirth, eclampsia and bleeding after childbirth and malformation and other problems in newborns at a significantly higher rate than women in Old HHF Areas.
There was no difference between men's knowledge of complications between the two areas (Table 9.2). Males in both areas showed no significant differences in knowledge for any period. In general, males had more responses for after childbirth and newborn periods than for during pregnancy and childbirth (Table 9.2).

### Table 9.1. Mean Danger Signs Identified by Women in New and Old HHF Areas for Each Obstetric and Newborn Period

<table>
<thead>
<tr>
<th>Danger Signs</th>
<th>Total Mean</th>
<th>SD</th>
<th>New Areas (n=300 women) Mean</th>
<th>SD</th>
<th>Old Areas (n=381 women) Mean</th>
<th>SD</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall danger Signs</td>
<td>6.65</td>
<td>3.046</td>
<td>7.39</td>
<td>3.288</td>
<td>6.07</td>
<td>2.762</td>
<td>p&lt;.001*</td>
</tr>
<tr>
<td>During Pregnancy</td>
<td>1.73</td>
<td>1.008</td>
<td>2.00</td>
<td>1.033</td>
<td>1.53</td>
<td>.939</td>
<td>p&lt;.001*</td>
</tr>
<tr>
<td>During Childbirth</td>
<td>1.36</td>
<td>.918</td>
<td>1.44</td>
<td>.929</td>
<td>1.30</td>
<td>.906</td>
<td>p=.042*</td>
</tr>
<tr>
<td>After Childbirth</td>
<td>1.73</td>
<td>1.154</td>
<td>1.91</td>
<td>1.250</td>
<td>1.58</td>
<td>1.052</td>
<td>p&lt;.001*</td>
</tr>
<tr>
<td>On Newborn</td>
<td>1.83</td>
<td>1.121</td>
<td>2.05</td>
<td>1.242</td>
<td>1.66</td>
<td>.984</td>
<td>p&lt;.001*</td>
</tr>
</tbody>
</table>

SD=standard deviation. * Significance p<0.05

### Table 9.2. Mean Danger Signs Identified by Men in New and Old HHF Areas for Each Obstetric and Newborn Period

<table>
<thead>
<tr>
<th>Danger Signs</th>
<th>Total Mean</th>
<th>SD</th>
<th>New Areas (n=38 men) Mean</th>
<th>SD</th>
<th>Old Areas (n=91 men) Mean</th>
<th>SD</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall danger Signs</td>
<td>5.34</td>
<td>3.220</td>
<td>5.42</td>
<td>3.636</td>
<td>5.31</td>
<td>3.050</td>
<td>NS</td>
</tr>
<tr>
<td>During Pregnancy</td>
<td>1.18</td>
<td>1.027</td>
<td>1.13</td>
<td>1.121</td>
<td>1.20</td>
<td>.945</td>
<td>NS</td>
</tr>
<tr>
<td>During Childbirth</td>
<td>1.12</td>
<td>.919</td>
<td>1.16</td>
<td>.886</td>
<td>1.11</td>
<td>.936</td>
<td>NS</td>
</tr>
<tr>
<td>After Childbirth</td>
<td>1.47</td>
<td>1.173</td>
<td>1.55</td>
<td>1.288</td>
<td>1.44</td>
<td>1.128</td>
<td>NS</td>
</tr>
<tr>
<td>On Newborn</td>
<td>1.57</td>
<td>1.074</td>
<td>1.58</td>
<td>1.266</td>
<td>1.56</td>
<td>.911</td>
<td>NS</td>
</tr>
</tbody>
</table>

SD=standard deviation * Significance p<0.05. NS=Not significant
<table>
<thead>
<tr>
<th>Complications</th>
<th>Female</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>SD</td>
</tr>
<tr>
<td>During Pregnancy</td>
<td>Mean</td>
<td>.79</td>
</tr>
<tr>
<td>Eclampsia</td>
<td>.69</td>
<td>.46</td>
</tr>
<tr>
<td>Bleeding</td>
<td>.28</td>
<td>.45</td>
</tr>
<tr>
<td>Infection</td>
<td>.71</td>
<td>.45</td>
</tr>
<tr>
<td>Other problems</td>
<td>.03</td>
<td>.18</td>
</tr>
<tr>
<td>Traditional beliefs</td>
<td>.02</td>
<td>.13</td>
</tr>
<tr>
<td>During Childbirth</td>
<td>Mean</td>
<td>.21</td>
</tr>
<tr>
<td>Eclampsia</td>
<td>.19</td>
<td>.39</td>
</tr>
<tr>
<td>Bleeding</td>
<td>.65</td>
<td>.48</td>
</tr>
<tr>
<td>Prolonged labor</td>
<td>.11</td>
<td>.31</td>
</tr>
<tr>
<td>Infection</td>
<td>.02</td>
<td>.15</td>
</tr>
<tr>
<td>Other problems</td>
<td>.02</td>
<td>.13</td>
</tr>
<tr>
<td>Traditional beliefs</td>
<td>.30</td>
<td>.46</td>
</tr>
<tr>
<td>After Childbirth</td>
<td>Mean</td>
<td>.55</td>
</tr>
<tr>
<td>Eclampsia</td>
<td>.36</td>
<td>.48</td>
</tr>
<tr>
<td>Bleeding</td>
<td>.30</td>
<td>.46</td>
</tr>
<tr>
<td>Infection</td>
<td>.05</td>
<td>.21</td>
</tr>
<tr>
<td>Other problems</td>
<td>.70</td>
<td>.46</td>
</tr>
<tr>
<td>Traditional beliefs</td>
<td>.01</td>
<td>.09</td>
</tr>
<tr>
<td>Malformation</td>
<td>.50</td>
<td>.50</td>
</tr>
<tr>
<td>Other problems</td>
<td>.06</td>
<td>.24</td>
</tr>
</tbody>
</table>

SD=standard deviation  * Significance p<0.05. NS=Not significant
Knowledge Level by Socio-demographic Characteristics

Female were found more knowledgeable than male in all periods (Table 10).

Table 10. Danger Sign Knowledge by Sex

<table>
<thead>
<tr>
<th>Gender</th>
<th>Total Responses</th>
<th>Mean During Pregnancy</th>
<th>SD</th>
<th>Mean During Childbirth</th>
<th>SD</th>
<th>Mean After Childbirth</th>
<th>SD</th>
<th>Mean Newborns</th>
<th>SD</th>
<th>Total</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>Mean</td>
<td>1.65</td>
<td>1.031</td>
<td>1.32</td>
<td>0.922</td>
<td>1.69</td>
<td>1.160</td>
<td>1.79</td>
<td>1.117</td>
<td>6.44</td>
<td>3.109</td>
</tr>
<tr>
<td>Female</td>
<td>Mean</td>
<td>1.73</td>
<td>1.008</td>
<td>1.36</td>
<td>0.918</td>
<td>1.73</td>
<td>1.154</td>
<td>1.83</td>
<td>1.121</td>
<td>6.65</td>
<td>3.046</td>
</tr>
<tr>
<td>Male</td>
<td>Mean</td>
<td>1.18</td>
<td>1.027</td>
<td>1.12</td>
<td>0.919</td>
<td>1.47</td>
<td>1.173</td>
<td>1.57</td>
<td>1.074</td>
<td>5.34</td>
<td>3.220</td>
</tr>
</tbody>
</table>

P value: p<.001* p=.007* p=.023* p=.014* p<.001*

SD=standard deviation * Statistical Significance if p<.05

Age did appear to have an effect on danger sign knowledge, as shown in Table 11. However, this was not a direct correlation. Among the respondents aged 20 to 49, correlations tests showed that except for the after childbirth period, there was no significant difference among age groups in knowledge of danger signs during pregnancy, during childbirth and during the newborn period. In general, people aged 20 to 49 were found to be more knowledgeable than elders and people under 20. However, only respondents aged under 19 had significantly lower scores than other age groups (Table 11).
Table 11. Danger Sign Knowledge by Age

<table>
<thead>
<tr>
<th>Total Responses</th>
<th>During Pregnancy</th>
<th>During Childbirth</th>
<th>After Childbirth</th>
<th>Newborns</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Mean SD</td>
<td>Mean SD</td>
<td>Mean SD</td>
<td>Mean SD</td>
<td>Mean SD</td>
</tr>
<tr>
<td>Total (n=808)</td>
<td>Mean 1.64 SD 1.031</td>
<td>Mean 1.32 SD .920</td>
<td>Mean 1.68 SD 1.160</td>
<td>Mean 1.79 SD 1.117</td>
<td>Mean 6.44 SD 3.110</td>
</tr>
<tr>
<td>0-19 (N=77)</td>
<td>Mean 1.22 SD 1.096</td>
<td>Mean .99 SD .896</td>
<td>Mean 1.34 SD 1.154</td>
<td>Mean 1.47 SD 1.165</td>
<td>Mean 5.01 SD 3.432</td>
</tr>
<tr>
<td>20-29 (N=223)</td>
<td>Mean 1.79 SD .983</td>
<td>Mean 1.32 SD .917</td>
<td>Mean 1.64 SD 1.154</td>
<td>Mean 1.81 SD 1.067</td>
<td>Mean 6.56 SD 2.912</td>
</tr>
<tr>
<td>30-39 (N=239)</td>
<td>Mean 1.72 SD 1.014</td>
<td>Mean 1.39 SD .848</td>
<td>Mean 1.80 SD 1.131</td>
<td>Mean 1.83 SD 1.095</td>
<td>Mean 6.74 SD 2.896</td>
</tr>
<tr>
<td>40-49 (N=219)</td>
<td>Mean 1.62 SD 1.008</td>
<td>Mean 1.42 SD .980</td>
<td>Mean 1.72 SD 1.161</td>
<td>Mean 1.86 SD 1.064</td>
<td>Mean 6.62 SD 3.095</td>
</tr>
<tr>
<td>50+ (N=50)</td>
<td>Mean 1.38 SD 1.123</td>
<td>Mean 1.12 SD .918</td>
<td>Mean 1.72 SD 1.262</td>
<td>Mean 1.70 SD 1.488</td>
<td>Mean 5.92 SD 3.885</td>
</tr>
</tbody>
</table>

P value | P<.001* | p=.003* | p=.042* | NS | P<.001* |

SD=standard deviation * Significance if p<.05. NS=Not significant

As might be expected, people who have children were more knowledgeable about danger signs than people without children (Table 12).

Table 12. Danger Sign Knowledge by Having Children

<table>
<thead>
<tr>
<th>Total Responses</th>
<th>During Pregnancy</th>
<th>During Childbirth</th>
<th>After Childbirth</th>
<th>Newborns</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children</td>
<td>Mean SD</td>
<td>Mean SD</td>
<td>Mean SD</td>
<td>Mean SD</td>
<td>Mean SD</td>
</tr>
<tr>
<td>Total (n=808)</td>
<td>Mean 1.65 SD 1.030</td>
<td>Mean 1.33 SD .923</td>
<td>Mean 1.69 SD 1.160</td>
<td>Mean 1.79 SD 1.117</td>
<td>Mean 6.45 SD 3.107</td>
</tr>
<tr>
<td>No Child (n=144)</td>
<td>Mean 1.35 SD 1.074</td>
<td>Mean 1.11 SD .925</td>
<td>Mean 1.34 SD 1.052</td>
<td>Mean 1.58 SD 1.075</td>
<td>Mean 5.38 SD 3.243</td>
</tr>
<tr>
<td>Have Child (n=664)</td>
<td>Mean 1.71 SD 1.010</td>
<td>Mean 1.37 SD .917</td>
<td>Mean 1.76 SD 1.169</td>
<td>Mean 1.84 SD 1.121</td>
<td>Mean 6.68 SD 3.030</td>
</tr>
</tbody>
</table>

P value | P<.001* | p=.002* | p<.001* | p=.011* | P<.001* |

SD=standard deviation * Statistical Significance if p<.05
There were 604 respondents who had at least one child and were between the ages of 20-49. When comparing knowledge by sex within this population, women and men had similar knowledge levels for the after childbirth and newborn periods in both danger signs and complications analysis (Table 13).

Table 13. Danger Sign and Complications Knowledge by Sex for Respondents between 20-49 years old with at least One Child

<table>
<thead>
<tr>
<th></th>
<th>Total (N=604)</th>
<th>Female (n=538)</th>
<th>Male (n=66)</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td><strong>Danger Signs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>During pregnancy</td>
<td>1.73</td>
<td>1.00</td>
<td>1.80</td>
<td>0.97</td>
</tr>
<tr>
<td>During childbirth</td>
<td>1.39</td>
<td>0.91</td>
<td>1.41</td>
<td>0.92</td>
</tr>
<tr>
<td>After childbirth</td>
<td>1.76</td>
<td>1.16</td>
<td>1.77</td>
<td>1.15</td>
</tr>
<tr>
<td>Newborns</td>
<td>1.85</td>
<td>1.09</td>
<td>1.87</td>
<td>1.08</td>
</tr>
<tr>
<td>Total Danger Signs</td>
<td>6.73</td>
<td>2.97</td>
<td>6.85</td>
<td>2.90</td>
</tr>
<tr>
<td><strong>Complications</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>During pregnancy</td>
<td>2.48</td>
<td>1.19</td>
<td>2.57</td>
<td>1.15</td>
</tr>
<tr>
<td>During childbirth</td>
<td>1.21</td>
<td>0.74</td>
<td>1.23</td>
<td>0.75</td>
</tr>
<tr>
<td>After childbirth</td>
<td>1.51</td>
<td>0.95</td>
<td>1.53</td>
<td>0.95</td>
</tr>
<tr>
<td>Newborns</td>
<td>1.22</td>
<td>0.61</td>
<td>1.23</td>
<td>0.60</td>
</tr>
<tr>
<td>Total Complications</td>
<td>6.42</td>
<td>2.38</td>
<td>6.57</td>
<td>2.31</td>
</tr>
</tbody>
</table>

SD=standard deviation * Statistical Significance if p<.05

Of the three models generated this was the fit. The results demonstrate that new village, female, and having more children accounted for most of the variance in danger sign knowledge (Table 14).
Table 14. Multivariate Analysis of Model

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>B: 9.283  Std. Error: .575</td>
<td>Beta: -.181</td>
<td>16.142</td>
<td>.000</td>
</tr>
<tr>
<td>new old village</td>
<td>B: -1.138  Std. Error: .216</td>
<td>Beta: -.119</td>
<td>-5.264</td>
<td>.000</td>
</tr>
<tr>
<td>Gender</td>
<td>B: -1.011  Std. Error: .296</td>
<td>Beta: -.119</td>
<td>-3.415</td>
<td>.001</td>
</tr>
<tr>
<td>Age</td>
<td>B: -.009  Std. Error: .011</td>
<td>Beta: -.034</td>
<td>-8.09</td>
<td>.419</td>
</tr>
<tr>
<td>Numbers of children</td>
<td>B: .124  Std. Error: .046</td>
<td>Beta: .115</td>
<td>2.710</td>
<td>.007</td>
</tr>
</tbody>
</table>

Focused Group Discussions

Focused group discussions were held with two groups with the purpose of better understanding some of the danger signs identified in the survey and to further explore local meanings and definitions of concerns during pregnancy, delivery, after birth and newborn periods. The first group was conducted in Terre Rouge, a village which was enrolled in HHF in 1997. The group consisted of four mothers aged 23, 28, 32 and 37 years old. The discussion was held in a temporary canvas shelter when an HHF Health Post was taking place in the village. The public health director for HHF, Dr. Gebrian, who is fluent in English and Creole, raised questions in Creole and then translated the responses into English, and study researcher, Chia-Yu Kuo, took notes on a laptop and also asked questions in English that were translated by Dr. Gebrian in Creole to capture further
information. All the women were very engaged in the discussion and contributed their knowledge and beliefs. There was general consensus about most topics that were discussed, and the women did not seem to be inhibited in their responses. Because HHF has been conducting health education in this village, these women mentioned some of the knowledge they had learned from HHF. Therefore, the group was asked to talk about not only the knowledge and concepts they have now but also the beliefs and traditional practices they heard about from elders and others in the community. Eight questions were discussed for defining twelve terms of danger signs and beliefs that were described in survey (Appendix III). The content included symptoms, causes and treatments.

The second group discussion was held at HHF during a monthly staff meeting and training session. This group included about twelve local nurses and health agents who were HHF employees from different villages. The discussion included further definitions of danger sign terms, including traditional knowledge and behaviors.

There were several danger sign terms which were defined. “Eklampsi” is a Creole word referring to mouth movement such as chewing and biting their tongues, and often is associated with convulsions and “fits”. Traditionally, they believed people had eklampsi because they were poisoned by others. When people had arguments they might poison the person they argued with. The group of mothers said they knew that eklampsi referred to a
danger sign for mothers and understood it is a physical condition and not voodoo. If they were to see women with eclampsia now, they would put a spoon into the mothers’ mouths and send them to the hospital. Another belief is that a woman who carries too heavy a load on her head will harm the fetus, resulting in the baby having a sore body, which means that the baby will be cranky and not calm because the baby’s body hurts, or that there will be other types of head problems. Also, it was believed that carrying heavy loads would push the fetus below the mother’s belly and might cause iodine deficiency goiters, back ache, miscarriage or a difficult labor.

A danger sign cited for the newborn was a runny nose or water in the nose. There is a belief that if the baby has a runny nose or has water in their nose it is also considered a danger sign. There is because of the belief that if babies have water or mucus in their nose and they suck it back, the mucus and water will run into their brain. To prevent this they clean the baby’s nose very often. Another belief is that if the mother has a strong negative emotion it will harm the health of both mother and baby. When mothers have very negative emotions and get very angry or yell, the mother’s health may be affected because blood will go into the breast and mix with milk, and then flow to the mother’s head and eyes. The symptom of this is a strong headache. Although breast milk is mixed inside the mother’s body, it will not come out from nipples. Strong negative emotions may also cause
their breast milk to spoil. If the baby drinks spoiled milk, it would get skin problems such as rashes. Therefore, once mothers get angry and have headaches, they may stop breastfeeding until they get treatment. The treatment is to tie three big red sago (arrowroot) leaves on their head for one day, and repeat the treatment the following day. In addition to sago leaves, mothers have to eat very bitter coffee ground with a small spoon of sugar cane mixed with amidor (manioc) powder. These actions are believed to make the milk come back to the breast from the head and to separate the breast milk from the blood.

Herbal treatments also play an important role during pregnancy and childbirth. Both of the focus groups mentioned herbal teas and vapors. Herbal tea keeps the mother healthy and prevents disease. Certain herbal vapors are used to help the woman’s vagina close and prevent bleeding after childbirth. Post delivery mothers crouch above a basin of steaming herbal vapor to close their vagina. Herbal teas are used for many conditions, including helping women to discharge the blood left in the womb or to heat up their bodies.

Another concern is exposure to drafts or getting cold, which is believed to cause mothers and babies to get sick. Neonatal tetanus, anemia, and headache are attributed to drafts and being cold. Mothers exposed to a draft of air after labor and delivery are believed to be likely to get tetanus. To prevent this, the mother is kept very warm after delivery by wearing sweaters and covering her ears and eyes. The mothers’ group
mentioned that they do not overdress mothers anymore. They already know that a draft of air will not cause serious harm. On the other hand, the women in the village did say that it is very dangerous if the baby’s feet, arms or any other part of the body except the head come out first. All of them knew women who died because of mal-presentation. Another danger sign of pregnancy that was mentioned was the “fetus sitting on the mother’s heart”. It was commonly thought to be a symptom caused by not eating, which results in the fetus moving up and close to mother’s heart. As long as mother eats, the baby will come back to the belly but if she doesn’t this causes a problem.

In terms of other traditional treatments, the health agent/nurse group mentioned several methods people might use when complications arise. If the mother had a prolonged labor or difficulty giving birth, or if the vagina did not open, people might sprinkle salt on the roof in a ceremony to urge the baby to come out. Another approach would be to open a pair of scissors in the room to hasten the opening of the woman’s vagina; if this is done, women with no sexual experience would need to leave the room. Another approach is is to put slippery soil into the vagina to help the baby slip out. When women have serious hemorrhaging, people might put clothes, leaves or other things into the vagina in order to prevent further bleeding, or use herbal vapor to close the vagina. If the baby does not cry after birth, people would make very loud noises to make the baby cry. Mothers and babies
would be over-dressed to prevent them from getting cold or from being exposed to drafts.

Also, babies would be dressed very tightly to prevent a split head because the gap on a baby’s head is considered a danger sign.

Discussion

General Danger Sign Knowledge

The results showed that while knowledge of danger signs was diverse across pregnancy, childbirth, after delivery and newborn periods, the level of knowledge was low based on the frequencies of responses for individual danger signs and the broader complication categories. Respondents averaged less than two danger signs and complications. This was only slightly higher for complications during pregnancy (2.4). These results are likely due to the fact that women and families have had direct experience with pregnancy, childbirth, postnatal and newborn care and recognize those problems they or someone in their family has experienced—however this knowledge varies based on experience so there is really no standard level of community knowledge. Low danger sign knowledge in the population has also been observed in rural areas in other developing countries such as India and Bangladesh.
Danger Sign Knowledge in Old and New HHF Areas

Overall, New HHF areas had significantly higher responses than Old areas. Except for sex distribution, there were no significant sociodemographic differences between Old and New areas. After doing a mean knowledge comparison for men and women separately, women from New HHF Areas had higher danger sign knowledge in all periods but there was no difference for men by New and Old areas. Knowledge in new areas might have been higher because new areas had a greater proportion of females, but this was disproved by controlling for sex. When the survey was conducted, HHF had only provided education about the danger signs during pregnancy. Even though the knowledge about danger signs and complications during pregnancy was higher than other periods, knowledge was higher in the New Areas.

Old Areas had been in HHF for 4-12 years compared to New Areas, which had been in HHF for 3 years or less. There were not enough villages in an intermediate level to compare gradations of participation in HHF; this may have skewed the findings of New vs. Old Areas.

Increasing knowledge of danger signs is one of the important recommendations for safe motherhood; however, evaluations of the effect of programs to increase knowledge levels have been inconsistent (WHO, 1999; Starrs, 1998). Knowledge levels were
evaluated among different groups of people to see if there was any improvement on different dimensions of knowledge or after certain interventions. The knowledge level of maternal complications was found to be higher after interventions (Ahluwalia, 2003; Khanum, 2001; Ronsmans, 2001), and between utilizers and non-utilizers of antenatal care facilities (Alam, 2005). In these studies, even though the knowledge showed improvement after a certain period of time, the overall level still remained low. Besides, many studies showed there were no significant differences in knowledge of danger signs after interventions at the community or traditional midwife levels (Kunene, 2004; Hussein, 2005).

The generally low danger sign knowledge may be partly explained by the fact that danger sign education is new, and at this time had only addressed pregnancy. In addition, the knowledge of danger signs might be affected by the attitude of interviewers, time period, respondent motivation and cooperation, and recording methods. Recent entry into HHF and the experience of interventions from HHF might have resulted in higher motivation and interest of both interviewers and respondents in new areas. Health agents and nurses in new areas might have taken more time and had more patience to interview people. New health agents might not have had as many other responsibilities as health agents in older areas. Also, people in new villages might have more motivation and
curiosity to cooperate in the interview process. In addition, new areas might have had higher baseline knowledge than old areas.

How the interviewer recorded and/or categorized responses also could have influenced the accuracy of data. Although interviewers were asked to record all the possible answers, some responses might not have been recorded at all or might not have been fully recorded. The interviewers in old areas were familiar with interviewing and recording. Therefore, the experienced interviewers might record respondents’ answers with more brief and concise answers, while interviewers in new areas might record all the descriptions of respondents. This type of recording bias could result in fewer and less descriptive responses in the old areas. For example, less-experienced interviewers might record all symptoms people describe such as bleeding, anemia and pale skin; however, an experienced interviewer might record all these symptoms under the single category of hemorrhage. In addition, although interviewers were asked to choose a single respondent in a household, it is possible that some questions were answered by more than one household member (when interviewing in rural communities it is usually not possible to interview one person alone). If people in new areas had more curiosity and enthusiasm to participate in interviews, there could have been more household members present and this could have resulted in more responses.
Women’s and Men’s Danger Sign Knowledge

Men were significantly less knowledgeable about danger signs than women. This finding is similar to other studies, including those in India and Bangladesh, which also showed that women know more symptoms of complications than their husbands (Khanum, 2001; Bloom, 2000). There were many more women than men in the survey. Although respondents were randomly selected by interviewers in selected households, the fact that women were more likely to be at home during the day, as well as the topic for this research, might have contributed to the higher proportion of women. In general, men’s danger sign knowledge was very low. There are several possible factors for higher knowledge among women. Women are the primary caretakers of children, and are the primary recipients of maternal and child health information. They have the experiences of being pregnant, attending prenatal care, and delivering and caring for newborns.

Men’s lack of reproductive knowledge may leave women particularly exposed to danger (Bloom, 2000). Researchers have started to pay attention to fathers’ knowledge of danger signs rather than just focusing educational interventions on mothers. The results showed that men of reproductive age (20-49) who have one or more children were more knowledgeable than other males. This male population was as knowledgeable as 20-49 year old mothers on danger signs after childbirth and for the newborn. Fathers in this
reproductive age group with greater knowledge would be able to play a more effective role in decision making.

**Danger Sign Knowledge and Age**

Except for newborn danger signs, age was significantly related to knowledge. The youngest age group (0-19) had the lowest knowledge, followed by the oldest age group (above 50). Men and women of reproductive age, the three groups between 20 and 49, had the highest danger sign knowledge and there was no significant difference between the sexes. This suggests that if community knowledge is important for mobilization of resources in the case of emergencies that messages should be targeted to everyone. Youth groups may be one outreach method for those who are about to enter child bearing.

**Areas of Low Danger Sign Knowledge**

Based on the key complications identified by WHO, there were several danger signs that were almost completely missed by the study population. Difficulty breathing was rarely mentioned as a danger sign during pregnancy. Less than 3% of respondents mentioned fever and as a danger sign during childbirth (25% mentioned this danger sign for the after childbirth period). No one mentioned difficulty breathing or no breath as a
danger sign for newborns. Baby not crying was the reported danger sign which related to baby not breathing; however, the frequency was low (5%). Prematurity and malformation were identified by less than 1% and no one mentioned yellow skin or eyes (jaundice), and convulsions as newborn danger signs.

**Traditional Danger Signs**

There was similar knowledge of traditional danger signs for all study groups. Most of the traditional danger signs are harmless; however, some might lead people to adopt unnecessary or even harmful actions for mothers and newborns.

Some beliefs are not harmful and some of these help people to take care of mothers and children. One of the traditional danger signs is that the fetus might move up and sit on the mother’s heart because the mother does not eat or does not eat enough—which is considered a normal symptom of pregnant women. In rural Haiti, food deficiency is very common; within the household, women tend to give first priority to their children and males in distributing available food. The effects of poverty and female malnutrition were evident in low-birth-weight newborns (Adams, 1998). Therefore, this danger sign would help ensure that women get more food within the household. According to the information from HHF Public Health Director, Dr. Gebrian, there is another belief that the fetus can stay in the
womb without growing for years. Because of this women sometimes have a strong belief they are pregnant even when pregnancy test shows a negative result. This belief is often beneficial to provide paternal heritage for a child whose father may have died several years prior to birth. Herbal treatments play an important role in maintaining good health and treating illnesses in Haiti. Some herbal teas are used to keep a woman warm or to help cleanse the womb after delivery.

However, some traditional beliefs are harmful either because they have direct negative health consequences or because they delay the time for referral and appropriate treatment and endanger the lives of mothers and children. Traditionally, people have believed that eclampsia is caused by voodoo. Therefore, referral to hospitals and appropriate treatment would be delayed. Another belief is that drafts and cold are bad for mothers and babies, which can result in overdressing mothers and children. Because Haiti has a tropical climate, excess warmth is at a minimum uncomfortable. One of the herbal treatments is steam vapor to help the vagina close. However, women who sit too close to the hot kettle and steaming vapor can be burned and get infections. Other practices, such as throwing salt on the roof, placing opened scissors in the room, putting slippery soil in the vagina and making noise so the baby will cry only delay time for referral and care seeking and some can cause infection. One of the most dangerous behaviors is to put leaves or clothes in the
vagina to stop severe bleeding. These traditional beliefs are dangerous and should be addressed through education.

**Danger Signs Education**

HHF has advocated for pregnant women in Jeremie and its surrounding counties since 1988. Prior to 2006, HHF danger sign education focused on pregnancy. Utilizing informal education formats, the educators pass on key danger sign messages through nurses, health agents, mothers' clubs, fathers’ clubs and youth clubs in villages.

**Home Based Life Saving Skills**

In 2006, KOMBIT contracted with the American College of Nurse Midwives (ACNM) to provide Home Based Life Saving Skills (HBLSS) training for HHF, MSPP and SGS health agents and nurses to become HBLSS trainers. HBLSS is a family focused, community-based program to reduce maternal and neonatal mortality. It is a series of lessons developed around specific topics. Included is general community information about woman and baby problems, prevention and referral and then specific information about women’s problems (bleeding too much, sickness with pain and fever, birth delay, swelling and fits, too many children) and baby problems (trouble breathing at birth, born too small and baby is sick). KOMBIT focused on training on the general community
topics as well as on two specific problems, mother bleeding too much and baby has trouble breathing at birth.

HBLSS was designed for developing countries with many home deliveries. It has been field tested in several countries, including India, Ethiopia, Viet Nam, Gaza Strip and the West Bank, with positive outcomes. This program educates birth groups (mother, father, birth attendant and others in family) and communities about how to provide basic life saving care where women are not able to deliver at hospitals or with professional care. The purpose is to increase family and community capacity to take appropriate action for obstetrical emergencies in a home setting. This includes immediate stabilizing actions and reduction of delays in reaching referral facilities where life-threatening problems can be managed. HBLSS focuses on the pregnant women, her family caregivers and the home birth attendant as a team to support birth preparedness and involvement of decision makers in making timely decisions.
Limitations

A 10% validation sample of the original paper data was compared with the information entered in the database. About 9% of responses were missing or had errors. Most of the inconsistencies (72%) were missing data. This would suggest an underestimation of danger sign knowledge. When missing data was compared for the new and old HHF areas, it was equally distributed. Therefore, missing data was not a factor in the higher levels of knowledge found in the new HHF areas.

The interviews were conducted in villages by local nurses and health agents. They have many other data collection responsibilities and this additional activity may have been a burden for them. There were difficult to control environmental factors such as other family members interrupting the interview or adding additional information that may have been included in the responses. While the households were randomly selected, the respondent in the household may have been selective for women because they are the ones most likely in the home during the day. Another factor might be that women are more likely to answer the reproductive questions or that people with knowledge might want to be interviewed. In addition, respondents may have had knowledge about danger signs but may have been confused about what period (pregnancy, childbirth, after childbirth or newborn) the danger sign was associated with. Some danger signs are associated with more than one period and
respondents may have only mentioned it once. For example, people recognized tetanus as a danger sign; however, some people reported this as a danger sign during childbirth or pregnancy instead for newborns. Some people reported the placenta staying in the womb as a danger sign during childbirth and others mentioned it in the after childbirth period.

Because qualitative information was recorded by interviewers, there was no standard code for individual danger signs or combined responses. While exact descriptions were to be recorded, the meaning of these descriptions might be equivocal because of unclear answers, limited documentation and translation from Creole to English. For example, the responses of “stomach ache” or “waist pain” both indicate the abdominal region. The translation from Creole to English might have resulted in a misinterpretation of waist pain (it could refer to kidneys, for example). Also, the signs might be normal symptoms or danger signs depending on the degree of the problem. For instance, vaginal discharge and mild headache could be normal obstetric symptoms but foul-smelling discharge and severe headache would be danger signs. The severity of the signs was not always clearly described.
Recommendations

This paper reports on a baseline study of community level danger sign knowledge for pregnant women and newborns in rural Haiti. The results will be used by HHF and KOMBIT to assess current interventions and educational messages, offering ideas about which parts of education should be emphasized, what people believe, and what concepts should be addressed.

Interventional Recommendations

- Behavioral and conceptual change needs reinforcement. Sustained and regular stimulation and education are required for people to memorize and change their behavior.

- One study (Perreira, 2002) evaluated the effectiveness of different methods of increasing danger sign knowledge; Mothers’ and Fathers’ groups were more effective than radio announcements or prenatal care. Because HHF has mothers’ and fathers’ groups in villages and KOMBIT is developing them in new areas, this is an important resource for improving danger sign messages and knowledge.

- Increase people’s motivation and reinforce messages through the development and use of reminders or notes to keep at home such as beautiful cards or pictures in
health examination cards.

- Respect cultural beliefs and practices. HHF has a well established practice of working with existing beliefs and developing trust with communities in order to effect social and behavioral change.

- Danger sign knowledge must be provided in combination with appropriate action and information such as the distances to hospital, estimated cost, and emergency contacts. KOMBIT has implemented obstetric and newborn evacuation planning at the village level, provided cell phones and has acquired a vehicle for emergency transport.

- Provide specific information about determining the severity of danger signs requiring referral. This will help increase confidence and immediacy in family and community decision making. For example, if a pregnant woman is bleeding, severity can be determined if she is soaking a pad or cloth in < 5 minutes; in such cases she should be referred immediately. A fever greater than 38°C and combined with very fast breathing, stiff neck, lethargy or being too weak to stand is dangerous and needs immediate referral (WHO, 2006).

- Utilize HBLSS to provide additional training at the village level to organize around obstetric and newborn emergencies.
Recommendations for Measurement

Future research in HHF and KOMBIT might utilize standard indicators of danger sign knowledge to avoid the limitations of the open-ended questions used in this research. The Centre for Health and Population Research (ICDDR,B) has the indicators for measuring percentage of mothers who know at least 2 danger signs of pregnancy, labor and postpartum period and at least 2 danger signs of newborn. It has a standard questionnaire and data analysis protocols to measure these indicators of knowledge.
Appendices

Appendix I: Map of Haiti
Appendix II: The Questionnaires of the Community Awareness of Maternal, Perinatal and Newborn Danger Signs Survey in Haitian Creole

KANTITE KESYON NAN CHAK LOKALITE SOU 30: _____________/30

Haitian Health Foundation

KESYONÈ 2001 PANDAN WAP FÈ VIZIT
Gason ou byen fam 15-49 ane

Nimewo kay # _______________ LOKALITE _______________
Non moun wap poze kesyon an: __________________________ Age: __________
Kantite Timoun li genyen: ____________________________
Ki moun ki te koupe kôd lonbrit dènye pitit ou: ____________________________

Bay tout siy danje pandan manman ap akouche:
________________________________________________________
________________________________________________________
________________________________________________________

Bay tout siy danje manman ka genyen aprè akouchman rive jiska 1 mwa:
________________________________________________________
________________________________________________________
________________________________________________________

Bay tout siy danje pou ti bebe a pandan li fenk fêt jiska 7 jou:
________________________________________________________
________________________________________________________
________________________________________________________

Bay tout siy danje pou fam ansent:
________________________________________________________
________________________________________________________
________________________________________________________

________________________________________________________
Non Ajan Sante Siyati Dat
Appendix III: The Questionnaires of Focused Group Discussions

1. Have you heard of the word “Eklampsi”? related to pregnant women in Haiti? It is not for yourself, tell us what do you hear from people.

2. What are the consequences to a woman and her baby if she carries a heavy load on her head while she is pregnant?

2.1 What kind of problem on baby’s heads?

3. If a baby that is just born has water in their nose – what will happen to that baby?

4. Can you describe the cause of “late gate” and how to prevent it?

4.1 How to treat it?

5. What are the best tizan (tisane) to drink immediately after a woman delivers her baby?

5.1 Anything else except ginger?

6. What happens if a mom gets cold after she delivers her baby?

6.1 If mothers and babies have draft air, what would happen?

7. What do you mean if baby do not come out the right way during delivery?

8. How do you think why baby would sit on mother’s heart?
References


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