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MASTER'S THESIS  
IN  
NURSING  
THE UNIVERSITY OF ALABAMA AT BIRMINGHAM

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STEVEN E. HARTMAN

UNIVERSITY SCHOOL OF NURSING

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MATERNAL MORTALITY IN THE  
ARTIBONITE VALLEY OF RURAL HAITI

Master's Thesis  
Submitted to the Faculty  
Yale University School of Nursing

In Partial Fulfillment  
of the Requirements for the Degree  
Master of Science in Nursing

Susan E. Martinson

May, 2002

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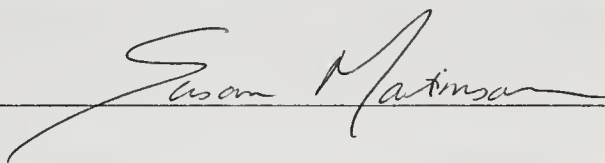
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## Abstract

### MATERNAL MORTALITY IN THE ARTIBONITE VALLEY OF RURAL HAITI

Haiti has one of the highest maternal mortality ratios in the world: more than 500 per 100,000 live births. Hospital Albert Schweitzer (HAS), a private institution located in the Artibonite Valley of rural Haiti, has recently started a Women's Health Division. The division is comprised of a five-bed high-risk obstetrics unit and includes community services. This study aims to provide data that will help with the development of policies and programs for this new division of HAS.

In Haiti, most deaths take place outside the health system; as a result, the cause of death is never documented. A Reproductive Age Mortality Survey (RAMOS) was done following WHO guidelines to provide baseline statistics regarding the deaths of women of reproductive age in the HAS district for the years 1996-2001, paying special attention to maternal deaths. 706 deceased women were identified using HAS's Family Data Registry, the hospital medical records database, and a hospital survey of 400 women in the community. A systematic random sample of 99 women was obtained from this population. Verbal autopsies were then conducted with surviving family members to determine cause of death. The Three Delay Model was used to identify potential contributing factors to maternal deaths. Obstetric services at each of the seven dispensaries in the HAS district and at the main hospital were evaluated using WHO process indicators of Safe Motherhood progress.

The maternal mortality ratio, based on the study data, was 556 maternal deaths per 100,000 live births, and the rate was 373 maternal deaths per 100,000 women of reproductive age. Puerperal sepsis was the leading cause of maternal deaths in the district (39%), followed by preeclampsia/eclampsia (28%). Maternal deaths accounted for 18% of the deaths for women of reproductive age. Late maternal deaths represented another 6% of the sample. Overall, HIV/AIDS was the leading cause of death for women of reproductive age (32%).

This study highlights ways for Hospital Albert Schweitzer to address and avoid underestimation of maternal deaths both in and out of the health system, including improvements in record keeping, coding of deaths and periodic surveys. Recommendations to strengthen preventive and emergency obstetric care in the community are made, including ways to decrease delays and improve quality and availability of services.





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## Chapter I

### The Problem

#### Statement of the Problem

Maternal mortality in developing countries is a significant public health problem. Complications related to pregnancy and childbirth are the leading causes of death for women of reproductive age in these populations (Maine & Rosenfield, 1999). This has implications beyond women's health. Maternal deaths impact the survival and health of families and entire communities.

Maternal mortality rates are key indicators of a country's general welfare. Of all the indicators commonly used to compare developing and developed countries, maternal mortality statistics reflect the greatest disparity (WHO, 1996). This research will explore the chain of events leading to maternal deaths, including socio-cultural, political, economic, geographic, and medical factors, all of which relate to the accessibility, utilization, and quality of health services. Haiti has one of the highest maternal mortality ratios in the world at more than 500 per 100,000 live births (Perry, October 2000) compared to less than 25 per 100,000 for developed countries (Maine & Rosenfield, 1999).

Hospital Albert Schweitzer (HAS) is a private institution located in the Artibonite Valley of rural Haiti. Americans Larry and Gwen Mellon established the hospital in 1956 to serve one of the most needy communities in Haiti. The hospital serves a district population of 143,000, 24% of which is comprised of women of reproductive age (15 to 49 years). Hospital Albert Schweitzer added a Women's Health Division in the late 1990s. This included opening a five-bed high-risk obstetrics unit in 1997 and focusing



attention to women's services at the community health dispensaries. In 1999, the hospital received a Gates Foundation grant to improve their women's health services. This study aims to provide data that will help with the development of policies and programs for this new division of HAS.

In Haiti, most deaths take place outside the health system; in these cases, the cause of death is not documented. A Reproductive Age Mortality Survey (RAMOS) was done following WHO guidelines to provide baseline statistics regarding the deaths of women of reproductive age in the HAS district for the years 1996-2001, paying special attention to maternal deaths. 706 deceased women were identified using HAS's Family Data Registry (compiled by community health workers), computerized medical records database, and a hospital survey of 400 women in the community. A systematic random sample of 99 women was obtained from this population. Verbal autopsies were then conducted with surviving family members. The number of deaths, the causes, and contributing factors based on the Three Delay Model are addressed. In addition, obstetric services at each of the seven dispensaries in the HAS district and at the main hospital were evaluated using WHO process indicators of Safe Motherhood progress.

The Nairobi Conference in 1987 was among the first to address the issue of maternal morbidity and mortality in developing countries. This conference created the Safe Motherhood Initiative, with the goal of reducing maternal mortality rates by half by the year 2000 (Weil & Fernandez, 1999). This goal has yet to be reached. A joint statement released in 1999 by WHO, UNFPA, UNICEF and the World Bank examined Safe Motherhood progress and made a further call for action. This research on maternal mortality in the district served by Hospital Albert Schweitzer is in response to this call,





and is a contribution to greater understanding of how many women die and, most importantly, why and under what conditions. This is an essential step to global Safe Motherhood.

The research aims were:

1. Evaluate Hospital Albert Schweitzer's Women's Health Division using process indicators of Safe Motherhood progress.
2. Document the maternal mortality rate and ratio in the hospital's district.
3. Document the causes and contributing factors to maternal deaths in the district.

### Background and Significance

The World Health Organization estimates that close to 600,000 women worldwide die each year—more than one per minute—of pregnancy and childbirth-related causes (WHO, 1999). This figure accounts for at least one quarter of all deaths among women of reproductive age, and is higher than that for tuberculosis, war injuries, traffic accidents, or HIV/AIDS (Weil & Fernandez, 1999). It is also believed that over 60 million women per year suffer long-term debilitating complications of pregnancy and childbirth, resulting in hardship for the woman, her family and her community (Weil & Fernandez, 1999).

Approximately 99% of all maternal deaths occur in developing countries (Barnes-Josiah, Myntti, & Augustin, 1998), and obstetric complications are the leading cause of death for women in this population (Maine & Rosenfield, 1999). Of these deaths, 24% occur in pregnancy, 16% in delivery, and 60% postpartum (Peters, 2000). Direct causes are the most common, and include hemorrhage, sepsis, induced abortion, hypertensive



disorders of pregnancy, and obstructed labor; indirect causes are less common, and include anemia, malaria, cardiovascular disease, and HIV/AIDS (WHO, 1999). The majority of these causes can be prevented or treated.

Most developing countries lack complete vital registration systems, and deaths are frequently misclassified where there is documentation. Circumstances surrounding women's deaths are often not identified, leaving causes and contributing factors unknown. As a result, maternal deaths are underestimated (Peters, 2000). This situation led to the late 1980's description of maternal deaths as "silent." The silence is said to have cracked, but not broken. The inadequacy of data has made the selection of appropriate interventions a long and difficult process, and the literature continues to debate the most effective strategies to reduce maternal mortality. These debates may be settled as more data becomes available. Safe Motherhood has been a priority on the international public health agenda since the Initiative's introduction at the Nairobi Conference in 1987. The 1990 World Summit for Children in New York, the 1994 International Conference on Population and Development in Cairo, the 1995 Fourth World Conference on Women in Beijing, the 1997 Safe Motherhood Technical Consultation in Colombo, and the 2001 conference of the Global Health Council have all rallied for international support of Safe Motherhood.

The Haitian government has had limited success in providing and maintaining health services: more than half of Haiti's health care is provided by missionary or other non-governmental organizations. Despite increasing urbanization, 70% of Haiti's population still lives in rural areas and depends on small-scale agriculture for survival (Barnes-Josiah et al., 1998). Per capita income is among the lowest in the western hemisphere at less



than \$400 US per year (Barnes-Josiah et al., 1998). Both public and private health services are disproportionately located in the Port-au-Prince metropolitan area, and many are cost-prohibitive to the majority of the population.

Hospital Albert Schweitzer (HAS) is a unique institution. It is situated in rural Haiti and has continued to grow and progress despite decades of Haiti's political and economic instability. It is a comprehensive health care institution that has achieved success on a modest budget supported by donated funds. HAS recently received the top achievement award for maternal and child health services from the U.S. Agency for International Development in Haiti.

Experts from national and international agencies, including WHO and the International Planned Parenthood Federation, examined the progress of the Safe Motherhood Initiative from 1988-1998. The information gained was reported in a joint statement released by WHO, UNFPA, UNICEF and the World Bank in 1999. Particular emphasis was placed on the following findings:

1. Maternal mortality and morbidity can be significantly reduced with limited investment and effective program and policy interventions.
2. Progress can and should be monitored with appropriate indicators. This includes an analysis of each maternal death to identify contributing factors that could have been mitigated or avoided.
3. Partnerships (international, national, and community based), and exchange of knowledge and ideas at all levels of health care delivery are critical to reducing maternal mortality and building and supporting momentum for change.



## Historical Overview of Haiti

Haiti occupies the western third of the Caribbean island of Hispaniola, which it shares with the Dominican Republic. Haiti began as a Spanish colony in 1492 and was overtaken by the French in 1697 (Desmangles, 1992). The island natives were enslaved, and eventually slaughtered by the Europeans. Around the year 1512, Africans from various countries in West Africa were transported to the island of Hispaniola for slave labor (Desmangles, 1992). The African slaves successfully revolted against the French, and in 1804, Haiti was proclaimed an independent republic (Desmangles, 1992).

Economic depression, political turmoil, and generalized violence has characterized Haiti throughout its past and continues to do so today. Duvalier was the Haitian dictator for 30 years, and his reign was associated with “brutal repression” (Marotte & Razafimbahiny, 1997, p.1248). In 1991, Aristide was elected as President of Haiti and nine months later was overthrown by a military coup. The United States and the Organization of American States (OAS) initiated sanctions in September of 1991 with the intention of forcing the government to return to democracy. The sanctions froze Haitian government assets in the U.S., and halted arms and oil shipments. The sanctions also prohibited foreign aid to the de facto regime, prohibited most imports and exports of goods, and restricted commercial flights (Marotte & Razafimbahiny, 1997). At that time, a United Nations peacekeeping force was sent to Haiti to maintain order (Marotte & Razafimbahiny, 1997). The sanctions continued through 1994 when constitutional order was restored. This period in Haiti’s past is referred to as La Crise--“The Crisis” (Gibbons & Garfield, 1999).





In 1996, the Ministry of Health in Haiti introduced a health policy that recognizes the State's obligation to guarantee access to health care for all. A priority of this policy was to reform the health sector to ensure comprehensive health care for women, with the reduction of maternal mortality as one of its aims (PAHO, 1999). This health policy was an encouraging sign of the Haitian government's willingness to be more active in improving obstetric programs and allocation of services. Unfortunately, little change has been made since the introduction of this policy. Aristide, however, was re-elected as the democratic president of Haiti in 2000, and entered office in February 2001. The country may be at a turning point, with the potential for improvement in health and human rights.



## Review of the Literature

### Conceptual Framework

Maternal deaths are complex events. Many causes of death overlap or interact with each other. An example of this is found in a study conducted in Northern Ghana, where prolonged obstructed labor was a major cause of maternal death from sepsis (Fiander, 1991). Midhet, Becker & Berendes (1998) comment on the high degree of interdependence among factors, and make the point that many of these reflect different aspects of a single attribute. Conceptual frameworks are useful in facilitating the examination of maternal mortality, and clarifying pathways for intervention. In 1992, McCarthy & Maine presented a framework for analyzing the determinants of maternal mortality (Figure 1). Based on this framework, an intervention must address at least one of the outcomes in the sequence, by being specifically designed to:

1. Reduce the likelihood that a woman will become pregnant; or
2. Reduce the likelihood that a pregnant woman will experience a serious complication of pregnancy or childbirth [including induced abortion]; or
3. Improve the outcomes for women with complications.

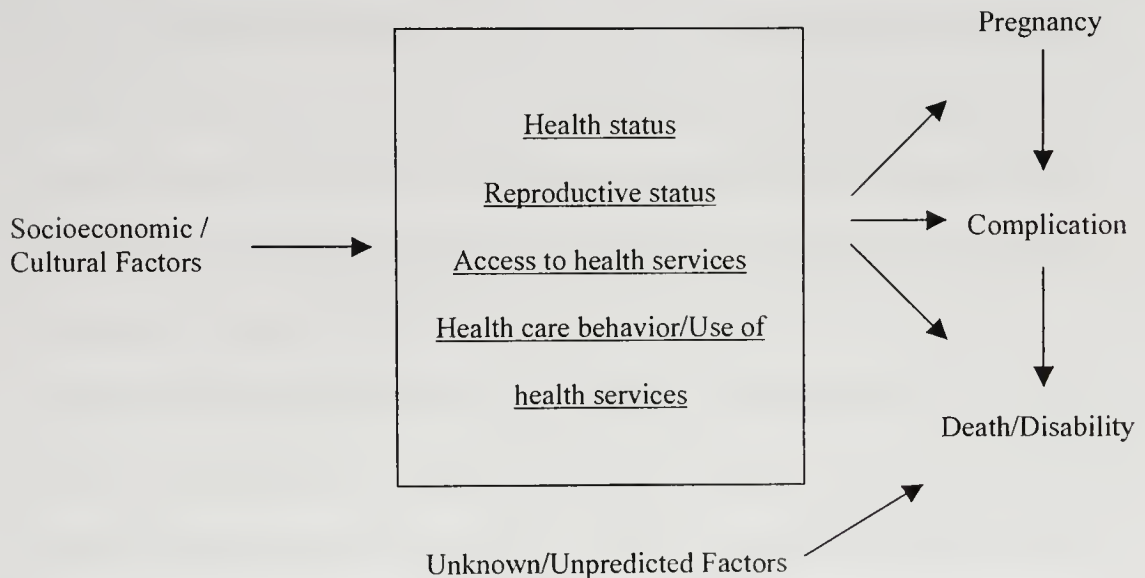
The variables in the framework are organized from those most distant to those closest to the event of death: distant determinants, intermediate determinants and outcomes. Other studies have utilized this framework, modifying it to their own research (Midhet et al., 1998). This review of the literature will highlight certain themes based on this framework, and explore variables as they relate specifically to Haiti and rural areas in other developing countries.



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Distant DeterminantsIntermediate DeterminantsOutcomes

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Figure 1: Conceptual Framework for Analyzing Determinants of Maternal Mortality (McCarthy & Maine, 1992)

### Distant Determinants

#### Socioeconomic and Cultural Factors

The socioeconomic and cultural factors that are hypothesized in the literature to influence maternal health include women's status in the community, and the status of the community. Level of education, occupation and income, and social and legal autonomy influence women's status. Standard of living, available resources, and religion influence the community's status.



## Women's Status

Education. In Haiti, 90% of schools are private and even public schools have mandatory fees. As a result, many rural families cannot afford to send their children to school (U.S. Dept. of State, 2001). The percentage of rural children attending primary school, however, has increased from 37% in 1988 to 51% in 1995, and enrollment for males and females is equal (Perry, March 2000). The literacy rate is similar for both males and females throughout the country, and has been estimated to be from 20-45% (U.S. Dept. of State, 2001; PAHO, 1999).

The 1994-1995 Demographic and Health Survey for Haiti reported that for women ages 15-49 in rural areas, 48.3% had no formal education, 40.8% primary education only, and 10.9% secondary education or greater. A study on maternal mortality in Jamaica in the late 1980s showed that risk of a maternal death was four times greater for women who had received only primary education compared to women who had gone on to secondary education or higher (Golding et al., 1989).

Occupation and income. Time and money for seeking medical services is not readily available for many women in developing countries (Devin & Erickson, 1996; Paolisso & Leslie, 1995). In Haiti, home, farm, and market activities are essential to the economic well being of families in most rural communities (U.S. Dept. of State, 2001). Most of these activities are considered "women's work" and require long hours with little financial compensation, and often the labor demands on women do not decrease during pregnancy (Devin & Erickson, 1996; Santow, 1995).





Social and legal autonomy. The U.S. Department of State published the following in its 2001 report: In Haiti, the 1987 Constitution promotes equal working conditions regardless of sex, beliefs, or marital status. The law also provides penalties for rape and domestic violence, but there is said to be little government enforcement of these laws (U.S. Dept. of State, 2001). Women are underrepresented in politics and government: only 3 of 82 deputies and 6 of 27 senators are women. The judicial system is deficient, and moves slowest for women and minors: approximately 98% of women in prison are awaiting trial, and most women prisoners are forced to share living quarters with male prisoners. Women's rights groups are said to be small, localized, and not publicized (U.S. Dept. of State, 2001).

### Community Status

The population statistics for Haiti are presented in Table 1. Statistics specific to households in rural Haiti are presented in Table 2.



Table 1

Pan American Health Organization (PAHO) 1999 statistics for Haiti

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Estimated population	7,534,000 persons
Estimated rural population	70% of total
Annual population growth rate	2.1%
Life expectancy at birth	Male: 52.9 years Female: 56.3 years
Infant mortality	74/1,000 live births
Mortality under 5 years of age	131/1,000 live births
Population living in poverty	65% of total 80% of rural
National health expenditure as percent of Gross National Product (GNP)	3.5%
Physicians	0.76/10,000 population
Nurses	1.1/10,000 population
Hospital beds	8.0/1,000 population

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Table 2

Characteristics of households in rural Haiti (Perry, March 2000)


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Percent with electricity	4.0%
Percent with a dirt or rock floor	68%
Percent with a water source	2.0%
Percent more than 15 minutes from a water source	60%
Percent with indoor toilets	<1.0%
Percent with no type of sanitation	60%
Percent with a radio	24%
Percent with a television	2.0%
Percent with a refrigerator	<1.0%
Percent with an automobile	<1.0%

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Religion. Desmangles (1992), in his book “The Faces of the Gods”, explores religion in Haiti. Roman Catholicism is the primary religion of Haiti and the church is partially funded by the government. In recent years, Protestant denominations including Methodist and Baptist churches have increased their members, but these churches remain unsubsidized by Haitian government. In addition, it is estimated that six million Haitians also practice Vodou, the “unofficial” religion of Haiti, which incorporates elements of both traditional African religions and Catholicism. The prevalence of Vodou is greatest in



rural areas. Vodouisants believe in numerous gods who are seen as influencing all of life's circumstances, including gods of fertility and childbirth. Vodou priests and priestesses often serve as healers in the community: supernatural forces, herbs and rituals are included in an elaborate system of medical practices (Desmangles, 1992).

### Intermediate Determinants

#### Health Status

The most common causes of morbidity and mortality for women of reproductive age in Haiti are described below.

Sexually transmitted infections (STIs). In 1995, a study of pregnant women attending prenatal clinics in Haiti revealed the following: 47% of 891 subjects had at least one STI, trichomoniasis being the most common (35%), followed by chlamydia and gonorrhea (12%); 11% of the sample had a positive RPR (Behets et al., 1995).

HIV/AIDS. AIDS is currently the leading cause of death in Haiti. In 1996, the percentage of the sexually active population infected with HIV was 3-5 % in rural areas and 7-10% in urban; 46% of AIDS cases in Haiti are female (PAHO, 1999). Walling (2001), in her review of international family medicine literature, discovered that among prostitutes in Haiti, 69% are infected with HIV. A longitudinal cohort study to define natural history and disease progression in a developing country was conducted in the Port-au-Prince area of Haiti from 1985 to 2000 (Deschamps, Fitzgerald, Pape & Johnson, 2000). The study followed 42 patients with documented HIV seroconversion. Patients were treated for opportunistic infections; antiretroviral therapy was not available. Results





revealed the median time to symptomatic HIV disease was 3.0 years, median time to AIDS was 5.2 years, and median time to death was 7.4 years (95% CI).

The Child Health Institute in Haiti performed a study of post-partum women between 1991-1992. They discovered that 7.4% of these women in urban areas and 4.1% in rural areas were seropositive for HIV (PAHO, 1999). In Haiti, the rate of perinatal transmission of HIV from mother to child is estimated to be 30% (Perry, March 2000).

Hepatitis B. In 1996, a study in Haiti found 2-7% of pregnant women in the sample were positive for Hepatitis B surface antigen (PAHO, 1999).

Tuberculosis. The prevalence rate for active tuberculosis in Haiti is one of the highest in the world: reports range from 180 to 500 cases per 100,000 persons, and 24-50% of these cases are infected with HIV (PAHO, 1999; Perry, March 2000).

Anemia. Anemia prevalence is highest in Africa and the Caribbean (Rush, 2000). Anemia is believed to increase women's susceptibility to illness, pregnancy complications, and maternal deaths (Shen, 1999). Hemoglobin concentrations of less than 8.0g/dL have been associated with the greatest risk for maternal mortality (Rush, 2000).

Thirty-five to fifty percent of women in Haiti are anemic (Perry, March 2000). In developing countries, anemia has multiple causes (many concurrent), including iron deficiency, folate deficiency, malaria, intestinal parasites, vaginal bleeding, hemoglobinopathies such as sickle cell disease, and infections such as HIV (Fiander, 1991; Rush, 2000). In addition, the practice of pica is common and considered harmless by Haitian women (Harris, 1987).

It is currently not known whether or not the treatment of mild anemia decreases the incidence of hemorrhage (Rush, 2000). Nutrition, in general, influences maternal



mortality, but based on current evidence, it does not make a major difference in incidence rates (Maine, 2000).

In Haiti, the dietary staples are rice, corn and beans. Chronic malnutrition is common, and 8% of children have moderate or severe acute malnutrition. Eighteen percent of non-pregnant women have a body mass index below 18.5 kg/m<sup>2</sup> (Perry, March 2000).

Short birth intervals have been theorized to influence anemia and maternal mortality, but studies have shown there is no significant causal relationship (Ronsmans & Campbell, 1998). Malaria prophylaxis and anthelmintic treatment can be important in controlling anemia in certain geographic areas, as well as emergency blood transfusions to avoid cardiac failure for the severely anemic (Rush, 2000).

Malaria. It is believed that pregnant women are especially susceptible to malarial infection and are more likely to die from the infection than women who are not pregnant (Rush, 2000). In Haiti, it is estimated that there are 250,00 cases of malaria per year in the general population (Perry, March 2000).

Cancer. In Haiti, as in most developing countries, cervical cancer is the most common cancer in women, followed by breast cancer (Perry, March 2000; Richart, 1995). The high mortality rate is due primarily to the inadequate screening and treatment capabilities of these countries (Guidozzi, 1996; Kitchener & Symonds, 1999).

### Reproductive Status

Age and parity both influence women's reproductive status and are explored below.

Age. In rural Haiti, the mean age at first birth is 21.4 years, with educational level having a positive influence on age at first birth (Population Council, 1996). A study done



in Port-Au-Prince in 1992 revealed that 8% of all births were to mothers aged 15-19 years. Adolescents accounted for 15% of pregnancy-related deaths, 4% of these from induced abortions (PAHO, 1999).

In general, studies have shown that women at both ends of the age spectrum are at increased risk of maternal mortality (Kestler & Ramirez, 2000). A study in Jamaica however, found the greatest risk of maternal death is for women over age 30 and for women of higher parity, but did not find a significantly higher risk for teenagers (Keeling et al., 1991).

Parity. Haiti is one of the most densely populated countries in the Western Hemisphere. The average fertility rate for rural Haiti is approximately 6 births per woman (Population Council, 1996). The total fertility rate in the Hospital Albert Schweitzer district is 4.1 for the plains versus 6.8 for the mountainous areas (Perry, Volk, Philippe, Amicar, 2000). Therefore, women are repeatedly exposed to the risks of pregnancy, and lifetime risk of a maternal death is high.

The woman is not the only one at risk. A study done in Mexico showed that in 50% of the maternal deaths in a rural area, the newborn child died either immediately after birth or within the following year (Elu, 1995). In another study, summarized by Santow (1995), a maternal death multiplied the risk of a neonate's death over the next two years by a factor of ten. In Haiti, 24% of all deaths among children under 5 yrs. occur during the first month of life, and of these, 25% are attributed to low birth weight, 25% to obstetrical problems, and 15% to neonatal tetanus (Perry, March 2000).

Reasons for high fertility rates are complex. In most developing countries, income from child labor goes directly to adults (Shen, 1999). An example of this in Haiti is the



practice called “restavek”: rural families receive financial compensation to send young children (usually female) to urban areas to work as domestic laborers (U.S. Dept. of State, 2001). Children are social security for their parents, caring and providing for them when they are elderly or disabled and unable to work. (Isibhakhhome Asowa-Omorodion, 1997; Santow, 1995). In Nigeria, women with living children are respected and considered to have successfully fulfilled a woman’s role: they are praised for their ability to bear and raise children and for securing a future for the entire family (Isibhakhhome Asowa-Omorodion, 1997). Fertility in many developing countries reflects social status: the greater the number of living children, the higher the woman’s status in the home and in society (Isibhakhhome Asowa-Omorodion, 1997; Eades et al., 1993).

### Access to Health Services

Many government-funded health facilities in rural areas of developing countries are under-staffed and poorly equipped to provide obstetric care, including basic prenatal care (Midhet et al., 1998). Haiti has less than 10% of the number of trained health care personnel than do other parts of the Caribbean and Latin America (Perry, March 2000). Most of these professionals are concentrated in Haiti’s capital city, Port-Au-Prince (Perry, March 2000). Data from a study of maternal mortality in Zambia showed that lack of a district hospital plus poor transportation can double rates of maternal mortality (Bacq & Rietsema, 1997). The authors of this study suggested the development of a referral system consisting of outlying health centers with radio communication, strategic blood banks, and ambulance services to improve the situation of women in remote areas.





## Health Care Behavior and Use of Health Services

Health care behavior and use of health services is reflected in use of family planning, prenatal care, and traditional practices.

Family planning. In Haiti, modern family planning services have been available to the public since the mid-1970s; the majority of services are offered by the private sector (Althus, 1992). Haitian government policy does not allow any organization to charge for family planning services; all methods offered must be free to the public.

A study in Haiti showed that among women whose last pregnancy resulted in a live birth, 56% reported that the pregnancy was planned, 11% that it was mistimed, and 21% that it was unwanted (Althus, 1992). When asked, many women, in both rural and urban areas, desire to limit family size but do not use contraception (Eades et al., 1993), and access to safe abortion services is limited (Cook, Dickens & Bliss, 1999). The 1994-1995 Demographic and Health Survey for Haitian women aged 15-49 revealed that the mean ideal number of children was 3-4, but only 12.8 % of rural women currently in a union used contraception (mostly modern methods). Education level was positively associated with contraceptive use. Among women 15-29, wanting children was reported as the greatest reason for non-use, followed by lack of information, side effects and religious reasons. Older women reported similar reasons plus menopause/hysterectomy or infertility. In the district served by Hospital Albert Schweitzer, based on a survey of women in the community, injectible methods of contraception were used the most by women currently using a method, and were considered the most desirable among current non-users (Volk, Silva, Berggren, & Perry, 2001).



Some researchers believe family planning remains a neglected area in developing countries (Puentes-Markides, 1992), while others state there is a disproportionately large share of resources allocated to 'family planning programs'--often a euphemism for population control-- thereby suggesting political and economic interest (Sundari, 1992).

Prenatal care. A study in rural Haiti showed that for women who had a live birth in the previous five years, 57-68% had had prenatal care, but less than half of these women received prenatal care during the first trimester. Earlier and more prenatal care was positively associated with level of education (more than six years of schooling) (Althus, 1992). The following reasons have been suggested for non-use of prenatal services in developing countries: lack of time and money and no need--earlier pregnancies were problem-free; multiple reasons related to unwanted pregnancies, including shame if pregnancy occurred out-of-wedlock and lack of motivation for self-care; long waiting periods at health clinics, and deficient services (Gharoro & Okonkwo, 1999; Sundari, 1992).

Some analyses of pregnancy-related deaths in various parts of the world have suggested that incidence rates of maternal deaths will decline when effective and affordable prenatal care is provided for the entire community (Gharoro & Okonkwo, 1999; Yanik et al., 1999). Others attribute maternal mortality to the lack of adequate prenatal care plus home deliveries, in combination with low socio-economic status (Ojanuga & Gilbert, 1992). Some disagree with these associations, stating that infant mortality is likely to decrease with better prenatal care, but maternal mortality rates will be minimally affected (De Brouwere, Tonglet & Van Lerberghe, 1998; Maine &



Rosenfield, 1999). Prenatal care is rarely defined in the literature, thereby limiting the data's use in program formation.

Traditional practices. It has been estimated that between 85% and 91% of births in rural Haiti take place at home (Althus, 1992; Perry, March 2000). Assistance at birth for rural women is as follows: 53.5% is provided by untrained traditional birth attendants (TBAs), 27.3% by TBAs with training, 6.8% by relatives, 5.4% by a physician, 3.7% by a nurse or auxiliary health worker, and 3.2% are unassisted (Population Council, 1996). Rural women breastfeed their children for an average of 18.4 months, though few breastfeed exclusively; educational level has a negative (inverse) association with breastfeeding (Population Council, 1996).

Focus groups conducted with women in Nigeria and with Haitian immigrants in the U.S. have revealed how strongly women believe in the effectiveness of traditional care; women in Nigeria suggested that health centers offer both traditional and modern services to achieve the best care (Harris, 1987; Isibhakhhome Asowa-Omorodion, 1997). Based on research in Mexico, Elu (1995) encourages the development of a framework for collaboration between the traditional and modern health sectors.

Traditional Birth Attendants (TBAs) are an extension of traditional beliefs and health practices. The literature shows that women place a high value on being attended by TBAs during pregnancy and delivery, and TBAs are trusted and respected by women and their families. The health sector in most developing countries consider health promotion and referral, as opposed to improving the delivery skills of TBAs, to be the best way TBAs can be incorporated into modern health care and contribute to a reduced incidence of maternal deaths (Eades et al., 1993; Sundari 1992). De Brouwere et al. (1998) believe



that the training of TBAs has diverted attention from the development of professional first-line midwifery and second-line hospital delivery care. The joint WHO /UNFPA/ UNICEF/World Bank statement (1999) does not support the training of TBAs to reduce maternal mortality; It states, “where TBA training is undertaken, it should be part of a broader strategy that includes a built-in mechanism for referral, supervision, and evaluation (p.26).”

The following factors contribute to the preference for birth at home with a TBA: lower cost, convenience, familiarity and comfort with the TBA and with home surroundings, belief that childbirth is natural and does not need medical interference, fear of medical intervention such as episiotomy and cesarean section, desire for a female care-provider and the fear that cultural practices will not be respected (eg. special foods and post-partum rituals) (Eades et al., 1993; Elu, 1995; Isibhakhhome Asowa-Omorodion, 1997; Sundari, 1992). Multiple studies have shown that cesarean sections in developing countries are associated with a high risk of mortality, primarily associated with anesthesia complications and postoperative sepsis (Etard et al., 1999; Fiander, 1991; Roopnarinesingh et al., 1991; Walker et al., 1986). Women in some areas, therefore, are justified in their fears of operative deliveries and their resistance to hospital births.

The literature suggests a general belief that if women only knew how to identify danger signs that call for medical attention, most would attempt to get care (Sundari, 1992). For example, in Mexico, family members interviewed after maternal deaths considered pregnancy as a natural event and did not perceive medical complications that needed medical attention (Elu, 1995). In other studies, however, women and TBAs indicated they can identify major emergencies such as hemorrhage (Harris, 1987;





Isibhakhoma Asowa-Omorodion, 1997), but often, when referrals are made, they are made either too late for medical intervention or families decide not to seek care (Elu, 1995; Eades et al., 1993). The power to decide to seek medical attention often does not lie with the woman herself; husbands and other family members may have control and prohibit the woman from seeking care for both social and economic reasons (Santow, 1995).

## Outcomes

### Incidental Causes of Maternal Deaths

Violence against women and suicide are considered incidental causes of maternal deaths because, although these incidents can be related to or aggravated by a pregnancy, they are not directly or medically caused by pregnancy.

Violence against women. A study by Rizzi et al. (1998) examined all violent deaths of women 12-44 years old in the Province of Cordoba, Argentina. Complications from induced abortion were included in this category. Of 272 deaths, 22 were due to complications of induced abortion. The remaining deaths were from traffic accidents (62%), homicide (20.4%), and suicide (17.6%). The death certificates identified six of these women as pregnant at the time of death.

Haiti has a long history of violence and human rights abuses. Most recently, the army, police, and paramilitary groups terrorized the population of Haiti following the military coup of 1991. Constitutional order was restored in 1994 and a UN peacekeeping force remained in Haiti until 1997, but there was little improvement of the situation (Marotte, 1997). Currently, rural areas of Haiti have little or no police presence and vigilante justice



is common (U.S. Dept. of State, 2001). Based on studies done by national and international groups, the physical and sexual abuse of women, including rape, domestic violence, and gun and knife injuries, is prevalent in Haiti (Perry, March 2000; U.S. Dept. of State, 2001). A study done in Haiti in 1995 reported that 81% of all documented cases of violence involved women aged 10-34 years (PAHO, 1999).

Suicide. Suicide accounts for a very small percentage of all maternal deaths. The numbers, however, are thought to be underestimates because often the pregnancy is not identified or recorded in relation to the event (Rizzi et al., 1998). Some believe maternal suicides are related to limited options for an unwanted pregnancy (Frautschi, Cerulli, & Maine, 1994).

#### Direct Medical Causes of Maternal Deaths

The following conditions are the most common causes of maternal deaths in Haiti and worldwide.

Hypertensive disorders of pregnancy / Toxemia of pregnancy. Toxemia is the leading cause of maternal death in Haiti, accounting for 16.7% of all reported maternal deaths (PAHO, 1999). Toxemia includes both preeclampsia and eclampsia, and is a complication of pregnancy with an unknown etiology. Unlike other direct causes of maternal death, hypertensive disorders of pregnancy continue to kill women in developing as well as developed countries, indicating that these deaths are difficult to prevent (Duley, 1992). Duley (1992) reviewed the history of maternal mortality in parts of the developed world and suggested that where deaths from eclampsia were high, the initial decline was likely to come from a fall in the case fatality rate, not the incidence of



the condition (Duley, 1992). Debates over management and treatment, however, remain prevalent in the literature.

Seasonal variability (incidence greater in wet as opposed to dry seasons), infection, and nutrition have all been proposed as possibly influencing the development of toxemia, but evidence to support these theories is inadequate (Maine, 2000; Rush, 2000).

Sepsis. Many developing countries have rates of sepsis similar to what was seen in industrialized countries a century ago, and for similar reasons: unsanitary conditions and lack of aseptic technique (eg. lack of clean linens, gloves, and antiseptics), and an overcrowding of hospitals forcing patients to share beds or close quarters (Sundari, 1992).

Most deaths from sepsis occur during the second week after delivery, but the infection is often established during delivery or early in the first week (Li et al., 1996). Many cases are related to genital tract infections already present (most of which could be treated through adequate prenatal care) and are not necessarily iatrogenic.

It has been proposed that greater mortality from infection is related to malnutrition's influence on the immune system; however, nutritional interventions alone have not been supported to decrease the incidence or severity of maternal infections (Rush, 2000).

Abortion. The World Health Organization estimates that one half of all pregnancies are unplanned, and one quarter are unwanted (Khanna et al., 1994). It is well established that induced abortion is a leading cause of maternal death in countries where abortion is illegal (Fauveau & Blanchet, 1989; Walker et al., 1986; Cook et al. 1999). In 1998, The World Health Organization estimated that 21% of maternal deaths in Latin America and the Caribbean are due to unsafe abortions. Legality of abortion, however, is not sufficient



to reduce maternal mortality associated with unsafe abortion. Appropriate equipment, facilities, and staff qualified and willing to provide abortion services is needed as well.

Article 262 of the Haitian penal code states that a woman, and anyone who assists her, can be jailed for abortion: sentence equivalent to the gestation of the terminated pregnancy. Despite this restrictive law, induced abortions do occur in Haiti. Althus (1992) reported the following research: among women who had been pregnant at least once, 6% reported having had an abortion (a range from 5% in rural areas to 10% in urban). The proportion of women who reported having had an abortion was twice as high among women with 1-3 years of education as among those with 4-6 years of education or no education. Among women who reported having had an abortion, 64% had had one, 23% had had two: about 1/3 had the procedure performed by a doctor (doctors had performed over 1/2 of the abortions in urban areas, but less than 1/4 of those in rural areas), 1/3 said they aborted their own pregnancies, and the remainder of procedures were performed by nurse-midwives, traditional birth attendants, friends, or others.

Hemorrhage. Hemorrhage accounts for 8.3% of maternal deaths in Haiti (PAHO, 1999). Major risk factors for obstetric hemorrhage include obesity, placental abruption, placenta previa, multiple gestation, retained placenta, induced labor, episiotomy, and a birth weight of >4 kg (Stones et al., 1993). Access to immediate and adequate blood supplies is necessary for survival, particularly if the woman is severely anemic or has a coagulation defect (Fiander, 1991). Absence of a blood bank and facilities for blood transfusion is one of the most frequently encountered inadequacies of health facilities in developing countries (Sundari, 1992).





Obstructed labor. Obstructed labor accounts for 8.3% of the maternal deaths in Haiti (PAHO, 1999). Commonly, obstructed labor occurs as a result of cephalopelvic disproportion related to either an abnormal fetus—eg. macrosomic, or congenitally malformed—or a small maternal pelvis, or fetal malpresentation (Konje et al., 2000; Wall, 1998). Lack of access to surgical delivery (cesarean section) greatly increases risk of mortality and morbidity. Untreated, women can labor as long as 10 days (Wall, 1998). Women can die from exhaustion or uterine rupture. Uterine rupture usually leads to the death of mother and fetus from hemorrhagic shock (Wall, 1998). Infection, hemorrhage, and soft-tissue damage are all potential sequelae of obstructed labor (Rush, 2000).

Second to the death of mother and fetus, the most serious complication of obstructed labor is an obstetric fistula (Wall, 1998). Subsequent pelvic and upper urinary tract infections, and both fecal and urinary incontinence lead to a life of suffering and isolation for these women. Wall (1998) reviewed studies done in northern Nigeria, where there is a high prevalence of obstetric fistulas, and found that more than 60% of women with obstetric fistulas developed the fistula before they were 20 years old and during their first pregnancy. Fistulas were seen at any parity when labor had been obstructed, but obstructed labor is more likely to lead to a ruptured uterus among multiparous women (Rush, 2000).

Risk factors for obstructed labor include nutritional deficiencies, pelvic injury, immature pelvis, and short stature (Konje & Ladipo, 2000). Short stature is influenced by nutrition, illness and genetics. Worldwide, women of short stature are more likely to require a cesarean section for obstructed labor; however, adequate maternal height can mask a pelvic deformity (Rush, 2000). Calcium and subsequent vitamin D deficiency can



result in rickets in childhood, and osteomalacia in adolescence and adulthood, causing poor or distorted pelvic growth (Rush, 2000). The high incidence of chronic malnutrition and disease in Haiti makes these risk factors for obstructed labor issues of concern.

The prevalence of complications associated with obstructed labor is reflected in long traditions and folk beliefs throughout the developing world. The practice of limiting food intake to avoid a large baby is a common example (Brems & Berg, 1988).

The Prevention of Maternal Mortality (PMM) Network was established in 1987 to conduct research in West Africa. The research teams used McCarthy & Maine's conceptual framework, creating a strategic model based on the premise that obstetric complications cannot be predicted or prevented, but they can be successfully treated ("About PMM Network", 1997). Much has been gained from the Network's efforts, including the development of the Three Delay Model, used in recent studies to identify points at which delays in receiving Essential/Emergency Obstetric Care (EOC) occur:

1. Delay between the onset of symptoms and the decision to seek care.
2. Delay between the decision to seek care and reaching the appropriate health facility.
3. Delay in receiving care at a health facility, or receiving substandard care.

The PMM teams designed and implemented activities to address delays at each level, and demonstrated replicable ways to improve EOC ("About PMM Network", 1997). Late arrivals and referrals account for most deaths in hospitals in the developing world (Sundari, 1992).

Distance, mode of transport and weather all contribute to delays in receiving medical care, and ultimately, affect the woman's survival (Bacq & Rietsema, 1997). In rural



areas, the rainy season can make roads impassable, and a woman may decide to not make the journey if there is work to be done during the planting and harvest seasons (Sundari, 1992).

The PMM network set new standards for research on safe motherhood, including the use of process indicators to evaluate interventions aimed at reducing maternal mortality. These indicators have been shown to modify the effects of the direct obstetric risk factors of maternal mortality (Midhet et al., 1998). Causes for delay need to be researched and addressed, as previous studies have discovered that both social and economic factors play as important a role in maternal deaths as medical factors (Eades et al., 1993; Jafarey & Korejo, 1993; Ojanuga & Gilbert, 1992).

Paolisso & Leslie (1995) caution the simplistic assigning of responsibility to organizations, disciplines, and individuals, including women themselves, for persistent health problems and underutilization of existing services. Puentes-Markides (1992) identifies three fundamental elements of access: the structure of the health system, the behavior of health professionals, and characteristics of the population seeking care. She explains that these are then further modified by governmental politics, macroeconomic and health policies, or the status assigned to women in society.

The development of a health system is a political and economic act, often tied to national and international pressures, particularly if international loans are utilized. A country's economic dependency on foreign investment has been associated with lower status of women, measured by women's relative educational status to men, autonomy in reproductive behavior, and general health care availability (Shen & Williamson, 1999). In the late 1980s, social and economic crisis in Latin America and the Caribbean and



resultant economic adjustment policies worsened the social and economic inequalities already present in those countries. This has directly affected the availability and quality of goods and services, including health care (Puentes-Markides, 1992).

An example of this was seen in the Dominican Republic in the late 1980s. The economic climate resulted in reduced government support for public health care, and clinics and hospitals suffered from lack of adequate electricity, water, medicines, supplies, and all levels of personnel (Whiteford, 1993). International support and funding for health clinics politicized the Dominican health system. The Dominican Republic adopted a foreign model of health care: curative, high-technology-dependent medicine inappropriate for primary health care in poor rural settings (Whiteford, 1990). Whiteford (1990) suggests that in part, primary health care in the Dominican Republic failed because it did not meet the culturally specific needs of its communities.

The incidence of neonatal tetanus was dramatically reduced in the period preceding this crisis, when the Dominican Republic's public health services were at their peak, and then doubled between 1985 and 1988, when hospitals' prenatal care (primarily consisting of vaccinations) and sanitary conditions were compromised (Whiteford, 1993). More recently, a similar situation arose in Nigeria, following the Structural Adjustment Program of the World Bank (Okafor, 2000). Most reports have shown that the social cost of these economic and political policies is high and long lasting, with women (particularly the rural poor) bearing most of the burden. The most dramatic examples are seen in reports from parts of the world affected by United Nations sanctions.

Sanctions are associated with declines in health and welfare, as seen in Cuba, Iraq, Nicaragua and Haiti (Gibbons & Garfield, 1999). In Haiti, the estimated maternal





mortality rate increased 30% from 1989 to 1994. The increase was most likely due to repercussions of the economic embargo: decreased quality and quantity of food, decreased access to transportation and medical services, and increased poverty-related abortions (Gibbons & Garfield, 1999).

External debt and economic adjustments within a country, however, cannot be seen as the only factors inhibiting better healthcare, and women's status has not improved even in countries where the economy has grown (Puentes-Markides, 1992).

### Operational Definitions

*Maternal Death* (International Classification of Diseases, Tenth Revision (ICD10)): death of a woman while pregnant or within 42 days of termination of pregnancy, regardless of the site or duration of pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes.

*Late Maternal Death* (ICD10): the death of a woman from direct or indirect obstetric causes, more than 42 days but less than one year after termination of pregnancy.

*Direct Obstetric Death* (ICD10): that resulting from obstetric complication of the pregnant state (pregnancy, labor and puerperium) from interventions, omissions, incorrect treatments or from a kind of event resulting from any of the above.

*Indirect Obstetric Death* (ICD10): death resulting from previous existing disease or diseases that developed during pregnancy and which was due not to direct obstetric causes, but aggravated by the physiological effects of pregnancy.



*Maternal Mortality Ratio* (WHO 1999): the number of maternal deaths during a given year(s) per 100,000 live births during the same period. It is a measure of the risk of dying of a pregnancy-related cause.

*Maternal Mortality Rate* (WHO, 1999): the number of maternal deaths in a given period per 100,000 women of reproductive age. It measures the combined risk of becoming pregnant and of dying of a pregnancy-related cause.

*Obstetric Case Fatality Rate* (McGinn, 1997): An indicator of quality of care, it is the number of maternal deaths due to direct obstetric complications in a given period divided by the number of women admitted with complications in the same period: the proportion of women admitted to a health facility with obstetric complications who ultimately die there.

*Trained Birth Attendant* (WHO, 1999): A person with midwifery skills who can diagnose and manage obstetrical complications as well as normal deliveries. This category excludes traditional birth attendants (TBAs) who have received less than six months of formal training.



## Chapter II

### Methodology

#### Research Design

This project is a descriptive, retrospective study to examine maternal mortality in the Artibonite Valley of rural Haiti. Inclusive dates of data collection: 6/10/01-8/06/01.

#### Setting

Hospital Albert Schweitzer (HAS) is a private institution situated at Deschapelles in north-central rural Haiti, 90 miles from the capital of Port au Prince. The hospital opened in 1956 and has remained the largest and most comprehensive health and development institution in Haiti. The hospital serves a population of 143,000 persons in its catchment area within the Artibonite Valley, a 610 sq. mile area of mountains and plains. It offers specialty services, including obstetrics and gynecology. HAS also operates health dispensaries and mobile clinics, and provides medical care and education through home visits. Ninety-eight percent of its employees are Haitian.

The district served by HAS is divided by localities, all of which fall under seven functional units. Each functional unit has an affiliated health dispensary. Two large dispensaries serve the functional units in the plains regions where most of the population resides. Three smaller dispensaries serve the mountain localities, and two others serve functional units that contain localities with characteristics of both mountainous and plains regions.

HAS created a census-based approach to ensuring health services for treatable or preventable conditions. Each household in the district is accounted for: community health workers are trained in health promotion and are responsible for the education of and



continued contact with 15 families in their locality. The computer records database consists of over 285,00 medical records.

## Methods

### Research Aim #1

Evaluate Hospital Albert Schweitzer's Women's Health Division using process indicators of Safe Motherhood progress.

The UNICEF/WHO/UNFPA document titled “Guidelines for Monitoring the Availability and Use of Obstetric Services” (Maine et al., 1997) recommends the following process indicators to monitor Safe Motherhood progress. Data for this research aim was gathered from hospital reports and records, site visits, and personal communications with hospital staff.

1. The number and distribution of obstetric care services, including prenatal education and other services.
2. The proportion of births attended by trained/skilled attendants (WHO definition), including home and hospital deliveries.
3. The rate of cesarean sections.
4. The rate of institutional case fatalities for direct obstetric complications.
5. Functioning basic and comprehensive Essential/Emergency Obstetric Care (EOC) services.

The UNICEF/WHO/UNFPA document (Maine et al., 1997) outlines the following: Obstetric services should be made geographically accessible to all women who require obstetric care in a given region. Skilled personnel should be in attendance for every birth,





as at least 40% of pregnant women will require some specialized care (WHO, 1999). At least 15% of the total births for a population should take place in either a basic or comprehensive EOC facility. At least 15% of pregnant women will develop serious complications requiring medical attention, and one-third of these women (5%) will need some form of treatment from a comprehensive EOC facility. At least 5% of pregnant women will require a caesarean section. The maximum acceptable level for an institutional obstetric case fatality rate is 1%. At the Health Clinic/Dispensary level, a facility must offer all of the following to qualify as a basic EOC facility:

1. Parenteral antibiotics.
2. Parenteral oxytocic drugs.
3. Parenteral sedatives/anticonvulsants for preeclampsia and eclampsia.
4. Manual removal of placenta or any retained products of conception.
5. Assisted vaginal delivery.

At the District Hospital level, a facility must offer all of the above plus surgery and blood transfusion to qualify as a comprehensive EOC facility.

### Research Aims #2& #3

Document the maternal mortality rate and ratio in the hospital's district. Document the causes and contributing factors to maternal deaths in the district.

This study falls under the category of a Reproductive Age Mortality Survey (RAMOS). RAMOS is the gold standard for estimating maternal mortality (WHO, 1996) and is considered to be one of the best ways to identify and investigate causes of death. In



a RAMOS, multiple sources of information are used including medical records and verbal autopsies.

A verbal autopsy consists of a flexible interview with open-ended questions designed to elicit discussions and recollections of events leading to a death, and a structured questionnaire about medical symptoms and the timing of their occurrence. As well as being a practical approach to identifying maternal deaths both in and outside the hospital setting, this method allows for an investigation into cause of death for all women of reproductive age. There is no vital registration system in Haiti. All of the health data/statistics available for Haiti are estimates from surveys, including verbal autopsies, conducted by organizations including the Pan American Health Organization, The Child Health Institute in Haiti, and the Population Council.

To identify as many deaths in the Hospital Albert Schweitzer (HAS) district as possible over the past five years, three sources of information were used:

1. The Family Data Registry, which consists of reports from Community Health Agents but does not include cause of death information.
2. Hospital Records Database (HIS system), which includes ICD9 diagnostic codes.
3. A HAS survey of a randomized sample of 400 women in the community asked if they knew of a woman 15-49 who had died between March 1, 1996 and February 28, 2001.

A total of 719 names were identified. 706 met the inclusion criteria: woman age 15 to 49 at time of death, death occurring between March 1, 1996 and February 28, 2001.

Addresses were verified by the Community Health Agents responsible for each locality in the HAS district. Verbal Autopsies were then conducted with a sample of 99 adult family members (households) of women from this population. Appendix D contains the verbal



autopsy interview/questionnaire used in this study. This tool was developed based on WHO guidelines for investigating maternal mortality as presented in the report of the March 2000 WHO Technical Working Group (WHO, 2000). Appendix E contains WHO algorithms for identifying selected causes of maternal deaths (WHO, 1994 ).

### Sample

Seven hundred and six deaths of women of reproductive age were identified in the district served by Hospital Albert Schweitzer (HAS) between March 1, 1996 and February 28, 2001. The majority were identified from the Family Data Registry (75%), followed by the HIS computer records database (22%), and the HAS community survey (3%). The data was organized alphabetically by localities within six of the seven HAS functional units. Functional Unit #6 (Terre Nette) was excluded from the verbal autopsy portion of the study due to safety concerns: violent riots were taking place in this region during July and August 2001. A systematic random sample of 99 women was selected from this population (14%). Adult family members with knowledge of the death were located and asked to participate in the study. If a family was not found or refused to participate, another woman's name, within the same locality, was chosen.

Reliability & validity for verbal autopsies. Verbal autopsies for child and adult deaths, including maternal deaths, are common worldwide (Achadi et al., 2001; Fauveau et al., 1988; Fikree et al., 1994; Fortney et al., 1988; Kwast et al., 1986); Walker et al., 1986). Kahn et al. (2000) found that the frequency distribution for causes of death based on



verbal autopsies closely approximated that of the hospital records used for validation. No difference in cause of death data was statistically significant.

Diagnostic algorithms for medical causes of death have been supported for greater reliability and validity of results (Chandramohan et al., 1994). Chandramohan et al., (1998) found 93% specificity, 94% sensitivity, and 87% positive predictive value for all causes of maternal death reached by verbal autopsy diagnostic algorithms. Narrative reports in addition to the use of algorithms, however, have proved valuable in clarifying and classifying cases (Barnes-Josiah, 1998; Hoj, 1999). In a reliability and validity study of three verbal autopsy methods for maternal deaths, Ronsmans et al. (1998) found the sensitivity to be higher for direct obstetric deaths as opposed to indirect obstetric deaths. Their report emphasizes the importance of appropriate translation for local illness and symptom terminology.

### Procedures

Human Subjects approval was obtained from the Yale School of Nursing Human Subjects Research Review Committee (Appendix A) and the Hospital Albert Schweitzer Ethics Committee (Appendix B). Dr. Henry Perry, Director General and CEO of Hospital Albert Schweitzer, reviewed the questionnaire and contributed to its modification.

An interpreter and I traveled to each of the seven health dispensaries in the HAS district to assess women's obstetric health services. Staff was interviewed and patient interactions observed.

The interview/questionnaire and informed consent were translated to Haitian Creole and back translated to English at Hospital Albert Schweitzer. The instrument was pre-





tested in two localities (Sous Belaire—a mountain locality, and Verrettes—a plains locality) with a total of six participants. A trained interpreter accompanied me during verbal autopsies. Three interviewers were hired and trained to conduct verbal autopsies in various localities. Verbal consent was obtained from respondents participating in the verbal autopsies and documented. Appendix C contains the consent form used in this study. Dr. Maria Small, Perinatal Fellow at Yale New Haven Hospital, reviewed each verbal autopsy and assisted with the assessment of cause of death for each woman in the sample. For validation, verbal autopsies were independently compared to ICD9-coded causes of death for the 21 women who died at HAS.



## Chapter III

### Results

#### Aim#1

#### Evaluate Hospital Albert Schweitzer's (HAS) Women's Health Division Using Process Indicators of Safe Motherhood Progress

The seven HAS dispensaries are geographically dispersed based on the population distribution in the district. All dispensaries are open Monday through Friday 7am –5pm, and are closed evenings and weekends. Auxiliary workers make up the majority of the full-time staff, with an average of one auxiliary and one assistant per 10,000 population. Registered nurses, physician extenders, and physicians visit monthly for staff education and occasional patient care. Hospital training and continuing education consists of three to four seminars per year.

Radio communication with HAS is functioning at less than half of the dispensaries. There are no ambulance services or other arrangements for emergency transport from a dispensary to the main hospital. Most dispensaries have electricity, but in the lab areas only. Clean water is accessible by outdoor water pumps at most of the dispensaries. The dispensaries in the mountains, however, must have water brought in from local streams and filtered on site. Supplies consist of basic first aid equipment and common primary care medications, including antibiotics, analgesics, and contraceptives. Supplies are limited and it is common for a dispensary to run out of popular items such as the contraceptive injection Depo Provera. Most dispensaries lack fetoscopes, suture kits, vaginal speculums, and teaching materials. Supplies may be requested from the main



hospital every two weeks, but in some cases it can take two to three months before items are received. As a result supplies are often inadequate to meet the dispensaries' needs.

Prenatal care is offered at each dispensary. It is estimated that most women in the community receive at least three prenatal visits during their pregnancy. The majority of women seek care during the second trimester unless they are having problems. Prenatal care includes vital signs, weight, tetanus vaccination, RPR serology, hemoglobin and hematocrit evaluation, urine analysis with chemsticks for glucose and protein, assessment of fetal heart tones with a standard stethoscope, fundal height measurements, and Leopold maneuvers. Pelvic exams are performed in rare cases. The dispensaries do not offer any gynecological services including pap smears, cervical cultures, or direct visualization of the cervix. Sexually transmitted diseases and vaginal infections are treated based on symptoms. Prenatal education varies by dispensary, but generally includes information regarding the normal course of pregnancy, fetal development, nutrition, common discomforts and remedies, warning signs of problems in pregnancy, breastfeeding, and family planning options.

Most dispensaries do not offer routine postpartum care. In general, a woman is instructed to return to a dispensary with her newborn one week postpartum for a newborn exam. If she is to be seen, this examination will take place two to three weeks postpartum. Her exam includes vital signs, observation and assessment of vaginal bleeding or discharge, and hemoglobin and hematocrit evaluation if indicated.

The majority of the births (85%) in the HAS district occur at home with "Matwons"--untrained or minimally trained traditional birth attendants. The other 15% of births in the district occur at the main hospital with trained registered nurses or an obstetrician.



Hospital records for the years 2000-2001 reflect the cesarean section rate at HAS to be approximately 15% of all hospital births, and the obstetric case fatality rate to be between one and two percent. None of the seven HAS health dispensaries qualify as a basic EOC facility. Most HAS dispensaries offer intra-muscular antibiotics, but do not offer other basic EOC services and do not have the capacity for intra-venous medication administration. The HAS main hospital qualifies as a comprehensive EOC facility.

### Aim#2

#### Document the Maternal Mortality Ratio in the Hospital's District

A maternal mortality ratio is calculated by dividing the number of maternal deaths by the number of live births for a given time period and multiplying that number by 100,000. Seven hundred and six deceased women age 15-49 were identified for the five-year period between March 1, 1996 and February 28, 2001. Verbal autopsies carried out on a random sample of 99 of these cases identified that 18% of deaths were due to maternal causes. It can then be estimated that there were 127 maternal deaths over the five-year period ( $706 \times 0.18$ ). Based on HAS census data and household surveys carried out between 1997 and 2000, the estimate of the number of live births in the HAS seven functional units is 4,567 (Dr. Henry Perry, personal communication, September 21, 2001). The estimate of number of live births over a five-year period is 22,835 ( $4,567 \times 5$ ). Based on this data, the calculation of the maternal mortality ratio for the HAS district is 556.2 ( $127 / 22,835 \times 100,000$ ).





### Document the Maternal Mortality Rate in the Hospital's District.

A maternal mortality rate is calculated by dividing the number of maternal deaths for a given time period by the number of women of reproductive age in the population. HAS records from 2001 estimate the number of women of reproductive age in the seven functional units of HAS to be 34,080. Based on this data, the calculation of the maternal mortality rate for the HAS district is 372.65 ( $127 / 34,080 \times 100,000$ ).

### Aim#3

#### Document the Causes and Contributing Factors to Maternal Deaths in the District

The causes of death for women of reproductive age in the district served by Hospital Albert Schweitzer (HAS) are presented in Table 3. The causes of maternal deaths are presented in Table 4. Demographic statistics for locality, age, gravidity and parity of the population of maternal deaths are presented in Table 5. Contributing factors to maternal deaths based on the Three Delay Model are presented in Table 6.



Table 3

Causes of death for women age 15-49 in HAS district (n=99)

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HIV/AIDS	32%
Maternal causes	18%
Late Maternal	6%
Tuberculosis	10%
TB or HIV	4%
Infections (Not HIV or TB)	9%
Unknown	9%
Trauma	3%
Carcinoma	3%
Cerebrovascular Accident	2%
Asthma	2%
Cardiac Failure	1%

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Table 4

Causes of maternal deaths in HAS district (n=18)


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Puerperal sepsis	7 (39%)
Complications of Preeclampsia/Eclampsia*	5 (28%)
HIV/AIDS	2 (11%)
Hemorrhage secondary to illegal abortion	1 (5.5%)
Mastitis	1 (5.5%)
Asthma	1 (5.5%)
Seizure (with history of epilepsy)	1 (5.5%)

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\*Complications of preeclampsia and eclampsia include placental abruption, seizure, and renal failure.



Table 5

Demographic statistics for maternal deaths in HAS district (n=18)


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Locality				Plains	50 %
				Mixed	39 %
				Mountains	11 %
Age	Mean	30.39	(SD± 7.91)	Range	17- 43
Gravidity	Mean	3.33	(SD ± 2.30)	Range	1-9
Parity *	Mean	1.83	(SD ± 1.76)	Range	0-7

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\*Parity represents the number of living children at the time of the maternal death





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Table 6

Contributing factors to maternal deaths in HAS district based on the Three Delay Model

(n=18)

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*1<sup>st</sup> Delay:* Delay between the onset of symptoms and the decision to seek care.

12 (67%) deaths took place at home.

*2<sup>nd</sup> Delay:* Delay between the decision to seek care and reaching an appropriate health facility.

1 (5 %) deaths occurred during transport.

*3<sup>rd</sup> Delay:* Delay in receiving care at a health facility, or receiving substandard care.

5 (28%) deaths took place at Hospital Albert Schweitzer.

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## Chapter IV

### Discussion

Based on the findings from this study, the number and distribution of obstetric services is inadequate to meet the needs of women in the HAS district. Basic prenatal services are offered at each dispensary, but are limited by a lack of appropriate supplies and trained staff. Unlike the structure of care given at the main hospital of HAS, care at the dispensary level lacks formal protocols, allowing for quality of care to vary by dispensary.

Most of the births in the district (85%) and most of the maternal deaths took place at home (67%). Seventy-eight percent of the maternal deaths were due to direct obstetric causes and twenty-two percent to indirect causes. Fifty percent of the maternal deaths were of women who lived in the plains regions. The majority of women of reproductive age live in the plains, so it was expected that most of the women in the sample would be from these regions. In general, however, women in the plains are better educated, have higher incomes, fewer children, better access to transportation and to the larger health dispensaries and rely less on traditional practices than women in the mountains. Due to the exclusion of one of the mountain functional units (Terre Nette), it is probable that the maternal deaths from the mountain regions are under-represented. Age, gravidity, and parity ranged widely and could not be independently associated with the maternal deaths.

A hospital-based study of maternal mortality at Hospital Albert Schweitzer revealed the leading cause of admissions to the high-risk obstetrics unit and the leading cause of death to be preeclampsia/eclampsia (Preval & Smith, 2001). The leading cause of maternal deaths for the sample in this study, which focused primarily on the community,



was puerperal sepsis (39%), above preeclampsia/eclampsia (28%). These findings emphasize the importance of sanitation relative to a safe birth.

Home birth with a traditional birth attendant, a "matwon", is the standard in the HAS district; there are no other options readily available to women with normal pregnancies. There are approximately 200 matwons in the seven functional units of HAS. These women are usually middle-aged or older, illiterate, and have learned their delivery skills through a local apprenticeship or by having their own children. The income from their role as a matwon is supplemental to their primary incomes from agriculture and market activities. Their business success as a matwon depends on their level of experience and reputation in the local community. Hospital Albert Schweitzer (HAS) offers short, inconsistent, training courses for matwons. The last formal program for training was conducted by a visiting American Nurse-Midwife during 1996-1997. In general, various levels of staff, ranging from auxiliary workers to physician extenders, offer training to interested matwons at monthly meetings. Curriculum regarding delivery management and situations requiring referral is flexible and is compiled from various international sources. Matwons are not hospital employees, and, therefore, are not regulated by HAS. Hospital Albert Schweitzer (HAS) provides clean birthing kits to those matwons who have received some hospital training. These birthing kits have not been updated since 1958 and include a razor blade, two pieces of string to tie off the umbilical cord, a cloth abdominal band for the newborn designed to protect the cord from infection --a practice which may in fact promote an environment for the growth of bacteria-- and some small pieces of gauze. Gloves, soap, alcohol, and tetracycline ophthalmic ointment for the newborn are offered by some of the dispensaries, but are not standard in the birth kits. The



dispensaries are in contact with matwons on a monthly basis, but it is up to the pregnant woman and her family to locate and hire a matwon for the birth.

Women are aware of the risks associated with a home birth in Haiti, and many of them attempt to deliver at a dispensary or at the main hospital. Dispensaries are not equipped to manage deliveries, so if a woman presents in active labor she is referred to the main hospital. A referral system is in place, but a lack of radio communication and transportation makes timely referrals a problem. Many women do, however, arrive at HAS in time for treatment. Approximately 40% of all referrals to the HAS obstetric unit are from matwons, and 60% from dispensaries (Preval & Smith, 2001). HAS will not turn away a woman in active labor, regardless of her risk factors, and she is admitted and delivered in the high-risk obstetrics unit.

The 15% of births that take place at the HAS main hospital in the five bed high-risk obstetrics unit includes women with normal pregnancies who are in active labor, hospital employees and their families, and women with private insurance. It is estimated that 20% of the births at HAS are to women with normal pregnancies. According to UNICEF/WHO/UNFPA recommendations (Maine et al., 1997) and patient interest in the HAS district, there is a need for either an expansion of the existing obstetric unit or establishing alternatives in the community for normal pregnancies and deliveries.

It is likely that, based on the Three Delay Model, many women who require the specialized care of the hospital are not receiving it. Based on the UNICEF/WHO/UNFPA guidelines (Maine et al., 1997), as a measure of adequate care, the 15% cesarean section rate at HAS may be appropriate for the total number of births in the hospital, but





if the HAS unit was utilized exclusively for high-risk deliveries, the cesarean section rate would likely be higher.

The obstetric case fatality rate of 1-2% is probably an underestimate. It is a common practice at HAS to transfer a patient from the obstetrics unit to the general medical unit postpartum. Maternal deaths occurring in the medical unit are likely to be misclassified. In this study, five maternal deaths took place at HAS, of which two were miscoded. One cause of death was coded as renal failure and the other as pulmonary embolism. Verbal autopsies revealed that both of these deaths were within 42 days post-partum.

HIV/AIDS was the leading cause of death for women of reproductive age in this sample (32%) and accounted for 11% of the maternal deaths. These findings are consistent with hospital based studies at HAS and in other regions of Haiti which show at least 25% of deaths among hospitalized patients to be due to HIV/AIDS (Olle-Goig, Rodes & Barrera, 1993; Olle-Goig, Rodes & Casabona, 1994). Voluntary counseling and testing is the current approach in most of Haiti and has recently been proposed in the HAS district. Otherwise, testing for HIV is only done if a person is ill and there is a suspicion of HIV infection. Treatment with antiretroviral therapy is largely unavailable.

Average time intervals from onset to death for major obstetric complications, in the absence of medical intervention, are estimated in Table 7. Based on these estimates, postpartum hemorrhage is the only complication that would require immediate emergency care. The other conditions require timely recognition, referral, and arrival to a functioning EOC facility. Currently, only the main hospital of HAS qualifies as an EOC facility. Travel in Haiti is primarily on foot or horse, with public transportation available on the main roads. The average time from an HAS dispensary to the main hospital ranges



from 25 minutes to 12 hours. Many people, primarily in the mountains, live at least three to five hours from the nearest dispensary.

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Table 7

Average time intervals from onset to death for major obstetric complications, in the absence of medical intervention (Maine et al., 1997)

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Postpartum hemorrhage	2 hours
Antepartum hemorrhage	12 hours
Ruptured uterus	1 day
Eclampsia	2 days
Obstructed labor	3 days
Infection	6 days

---

Contributing factors to maternal deaths in this study, based on the Three Delay Model, emphasize the importance of timely recognition, referral, and arrival to an appropriate facility. The first delay was the most significant, with 67% of maternal deaths occurring at home. In more than half of the cases, family members reported not seeking care due to the belief that the problem was a "mystical problem" and not a "hospital problem." Many sought care with a Bocar, or vodou doctor, and not with a medical doctor.

The second delay accounted for only one of the maternal deaths (5%). This woman was seven months pregnant with a history of high blood pressure who died from an



eclamptic seizure. She was carried on the heads of four men down from the mountains, was placed on a raft in the river, and died before reaching the main road.

The third delay accounted for 28% of the maternal deaths. Five of the eighteen maternal deaths took place at Hospital Albert Schweitzer. Late referrals and arrivals were more likely to contribute to the deaths than delay in receiving care or receiving substandard care at the hospital. However, one woman died on December 25th, and her family explained that because it was the Christmas holiday the hospital was poorly staffed and they could not find anyone to help them in time.

### Recommendations

Based on findings from this study, the recommendation is to strengthen care in the community with a focus on the HAS dispensaries, the role of the traditional birth attendants, and a proposal for professional midwives and birth centers.

The seven HAS dispensaries are an invaluable part of Hospital Albert Schweitzer. They are geographically dispersed and attend to local primary care needs. They are usually the only accessible resource for health care in the community and are the gateway to care within the larger HAS system. Recommendations for the improvement of referral and emergency services are as follows:

1. Increase the level of professional staff at the dispensaries by adding well-trained physician extenders to each dispensary, and additional training for existing staff.
2. Standardize the prenatal care given at dispensaries with protocols and staff education.
3. Ensure that adequate supplies are available at each dispensary, including items such as fetoscopes, urine chemsticks, and iron supplements. Posters depicting warning signs



and symptoms in pregnancy should be placed in the waiting areas of each dispensary.

4. Re-establish and maintain radio communication between each dispensary and the main hospital. This could be lifesaving in an event of emergency.
5. Move towards dispensaries becoming a basic Essential/Emergency Obstetric Care facility (EOC) by adding at least one basic EOC function. Syringes are currently available at each dispensary, as well as staff trained to give injections. Inexpensive additions could include intra-muscular oxytocics for hemorrhage and intra-muscular sedatives to stabilize a preeclamptic/eclamptic woman for transport to the main hospital.

The international community does not support the training of traditional birth attendants. It is not cost-effective and has not been proven to reduce maternal mortality. Hospital Albert Schweitzer, while evaluating alternatives, should place its matwon training emphasis primarily on the matwon's role in referral and pregnancy education, and move away from delivery skills training. The issue of sanitation can be addressed in the short term by updating the birth kits to include gloves and soap, with pictures illustrating hand washing.

It is recommended that HAS consider incorporating professional midwives and freestanding birth centers as a future goal for improving the health of women in the HAS district. HAS could establish their own formal training of midwives, or recruit nurse-midwives who graduate from the university in Port-Au-Prince, Haiti. Midwives are cost-effective, as they are less expensive than hiring an obstetrician, and are qualified to provide a range of women's health services. The World Health Organization and the





international literature support professional midwifery care as a means to reducing maternal and infant mortality.

### Implications for Future Research at Hospital Albert Schweitzer

Process indicators of safe motherhood progress should be evaluated on an ongoing basis. Impact indicators (primarily the maternal mortality ratio) should be evaluated every three to five years to monitor progress. Closer attention to accurate classifying and coding of maternal deaths within the hospital and improved record keeping within the community health system are essential for future analysis and program formation. When a woman of reproductive age dies, there should be documentation of whether or not she was pregnant or up to 42 days post-partum at the time of death. This can be achieved by adding a separate section to forms already in use for this type of documentation. This information could then be entered into the computer records database, as is the standard procedure at HAS, and easily retrieved.

### Limitations of the Study

The most significant limitation of this study was the small sample size of deaths of women of reproductive age. The study time period of five years is the maximum recommended by the World Health Organization to evaluate the maternal mortality ratio. Assumptions based on this data are complicated by this large time frame and small sample size.



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## Appendix A





May 31, 2001

Susan Martinson  
Yale University School of Nursing  
100 Church Street South  
New Haven, CT

Protocol #01-28  
Committee Review Date: May 15, 2001  
Approval Date: May 30, 2001  
Expiration Date: May 14, 2002

Dear Susan:

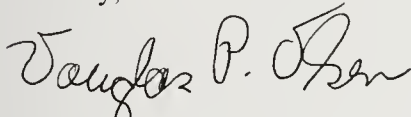
This is to advise you that the Human Subjects Research Review Committee has completed its review of your proposed study, "An Assessment of Maternal Mortality in the Artibonite Valley of Rural Haiti" (Protocol #01-28), and your application has final approval. **Approval is for one year from date of committee review and will expire on May 14, 2002.**

Your final, approved consent form is enclosed. Any changes in your study that may affect the experience of human subjects must be reported to the Committee in the interim period. This includes, but is not limited to, changes in the recruitment procedure, data collection site, investigators, informed consent procedure, and study design. **You must receive Committee approval before implementing any changes from the protocol on file with the Committee.**

Researchers are also responsible to promptly report to the Committee any unanticipated injuries or other unanticipated problems involving risks to subjects or others that occur during the interim period.

Good luck with your research.

Sincerely,



Douglas P. Olsen, RN, PhD  
Chair, Human Subjects Research Review Committee

DPO/skz  
enclosures

cc: Lynette Ament



## Appendix B





Reverence for Life  
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Cazeau, Port-au Prince, Haiti  
Phone: 509-238-1142  
FAX: 509-238-1141  
Bureau Email: [HAS-PAP@MAF.org](mailto:HAS-PAP@MAF.org)  
Hospital Email: [Sysop@hti.healthnet.org](mailto:Sysop@hti.healthnet.org)

Within United States:  
HAS, c/o Agape Flights  
7990 15th Street East  
Sarasota, Florida 34243

## HAS ETHICS COMMITTEE

June 9, 2000

Ms. Susan Martinson  
HAS

**Subject: Questionnaire and Consent Form regarding the research  
An Assessment of Maternal Mortality in the Artibonite  
Valley of Rural Haiti.**

Dear Ms. Martinson,

I am pleased to inform you that, after a thorough examination of the above mentioned documents, I, as the acting Chairman of the Ethics Committee at Hôpital Albert Schweitzer, give official approval of the documents.

The translation in Creole is very close to the original version and respectful of the integrity of the persons you plan to interview. Both the Questionnaire and the Consent Form respect the principles of the Ethics Committee and the nominal information you seek to collect does not lead to possible breach of confidentiality.

In the name of the Ethics Committee, I wish you the best of luck in your research.

Sincerely,

Richard Duchesne  
Chairman  
HAS Ethics Committee

CC: Members of the Ethics Committee

the mission of  
Hôpital Albert Schweitzer is to  
collaborate with the people in its  
territory of the Artibonite Valley  
they strive to improve their  
health and quality of life.

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Robert E. Wells, MD

Wolf Zurbrugg, MD

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## Appendix C





Susan Martinson, R.N., SNM  
 Yale University School of Nursing, U.S.A.  
 Hospital Albert Schweitzer, Deschapples, Haiti

### INFORMED CONSENT

Title of study: An Assessment of Maternal Mortality in the Artibonite Valley of Rural Haiti.

The following information will be read to you and you will then be asked to explain your understanding of the study, including whether or not you consent to participate. You will be given a written copy of this information, and the address and telephone number you can use to contact Yale University with questions or concerns regarding this study. You may also contact the Ethics Committee at Hospital Albert Schweitzer in Deschapples, by mail or in person.

Description and explanation of study: You are being asked to participate in a research study. You are free to refuse to participate. The purpose of this research is to gather information about women's deaths related to pregnancy or childbirth. With this information, we hope to identify ways that future deaths may be avoided.

You will be asked to discuss and answer questions regarding circumstances and events surrounding a woman's death. Your participation is voluntary. You will not receive any financial compensation for participating. Your name and the name of the deceased woman will not be published. Your name will not be used at the hospital or given to anyone else. Your involvement in this study and the information you disclose will not affect your relationship with Hospital Albert Schweitzer.

You are free to discontinue your participation at any time without penalty. If you choose to discontinue your participation, any information you provided will not be used in this study.

I have fully explained the nature and purpose of this study to: (name of participant)

Date:

Signature:

Verbal consent obtained: YES \_\_\_\_\_ NO \_\_\_\_\_

Human Subjects Research Review Committee (HSRRC) approval: *ste*

This form is valid only until: *5/1/10*

Approved on: *5/2/10*

HSRRC protocol number: *01-28*

Yale University  
 Office of Research and Policy, School of Nursing  
 100 Church Street South  
 P.O. Box 9740  
 New Haven, CT 06536-0740  
 Telephone: 203-737-2420



Interviewer

Appendix D

Section 1, Part 1

What is your relationship to the woman who died? (for example: sister, cousin, husband, mother etc.)

We would like to begin by asking you for some background information regarding the woman's death. Please tell us what happened.

1. From the time her problem or illness began to the time of her death.
2. Around the final hours before her death.



## Interview

### Section 1, Part 1

What is your relationship to the woman who died? (for example: sister, cousin, husband, mother etc.)

We would like to begin by asking you for some background information regarding the woman's death. Please tell us what happened:

1. From the time her problem or illness began to the time of her death.
2. Around the final hours before her death.



## Section 1, Part 2

Questions	Answers	
1. How long ago did she die?	Months	Date of death (month/year)
2. How old was she when she died?	Years	Date of birth
3. Where did she die?	Home  During Transport  Dispensary (which)  Hospital (which)  Other  Don't know	
4. Do you know the cause of death?	Yes (specify)  No	
5. Was her death due to an accident or injury?	Yes (explain)  No  Don't know	
6. Prior to the time of her death, did she have any medical problems or illnesses?	Yes (specify)  No  Don't know	Skip to #8  Skip to #8
7. Did she ever receive any treatment for this illness?	Yes (where and what)  No  Don't know	





8. How many children did she have, including those that died?	# of children  # of children still living	If never pregnant go to #14
9. How many times was she pregnant?	# of pregnancies	If never pregnant go to #14
10. Was she pregnant when she died?	Yes  No  Don't know	
11. What was the outcome of her last pregnancy?	Live birth  Still birth  Spontaneous abortion  Induced abortion  Don't know	Go to #13  Go to #13  Go to #13  Go to #13
12. Is the child from the last pregnancy still living?	Yes (where)  No  Don't know	
13. How long after the end of this last pregnancy did she die?	Less than one day  1-7 days  7-14 days  14- 42 days  Greater than 42 days	
14. (For the investigator)  Suspected maternal death?	Yes  No  Don't know	Go to relevant sections/questions



**Questions For Differential Diagnoses:**

Did she have any vaginal bleeding around the time of her death?

Did she see a doctor or someone about this?

Did they tell her anything about the problem?

Did she have any tests done? What kind? Do you know the results?

Was she or anyone else in the village yellow (jaundiced) around the time of her death?

How long was her labor?

Did she have a bad-smelling discharge from her vagina before her death?

Did a doctor or anyone else ever say that she had AIDS?

If yes, did she ever receive treatment?

Did a doctor or anyone else ever say that she had Tuberculosis?

If yes, did she ever receive treatment? If yes, how long after being treated at the TB facility did she die?

Did she cough a lot?

Did she have a fever?

Did she have shingles?

Did she lose a lot of weight? If yes, did she become “like bones” before she died?

Did she have any diarrhea or vomiting? If so, for how long?

How long was she sick before she died?



## 1. Obstetric/Medical Causes of Death:

### 1.1 Early Pregnancy Death

During her final illness:

Was she bleeding from the vagina?

Did she have a fever?

Did she complain of severe abdominal pain?

### 1.2 Eclampsia

Did she have any convulsions?

Were her legs, face, or hands swollen?

Did she have any visual disturbances?

Do you know if she had high blood pressure while she was pregnant?

### 1.3 Hemorrhage

Was she bleeding heavily from the vagina?

If Yes

Was the heavy bleeding continuous?

Did it wet her clothes, the bed, or the floor?

Did the bleeding start before delivery?

If the bleeding started before delivery:

Was she in pain while bleeding?

If not, did she ever have other episodes of bleeding during this pregnancy? How many times?

If she had pain, did the pain start before labor?

If the pain started before labor:

Did she ever have a cesarean section? If yes, when?

Were any instruments used to assist this delivery?

Did she die before the baby was born?

If bleeding occurred during labor:

Did she have a vaginal exam?

If yes, did it increase the bleeding?



How long was she in labor?

Were any medicines used before or during labor?

If the bleeding started after the birth of the child:

How long after the birth of the child was the placenta delivered?

Were any instruments used to assist this delivery?

#### **1.4 Sepsis**

Did she die before or after the delivery of the child?

If the woman died before the onset of labor or before childbirth:

Did she receive any prenatal care during this last pregnancy?

If Yes:

Where did she get prenatal care?

Who provided it? (For example: Doctor, Auxiliary)

How many times did she get prenatal care?

Did she go to her first visit because she had a problem, or just to get a regular check-up?

If the woman died after childbirth:

Did she have a fever before she died?

Did she have a history of any problems or illnesses?

Did she have a bad-smelling vaginal discharge before she died?

How long was her labor?

How long after the delivery of the child was the placenta delivered?

Were any instruments used to assist delivery? If yes, what kind?

#### **1.5 Jaundice**

Was she yellow/jaundiced before she died?

Was her skin itchy?

If Yes:

For how long was she yellow?





Did she ingest any poison?

Did she have a seizure/convulsions?

Did she have any diseases of the blood, such as malaria or other illnesses?

Did she have a fever before she died?

If the woman died soon after delivery:

Was she yellow at the time the pregnancy ended?

If not, how many days after delivery did she develop jaundice?

### **1.6 Anemia**

Was she short of breath around the time of her death?

Was she ever short of breath, tired or weak while carrying out normal daily activities?

Was she pale?

Was she ever told that she was anemic or should take iron?

## **2. Contributing Factors to the Death: Delay**

### **2.1 Delay in seeking care:**

For women who never sought care:

Was a problem recognized?

Who recognized it?

Was the severity of the problem recognized?

Did anyone seek help? Who?

If not, why not?

Did you/they know where to go for help?

Did you/they know how to get there?

Why didn't you go?

### **2.2 Delay in arriving at appropriate level of care :**

For those who did seek care :



When was the problem recognized?

Was she in labor?

How was the decision to seek care made?

Who decided it?

Where did you/they go?

How did you/they get there? (For example: walked, by horse, she was carried on somebody's head etc.)

Who went with her?

Did she die on the way (before she arrived)?

How long did it take you to get there?

Who did she see for help? (For example: Bocor (Vodou doctor), Matwon (TBA), Medical Doctor etc.)

What kind of treatment did she receive? Tell us about all treatments she received.

When did she receive treatment? How long did she have to wait?

Was she referred to another place for care?

If yes, did she go?

If not, why not?

### **2.3 Delay in receiving care at the facility:**

When did she arrive at the final place for help?

What kind of condition was she in? (For example: not breathing, unconscious, sweating profusely with fever, in pain, cold etc.)

When did she receive treatment? Tell us this for each treatment she received. When did she die?



### 3. Supporting Information:

#### 3.1 How did she give birth?

<u>Mode</u>	<u>Yes/No</u>	<u>Where</u>	<u>When?</u> (After labor began, after her water broke etc.)  <u>How long did it take?</u>	<u>Comments</u>
Normal vaginal delivery				
Vaginal :  Did the child come...  Face first?  Hand first?  Foot first?  Buttocks first?  Umbilical cord first?  Other				
Instrumental vaginal delivery  (What kind of instruments?)				
Cesarean Section				
Other				



**1.2 Who assisted the delivery?**

No one, she did it by herself.	
Family or friend?	
Matwon (TBA) with HAS delivery kit?	
TBA without HAS delivery kit?	
Auxiliary or Nurse?	
Doctor?	
Other? Who?	



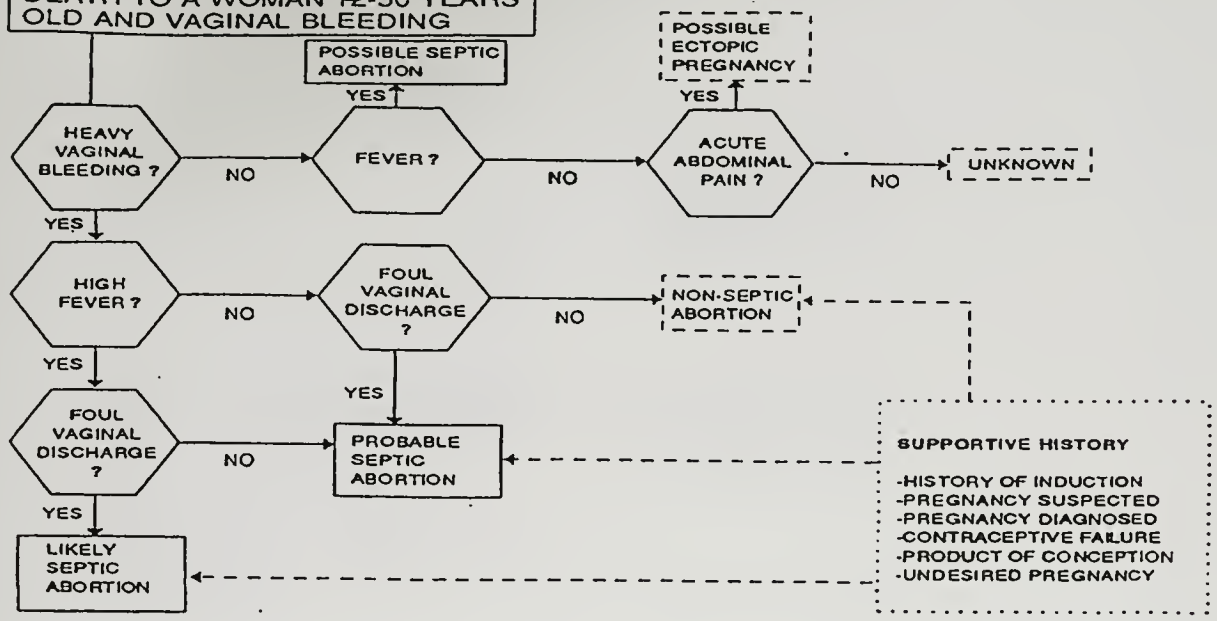


## Appendix E



**EARLY PREGNANCY DEATHS 15-49**  
**DEATH TO A WOMAN 12-50 YEARS OLD AND VAGINAL BLEEDING**

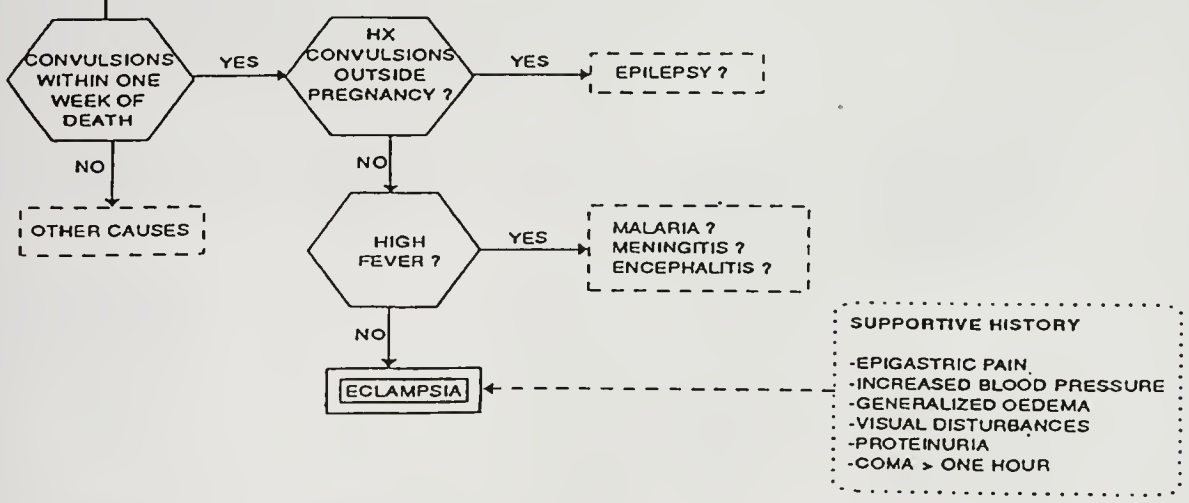
FLOWCHART I



**HYPERTENSIVE DISORDERS OF PREGNANCY**      **ECLAMPSIA**

FLOWCHART II

**DEATH DURING PREGNANCY (>22 WKS) OR WITHIN 72 HOURS AFTER DELIVERY**

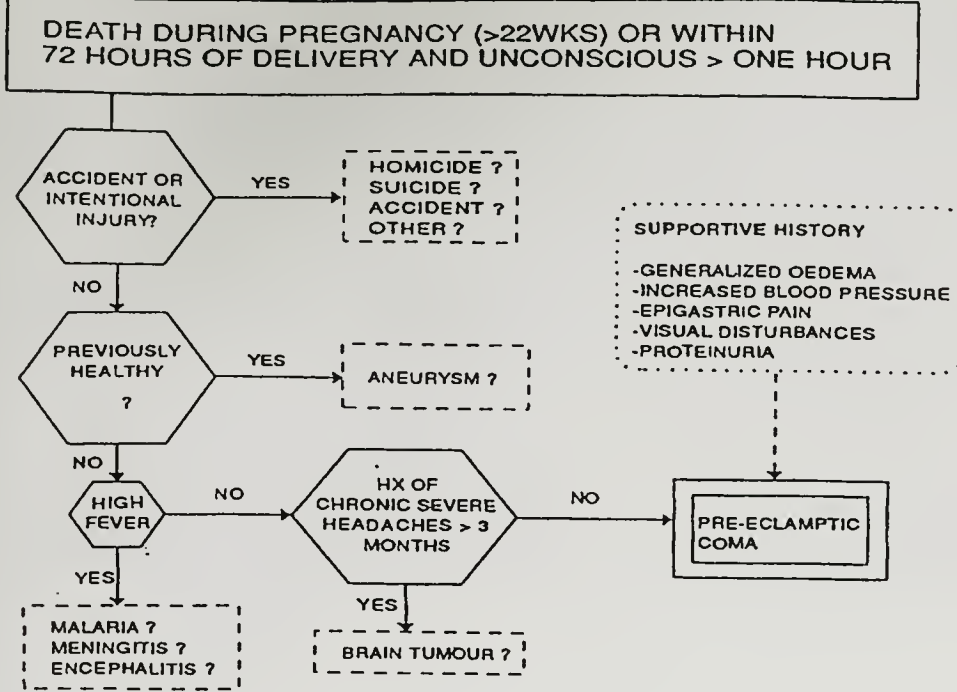




**HYPERTENSIVE DISORDERS OF PREGNANCY**

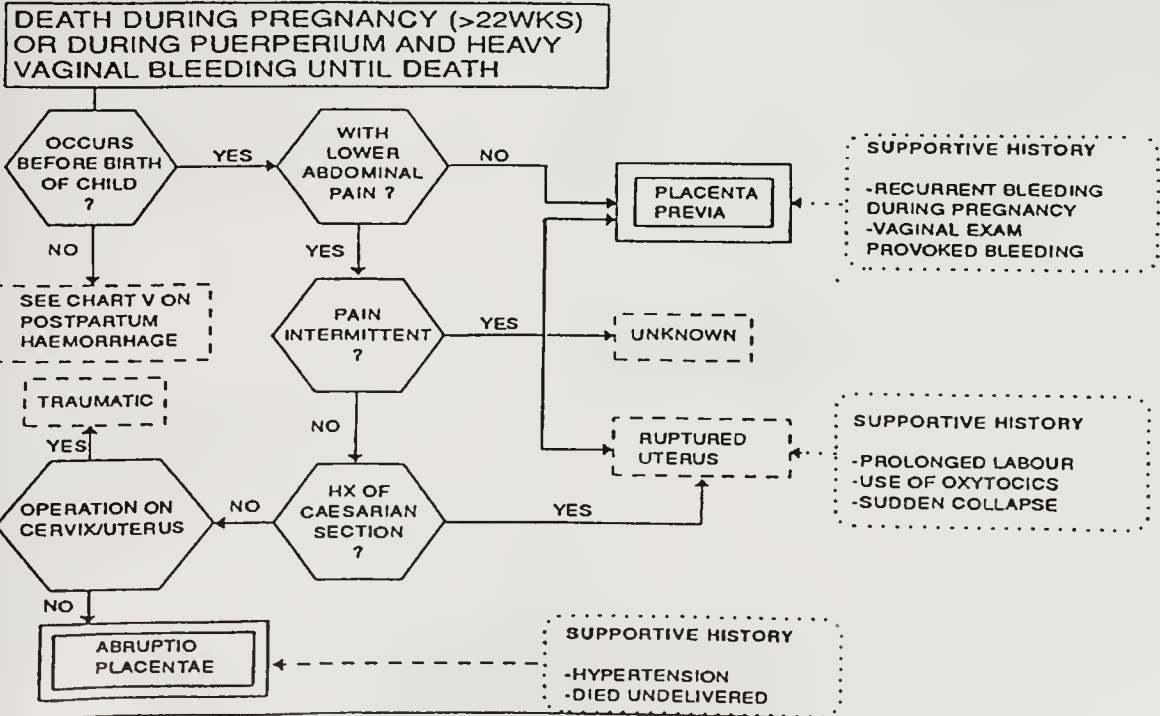
**PRE-ECLAMPTIC COMA**

**FLOWCHART III**



**ANTEPARTUM HAEMORRHAGE**

**FLOWCHART IV**

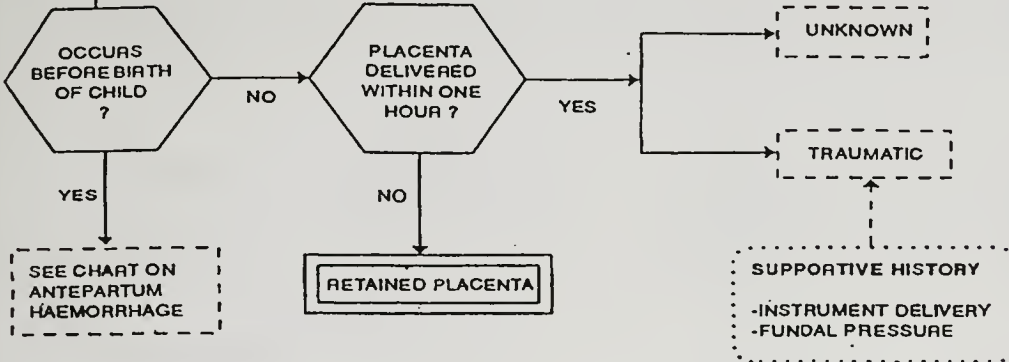




POSTPARTUM HAEMORRHAGE

FLOWCHART V

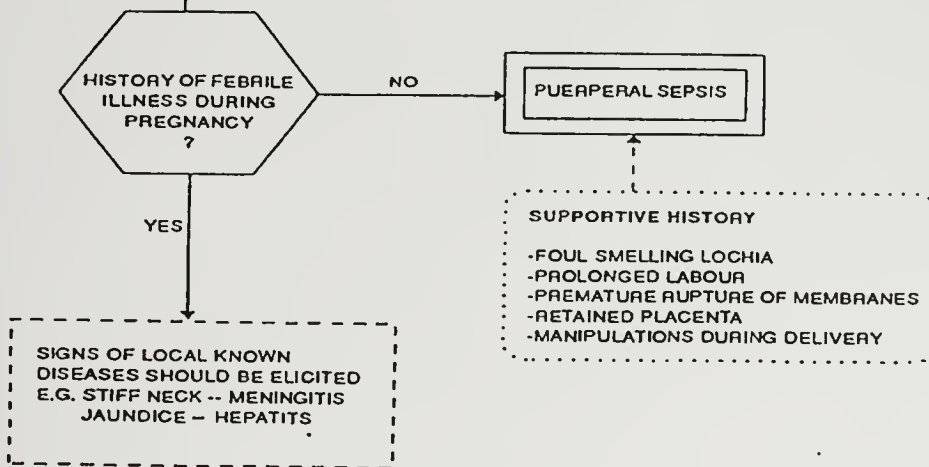
DEATH IN PREGNANCY (>22 WKS) OR DURING PUERPERIUM AND HEAVY VAGINAL BLEEDING



PUERPERAL SEPSIS

FLOWCHART VI

DEATH IN THE PUERPERIUM WITH FEVER > ONE DAY



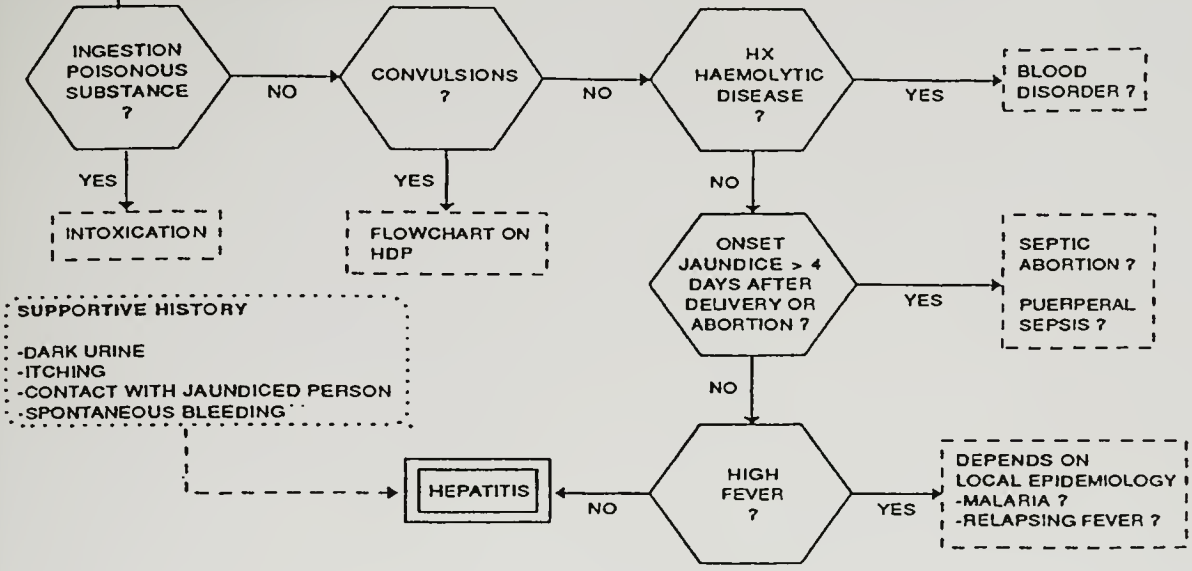




HEPATITIS

FLOWCHART VII

DEATH IN PREGNANCY OR PUERPERIUM WITH JAUNDICE











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