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**Ghanaian pregnant women's knowledge, attitudes, and intentions
regarding prenatal voluntary testing of HIV and infant feeding:
Determinants of 'fully informed decisions' on infant feeding methods**

by

Yi-Kyoung Lee

A dissertation submitted to the graduate faculty
in partial fulfillment of the requirements for the degree of
DOCTOR OF PHILOSOPHY

Major: Nutrition

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For the Major Program

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ABSTRACT

The purpose of this study was to examine the culturally sensitive information regarding the factors that permit Ghanaian pregnant women to make an informed decision on infant feeding methods, with special attention to prenatal voluntary human immunodeficiency virus (HIV) testing and infant feeding. Focus group discussions (n=10), in-person interviews (n=403), and a follow-up study (n=41) were conducted based on an integrated model of the Theory of Reasoned Action/Planned Behavior and the Health Belief Model.

Ghanaian pregnant women's intention of prenatal voluntary testing of HIV was low, but their intention would have increased significantly with a health professional's recommendation. Their intention about voluntary testing was well predicted by high self-efficacy about the testing, followed by no history of previous HIV testing. Participants generally had a high knowledge about transmission modes of HIV including mother-to-child transmission (MTCT), but misconceptions were also common. Lack of knowledge about the prevention methods of MTCT was evident and this was strongly associated with a lower intention of having a prenatal voluntary testing.

Most women preferred exclusive breastfeeding to formula feeding at least during the first month due mainly to the protective property of breast milk for their infants. Almost all women intended to feed breast milk exclusively during the first month and the best predictor of exclusive breastfeeding intention was self-efficacy, followed by attitudes toward exclusive breastfeeding. Because of its recognized negative health consequences, only a small number of pregnant women intended to introduce formula within one month. If the distribution of

subsidized formula for HIV-positive women were under-regulated, the spillover effects of formula feeding to children born to HIV-negative mothers or mothers of unknown status is likely to occur especially among those women who had favorable attitudes toward formula feeding.

An 'opt-out' approach of voluntary counseling and testing of HIV and a systematic nutrition education program including the risks and benefits of exclusive breastfeeding and formula feeding should be routinely offered to all pregnant women to enable them to make an informed infant feeding decision.

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CHAPTER 1. GENERAL INTRODUCTION

Dissertation organization

The dissertation contains a general introduction, a review of literature, general methods, three manuscripts prepared for submission to scientific journals, general conclusions, and appendices. References cited in the general introduction, review of literature, methods, and conclusions are listed after the conclusions in alphabetical order; the references cited in each manuscript are listed at the end of that manuscript. Appendices include the study questionnaires and additional data.

Introduction

Breastfeeding contributes to many aspects of health by providing the best possible source of nutrients for infants, decreasing infant mortality and morbidity, and decreasing fertility of women of childbearing age (UNICEF/UNAIDS/WHO 1998a). However, various studies conducted to date indicate that between 4 to 29% of infants born worldwide to human immunodeficiency virus (HIV) positive women become infected with the virus through breastfeeding (Bertolli et al. 1996; Datta et al. 1994; De Martino et al. 1992; Dunn et al. 1992; Ekpini et al. 1997; European Collaborative Study 1992; Leroy et al. 1998; Miotti et al. 1999; Nduati et al. 2000). With the growing number of HIV-positive women, the prevalence of mother-to-child transmission (MTCT) of HIV through breastfeeding has dramatically increased in low-income countries where breastfeeding is the norm (UNAIDS 1999a).

Thus, the United Nations Programme on HIV/AIDS (UNAIDS), with the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF), changed their infant-feeding policy in 1997 to "HIV-positive mothers should be empowered to make fully informed decisions about infant feeding" in their particular circumstance. They also

recommended that no matter what a mother's decision is, mothers "should receive educational, psychosocial, and material support to carry out their decision as safely as possible, including access to adequate alternative to breastfeeding, if they so choose" (UNAIDS/WHO/UNICEF 1997; WHO/UNAIDS/UNICEF 1998). WHO currently recommends replacement feeding for HIV-positive women when it is "acceptable, feasible, affordable, sustainable, and safe." Otherwise, exclusive breastfeeding, followed by early cessation is advised (WHO Technical Consultation 2001).

Recent data on the prevalence of HIV and acquired immunodeficiency syndrome (AIDS) have clearly shown that HIV/AIDS is becoming one of the most serious health problems in Ghana, where breastfeeding is not only the cultural norm, but also an important protective child-caring behavior for many infectious diseases (Ghana Statistical Service & Macro International 1999). The National AIDS/STI Control Programme (2001) estimated that about 3% of the entire adult population (15-49 years) of the country was infected with HIV in 2000. They projected that the number of HIV-infected people will reach up to 1.2 million (9%) in 2014 excluding those who would have died of AIDS.

About two-thirds of the reported AIDS cases in Ghana are among adult females and 15% of HIV transmission occurs through MTCT (transplacental, at birth, or via breast milk) (Ministry of Health & National AIDS/STD Control Program 1999; UNAIDS 2000). De Cock et al. (2000) reported that HIV might be transmitted to up to 50% of breastfed infants of HIV-positive mothers in communities where breastfeeding through 18 to 24 months is common. Considering the 97% breastfeeding initiation rate and the median breastfeeding duration of over 21 months, up to 7.5% of HIV infection in Ghana might occur among

breastfed children by HIV-positive mothers (Ghana Statistical Service & Macro International 1999).

To make fully informed decisions about the best way to feed their infants, women first must know and accept their HIV status. Then, HIV-positive women must be provided with adequate information on infant-feeding options, including risks and benefits of both breastfeeding and alternative feedings (WHO/UNAIDS/UNICEF 1998). HIV-positive women also need culturally acceptable breast milk alternatives. Due to the limited Ministry of Health resources, HIV voluntary counseling and testing (VCT) services for people of reproductive age, which are imperative for the prevention of MTCT (PMTCT) via breastfeeding, are not yet widely available in Ghana nor is their acceptability understood (UNAIDS 2000). In addition, the consequences of using breast milk alternatives are largely unanswered; the availability and acceptability of replacement feeding for HIV-positive women without a “spillover¹” effect, which could increase the morbidity and mortality of infants in countries with high infectious disease, has not been evaluated. There is also a dearth of information on the ability of HIV-positive mothers in developing countries to consistently provide nutritionally adequate breast milk alternatives for their infants. Implications for women who could be identified in their society as HIV-positive, because of their use of alternative infant-feeding methods, must be identified and considered (White 1999).

It is imperative to examine pregnant women’s knowledge, attitudes, and intentions regarding infant-feeding options in the era of HIV/AIDS pandemic and to clarify culturally

¹ The spread of artificial feeding to infants of mothers who are HIV-negative or who do not know their HIV status, and who would benefit from breastfeeding (WHO/UNAIDS/UNICEF 1998)

acceptable, affordable, and nutritionally appropriate breast milk substitutes for those who choose to feed breast milk substitutes. This project, based on an integrated model of the Theory of Reasoned Action, the theory of Planned Behavior and the Health Belief Model, studied culturally sensitive information regarding the factors that promote Ghanaian women's intention to participate in prenatal voluntary HIV testing programs and those factors that permit women to make an informed decision on infant feeding. Advances in our knowledge about the determinants of participation in counseling and testing programs and fully informed infant-feeding decisions will be useful to assist health care workers and policy planners in creating a culturally sensitive HIV prevention program that will assist in improving the nutritional and health status of young children.

Specific aims

The Specific Aims of this study are:

1. To examine Ghanaian pregnant women's knowledge and perceptions regarding
 - HIV/AIDS,
 - People with HIV/AIDS, and
 - MTCT through breastfeeding
2. To examine Ghanaian pregnant women's intentions to participate in prenatal HIV testing and the factors that influence their intentions
 - To measure knowledge, attitudes, subjective norms, perceived behavioral control, perceived threats to HIV and intentions with respect to using VCT for HIV among Ghanaian pregnant women
 - To identify other determinants (e.g., socioeconomic status) of VCT participation intention among Ghanaian pregnant women

3. To examine Ghanaian pregnant women's intentions regarding infant-feeding methods and the factors that influence their intentions

Exclusive breastfeeding

- To measure knowledge, attitudes, subjective norms, perceived behavioral control, perceived threats to disease and intentions as to exclusive breastfeeding among Ghanaian pregnant women
- To identify other determinants of exclusive breastfeeding intention among Ghanaian pregnant women

Replacement feeding

- To identify available, acceptable, affordable, and feasible breast milk substitutes
 - To measure knowledge, attitudes, subjective norms, perceived behavioral control, perceived threats to disease and intentions as to replacement feeding among Ghanaian pregnant women
 - To identify other determinants of replacement feeding intention among Ghanaian pregnant women
 - To identify the characteristics of women at risk of spillover effect
4. To examine the relationship between intention and actual infant-feeding behavior of Ghanaian pregnant women through a longitudinal sub-sample follow-up
 - To measure the changes in Ghanaian pregnant women's intention regarding infant-feeding methods during their pregnancy
 - To identify the factors that determine Ghanaian pregnant women's infant-feeding behavior

Operational definitions

Infant feeding

Fully informed infant-feeding decision: making a specific choice of infant-feeding methods after the currently available information regarding the risks and benefits of each feasible infant-feeding option is given to a pregnant woman infected with HIV (UNICEF/UNAIDS/WHO 1998a; WHO Technical Consultation 2001).

Exclusive breastfeeding: giving an infant no other foods or drink, not even water, apart from breast milk (including expressed breast milk), with the exception of drops or syrups consisting of vitamins, mineral supplements or medicines. When vitamins, minerals, water, juice, or ritualistic feeds are given infrequently in addition to breast milk, it is defined as 'almost exclusive' breastfeeding (UNICEF/UNAIDS/WHO 1998a; WHO Technical Consultation 2001).

Partial breastfeeding: some breastfeeding while giving other forms of food; different levels of mixed feeding are defined as 'high' if more than 80% of feeds are breast milk, 'medium' if 20-80% of feeds are breast milk, and 'low' if less than 20% of feeds are breast milk (Labbok & Krasovec 1990; UNICEF/UNAIDS/WHO 1998a).

Mixed feeding: partial breastfeeding and giving some other milk, often bottles of infant formula (UNICEF/UNAIDS/WHO 1998a).

Replacement feeding: the process of feeding a child, who is not receiving any breast milk, with a diet that provides all the nutrients the child needs. During the first six months this should be with a suitable breast milk substitute - commercial infant formula, or home prepared formula with micronutrient supplement. After six months this should preferably be with a suitable breast milk substitute, and complementary foods made from appropriately

prepared and nutrient enriched family foods that are given three times a day. If breast milk substitutes are not available, appropriately prepared family foods should be further enriched and given five times a day (UNICEF/UNAIDS/WHO 1998a).

Modified breastfeeding: a number of non-standard breastfeeding practices, such as early cessation of breastfeeding (i.e., rapid transition from exclusive breastfeeding to exclusive replacement feeding in the first six months of infant's life) and providing heat-treated breast milk (Preble & Piwoz 2001; WHO/UNAIDS/UNICEF 1998).

Breast milk substitutes/alternatives: any food being marketed or otherwise represented as a partial or total replacement for breast milk, whether or not suitable for that purpose (UNICEF/UNAIDS/WHO 1998a).

Formula: breast milk substitute formulated industrially in accordance with applicable Codex Alimentarius standards to satisfy the normal nutritional requirements of infants up to four to six months of age, and adapted to their physiological characteristics. Infant formula may also be prepared at home from fresh or processed animal milks, suitably diluted with water and with the addition of sugar, in which case it is described as "home prepared" (UNICEF/UNAIDS/WHO 1998a; UNICEF/UNAIDS/WHO 1998b).

HIV/AIDS

Human Immunodeficiency virus (HIV): a retrovirus that infects human CD4 T cells and causes acquired immunodeficiency syndrome (AIDS). Unless otherwise specified, HIV refers HIV-1 (DeVita et al. 1997)

Mother-to-child transmission (MTCT) of HIV: transmission of HIV to a child from an HIV-positive woman during pregnancy, delivery or breastfeeding. The technical term is vertical transmission (UNICEF/UNAIDS/WHO 1998b).

Voluntary counseling and testing (VCT) of HIV: voluntary and confidential HIV testing with pre- and post-testing counseling with fully informed consent. Pre-test counseling consists of information regarding 1) transmission and prevention of HIV including MTCT of HIV, 2) the HIV testing process, 3) assurance of confidentiality and discussion of shared confidentiality and couple counseling, 4) the implications of a negative test result, including promotion of breastfeeding, 5) the implication of a positive test result; costs and benefits of potential interventions, including the individual's and his/her child's survival, and possible exposure to stigma, and 6) counseling for risk assessment. Post-test counseling includes 1) information to prevent future infections, 2) a high risk of transmission to infant if becomes HIV-infected during pregnancy or breastfeeding, and 3) importance of sustained and exclusive breastfeeding for infant health, if result is negative. If result is positive, post-counseling includes 1) information about therapy options, including costs, 2) counseling about feeding options, including health benefits and risks of breastfeeding a breast milk substitute, exposure to stigma and need for contraception, 3) information and counseling about future fertility, 4) information about preventing HIV transmission to uninfected sexual partners, 5) counseling about shared confidentiality, and 6) information and referral for support, services and positive living (UNAIDS 1999b).

Framework constructs

Attitude toward the behavior: the degree to which performance of the behavior is positively or negatively valued (Ajzen & Fishbein 1980).

Subjective norm: one's perception of the social pressures put on one to perform or not perform the behavior in question (Ajzen & Fishbein 1980).

Perceived behavioral control: one's perception of his/her ability to perform a given behavior. It is the combination of Bandura's (1982) concept of self-efficacy (one's confidence in one's ability to take action) and Rotter's (1966) concept of locus of control (generalized belief about one's ability to control events) (Glanz et al. 1997).

Cues to action: stimulus or trigger to activate one's readiness, which may come from internal (e.g., symptoms) or external (e.g., mass media communications, reminder postcards from health care providers) sources (Janz & Becker 1984).

Perceived susceptibility: one's subjective perception of the likelihood of experiencing a condition that would adversely affect one's health (Glanz et al. 1997; Janz & Becker 1984).

Perceived severity: one's beliefs and evaluations regarding the medical, clinical, and possibly social consequences (e.g., death, disability, pain, family life, and social relations) of contracting the condition. The combination of perceived susceptibility and severity represents perceived threat of disease (Glanz et al. 1997; Janz & Becker 1984).

Intentions: the cognitive representation of a person's readiness to perform a given behavior; the indication of how hard people are willing to try, of how much of an effort they are planning to exert, in order to perform the behavior (Ajzen 1991).

Behavior: the action of individuals, groups, and organizations of something under specified circumstances (Janz & Becker 1984).

CHAPTER 2. LITERATURE REVIEW

Definition of HIV/AIDS

Acquired human immunodeficiency syndrome (AIDS) was first recognized as a new acquired cellular immune dysfunction in 1981 among young homosexual men (Gottlieb et al. 1981; Masur et al. 1981; Siegal et al. 1981). By 1983, the pathogen responsible for AIDS, known as human immunodeficiency virus (HIV) was isolated (Barre-Sinoussi et al. 1983; Gallo et al. 1983; Gelmann et al. 1983).

HIV is the lenti-type retrovirus, which usually targets T₄ lymphocytes and macrophages. The majority of scientists believe that HIV causes AIDS, the end stage of HIV disease, by directly killing cluster designation 4 (CD4) T cells and by destroying immunologic organs such as the lymph nodes. The course of infection with HIV is characterized by a long latent period between initial infection and the onset of symptoms. The main characteristic of the disease is a gradual deterioration of immune function, followed by an increased susceptibility to infection with opportunistic pathogens and the occurrence of an aggressive form of cancer, such as Kaposi's sarcoma or B-cell lymphoma (DeVita et al. 1997)

According to a new classification of HIV disease by the WHO (Malamba et al. 1999; Schechter et al. 1995), the staging of HIV is primarily based on clinical criteria and laboratory criteria. Each HIV-positive person is assigned to one of four clinical stages (asymptomatic to AIDS) based on the presence of physical signs, symptoms, or activity levels. Laboratory tests of CD4 T cell counts and lymphocyte counts are also used to classify the progression of HIV infection. For example, the number of CD4 T cells of a healthy, HIV-negative person ranges from 800 to 1200 cells/mm³ of whole blood. With HIV

infection, the number of CD4 T cells gradually declines. When these numbers fall below 200 cells/mm³, the person is classified as having AIDS.

The initial infection with HIV occurs by transferring body fluids of the infected person, which contain the virus infected CD4 T cells, dendritic cells, and macrophages, or a cell-free virus. HIV is most commonly transmitted through sexual contact with an infected partner. HIV is also spread through the transfusions of contaminated blood (Curran et al. 1984; Davis et al. 1983) and the sharing of contaminated needles among intravenous drug users (Centers for Disease Control and Prevention 1982). In addition, it has been found that women can transmit HIV to the fetus during pregnancy, and to the infant at delivery as well as through breastfeeding (Oleske et al. 1983; Rubinstein et al. 1983; Scott et al. 1984; Ziegler et al. 1985).

Significance of AIDS epidemic

As of December 2002, 42 million men, women and children were living with HIV and/or AIDS worldwide (UNAIDS/WHO 2002). In 2002 alone, 5 million people were newly infected with HIV and 2 million of them were women. Sixteen percent of new infections in 2002 occurred in children aged 14 years or younger and most of them acquired HIV from their HIV-positive mothers. Without a successful prevention effort, another 45 million people are expected to get infected with HIV by 2010. More than 95% of all HIV-infected people now live in the developing world, and sub-Saharan Africa alone continues to have 70% of the adults and 80% of the children living with HIV/AIDS. With a nine-percent adult prevalence rate overall, HIV-positive women have outnumbered the HIV-positive men in Africa since 1999. Ninety percent of MTCT of HIV among babies occurred in sub-Saharan Africa (UNAIDS/WHO 1999; UNAIDS/WHO 2000).

In addition, several studies have shown that HIV-positive children in Africa have a prognosis worse than those in developed countries due to many unfavorable conditions such as high prevalence of infectious diseases, difficulties getting appropriate primary health care, and unavailability of antiretroviral therapies as well as prophylaxis against opportunistic infections. For example, an estimate of mortality from 392 HIV-positive children of the French Pediatric HIV Infection Study and European Collaborative Study (1997) showed that about one quarter of children died during the first six years from birth. The children in this study survived 23 months even after onset of severe AIDS-related symptoms such as recurrent serious bacterial infections, HIV-specific encephalopathy, wasting syndrome, and cancers because of a wider and earlier use of antiretroviral therapy and prophylactic use of antibiotics. In contrast, more than a third of 190 Malawian children infected with HIV died within two years after birth. At three years of age, about 89% of children had died and only about one percent of children were asymptomatic. Unlike children with AIDS in developed countries, the Malawian children died within a median duration of 10 months after demonstrating AIDS-related symptoms such as developmental delay, oral thrush and splenomegaly (Taha et al. 2000).

Evidence and timing of mother-to-child transmission of HIV

MTCT of HIV has been documented to occur in utero, during labor and delivery, and through breastfeeding. The evidence of intrauterine infection of HIV came originally from the detection of HIV in aborted fetus and conception products. Lapointe et al. (1985) found HIV in products of conception such as fetal thymus, cord blood samples, and placental tissue. Other researchers showed that the HIV DNA sequence was present in the spleen, thymus, brain, lung, liver, placenta, and peripheral mononuclear blood cells from the aborted fetus at

the first and second trimester (Courgnaud et al. 1991; Mano & Chermann 1991; Sprecher et al. 1986). Ehrnst et al. (1991) also found HIV from a fetus in its first trimester and the liver of another aborted fetus at gestational week 18. Use of polymerase chain reactions (PCR) for early detection of proviral sequences of HIV in infants born to seropositive mother makes it possible to find intrauterine infection of HIV directly. For example, Bertolli et al. (1996) found that 23% of 69 HIV-positive infants born to 261 study participants with HIV in Zaire were infected with HIV in utero, which was confirmed by positive results on PCR in the first two days of life.

Intrapartum infection of HIV is believed to happen through 1) the transplacental passage of virus in labor, 2) the exposure to maternal cervicovaginal secretions in labor, or 3) the exposure to maternal blood at delivery (Sperling 1997). Even though there is not direct evidence, there are several possible indicators. One possible piece of evidence in support of intrapartum transmission of HIV is the seroconversion of HIV status to positive within 7-90 days of delivery in non-breastfeeding infants (Working Group on Antiretroviral Therapy 1993). Other evidence is the low transmission rate among babies delivered by cesarean section. For example, the European Collaborative Study (1994) showed that transmission rate was higher in 946 children delivered vaginally than in 308 children delivered by cesarean section (17.6% and 11.7%, respectively). Cesarean section in their study was estimated to significantly lower (51% reduction) the rate of vertical transmission when potential confounding factors, including the disease progression measured by maternal CD4 counts, were controlled. The 1996 follow-up of European Collaborative Study (1996) also showed the same trend of reduction associated with cesarean section (odds ratio (OR) = 0.70 for elective cesarean section, OR=0.58 for emergency cesarean section). Protective effects of

both elective and emergency caesarean sections were more profound after controlling for maternal AIDS status, zidovudine use during pregnancy, breastfeeding and gestational age (OR=0.56 for elective, OR=0.38 for emergency caesarean section). Tovo et al. (1996) also reported that vaginal delivery showed a significantly higher transmission rate of HIV than cesarean section among 1033 children born to HIV seropositive mothers in Italy (20.6% and 11.7%, respectively). However, such differences in transmission rate between vaginal delivery and cesarean section have not been confirmed in other studies (Blanche et al. 1989; Hutto et al. 1991; Mandelbrot et al. 1996; Mayaux et al. 1995; Tess et al. 1998a)

Postpartum HIV transmission via breastfeeding was first documented based on a case report of an HIV-positive, breastfed baby whose mother was seronegative at birth but became infected after a contaminated blood transfusion (Ziegler et al. 1985). There have been many similar cases of HIV transmission to breastfed babies by their mothers who were postnatally infected via heterosexual contacts or blood transfusion (Lepage et al. 1987; Palasanthiran et al. 1993; UNICEF/UNAIDS/WHO 1998a; Weinbreck et al. 1988). In addition, Thiry et al. (1985) reported the presence of HIV in cell-free breast milk, even though they failed to grow lymphocytes harboring the virus in milk due to bacterial infection. Lewis et al. (1998) also found that a substantial proportion (39%) of cell-free breast milk specimens from 75 HIV-infected Kenyan women had HIV RNA; the concentration in breast milk was much lower than that in plasma. From milk samples collected 15 days postpartum in 215 HIV-infected women, Van de Perre et al. (1993) showed that presence of HIV-infected cells in milk with absence of HIV immunoglobulin (Ig) M was the strongest predictor of HIV infection among infants (OR=4.51).

Magnitude of mother-to-child transmission of HIV

Rates of MTCT vary substantially from place to place. In developed countries, vertical transmission rates of HIV-positive women who have not received any treatment were 14% to 32%, while those in developing nations ranged from 13% to 48% (De Cock et al. 2000; Working Group on Mother-to-Child Transmission of HIV 1995). A meta-analysis of 13 study data sets estimated that at 15 months of age the rates of MTCT of HIV in most developing countries were in the range of 25% to 30%, with the more than 40% transmission rates in Kenya and Congo (Working Group on Mother-to-Child Transmission of HIV 1995). The differences in transmission rates can be attributed to many factors, such as advanced disease, high viral load, or prematurity of infants. However, much of the increased rate of transmission in developing countries was associated with universal practice of breastfeeding with a median duration of at least 20 months (Bassett 2000; UNICEF/UNAIDS /WHO 1998a).

Magnitude of mother-to-child transmission of HIV through breastfeeding

Subsequent epidemiologic studies and one randomized clinical trial demonstrated that the MTCT rates of HIV through breastfeeding were extensive (Bertolli et al. 1996; Datta et al. 1994; De Martino et al. 1992; Dunn et al. 1992; Ekpini et al. 1997; European Collaborative Study 1992; Leroy et al. 1998; Miotti et al. 1999; Nduati et al. 2000). The transmission rate was about 15% to 30% in non-breastfeeding populations. About 30% of HIV infections among non-breastfeeding populations occurred in utero, and the rest occurred during labor and delivery (UNICEF/ UNAIDS/WHO 1998a). For instance, overall vertical transmission rate of HIV in the French Prospective Study on Pediatric HIV Infection was 19.2% (95 out of 495), excluding breastfed infants (Rouzioux et al. 1995). Rouzioux et al.

(1995) estimated that one-third of the 95 HIV-positive infants were infected in utero, less than 2 months before delivery. About two-thirds of the remaining infants were considered to have been infected during delivery or on the day of birth. In other words, the risk of transmission in utero was seven percent, while that on delivery was 13%.

In breastfeeding populations, MTCT rates of HIV rose to 30% to 45%, depending on the duration of breastfeeding, and the attributable risk of MTCT through breastfeeding ranged from 10 to 45% among HIV-positive infants (De Cock et al. 2000). The magnitude of the increased risk of transmission associated with breastfeeding is, however, still subject to controversy. Such controversy results mainly from a wide variety of differences in study protocols in calculating postnatal transmission via breastfeeding. It is not always easy to differentiate the timing of transmission due to the presence of maternal antibodies in infants and a 'window' period of about six to eight weeks between the time of infection and the appearance of detectable antibodies using currently available technology (UNICEF/UNAIDS /WHO 1998a). Also HIV testing methods, the end point of the HIV infection, the definition and duration of breastfeeding varied substantially depending on the studies.

A few studies have reported that breastfeeding does not increase the rate of HIV transmission. For example, Ryder et al. (1991) found that self-selected feeding methods during the first three months of life did not make any difference in the risk of developing HIV after the age of 12 months of life among Zairian infants who were born to seropositive mothers and were still alive at the age of six months. Twenty-one percent of 28 exclusively breastfed infants and 19% of 68 mixed-fed infants of HIV seropositive mothers developed HIV. Even though none of 10 bottle-fed infants born to HIV-infected mothers were infected with HIV, the risk of developing HIV infection according to feeding practice did not reach

statistical significance. This might have been due to a small sample size, a short duration of feeding used in the analysis (three months), or the exclusion criteria, which left out children who had died before six months of age.

Nevertheless, most published studies have shown clear evidence of HIV transmission via breastfeeding. Studies of infants, seronegative at two to six months of age, but with subsequent infection, have provided evidence of late postnatal transmission of HIV through breastfeeding, which ranged from 4 to 29%. According to Dunn et al. (1992), the risk of transmission from a postnatally infected mother to her child was 29% (95% CI 16-42%), even after excluding some cases of seroconversion within three month of delivery to eliminate the possibility of in utero or intrapartum transmission in their meta analysis. When mothers were HIV-positive at delivery, the additional risk of transmission through breastfeeding was 14% (95% CI 7-22%) with extreme estimates of 33% additional risk of HIV infection in Australia. Direct comparison of HIV vertical transmission rate among breastfed infants with never-breastfed infants has supported assessment of the transmission through breastfeeding. In the European Collaborative Study (1992) of children born to 701 HIV-infected mothers, ever-breastfed children were more likely to be infected (31% of 36 children) than never-breastfed children (14% of 683 children). The OR for risk of infection via breastfeeding was 2.25 even after controlling for center, mode of delivery, gestational age, clinical progression, and race. However, it did not reach significance due probably to the small number of ever-breastfed group (five percent of 719 children). Mayaux et al. (1995) also found in their seven years of the French Cohort Follow-up Study that the HIV transmission rate among infants breastfed for a mean duration of 6.2 weeks was twice as high as that among bottle-fed infants (40% vs. 19%). Although the number of total breastfed

infants in their study was less than three percent of 821 infants examined, the difference was significant.

In brief, HIV vertical transmission rates were higher among breastfeeding population than non-breastfeeding population. Ten to forty five percent of HIV vertical transmission was through breastfeeding and the additional risk of transmission via breastfeeding increased overall MTCT of HIV in breastfeeding population to 30-45%, compared with 15-30% in non-breastfeeding population.

Effects of exclusive breastfeeding on mother-to-child transmission of HIV

To estimate the effect of exclusive breastfeeding on MTCT of HIV, subsequent epidemiological studies have focused on collecting detailed information on feeding style that was self-selected. However, these studies have shown inconsistent results regarding the effects of exclusive breastfeeding. Bobat et al. (1997) examined the effect of self-selected feeding methods on HIV infection among 133 South African infants born to HIV-positive mothers. The median vertical transmission rate was 34% (95% CI 26-42%) and HIV transmission rates were highest in exclusively breastfed infants (39% of 36 infants), followed by mixed-fed infants (32% of 76 infants) and formula-fed infants (24% of 21 infants). The relative risk (RR) for infection between the exclusively breastfed versus formula-fed infants was 1.63, which did not reach significance. Yet, exclusively breastfed children appeared to progress to AIDS more slowly than those who received mixed-feeding among infected children. Mean range of diagnosis of AIDS was 7.5 months in the exclusively breastfed group and five months in the mixed-fed group.

Similarly, but a significant increased risk of vertical transmission by breastfeeding was reported in a study by Olayinka et al. (2000). Prospectively collected data about the

impact of infant-feeding methods on MTCT of HIV among 236 infants in Zimbabwe showed that RR of exclusive breastfeeding versus formula feeding in HIV vertical transmission was 4.19 even after adjusting many factors such as maternal age, education, and infant HIV antibody status. Even though the magnitude of transmission by mixed feeding was much smaller than that by exclusive breastfeeding, mixed feeding in this study also showed increased risk of HIV transmission as compared to formula feeding (RR = 1.1). This study also revealed that transmissibility of HIV through breastfeeding was greatest within the first three months regardless of exclusiveness of breastfeeding.

On the other hand, some studies have shown that exclusive breastfeeding has lower risk of HIV transmission than mixed feeding, or even formula feeding in a short-term comparison. According to Tess et al. (1998b), ever-breastfed infants born to HIV-positive Brazilian women had a significantly higher risk of being vertically infected than never-breastfed infants, even after adjusting for maternal stage of HIV disease (21% vs. 13%). Even though it failed to attain statistical significance, a history of mixed feeding appeared to be related to higher risk of HIV vertical transmission, compared with exclusively breastfeeding (OR=2.2, 95% CI=0.9 – 5.1).

The analysis of 549 infants whose mothers enrolled in an intervention trial to reduce MTCT using vitamin A in South Africa demonstrated that there was no significant difference in the risk of transmission between breastfed infants (21.3%) and never-breastfed infants (18.8%) by three months of age (Coutsoudis et al. 1999). When breastfed infants were separated into exclusively breastfed and mix-fed groups, the estimated proportion of HIV infection among exclusively breastfed infants was significantly lower (14.6%) than that among mix-fed infants (24.1%). The estimated proportion of HIV infection seemed to be

lower in the exclusively breastfed infants (8.3%) than the never-breastfed infants (13.2%, $p=0.22$) or mix-fed infants (19.9%, $p=0.01$) even in the analysis which excluded 32 HIV-positive infants on the first day of life. Coutsoydis et al.'s recent report (2001) confirmed that the cumulative probability of HIV infection by the end of 15 months follow-up among exclusively breastfed children for three months or more was lower than that in mixed fed children. At six months follow-up, about one in five exclusively breastfed infants were infected with HIV while more than a quarter of mixed fed infants was infected. By the end of 15 months follow-up, the proportions of HIV transmission among exclusively breastfed and mixed fed children were 24.7% and 35.9%, respectively, while that among never breastfed children remained 19.4% after six months:

Contradictory results on MTCT by self-selected feeding methods would be due partly to the differences in study subjects and criteria. First, subjects in the above studies self-selected the feeding options. Even though there were no differences in socio-economic and biologic factors measured or differences were controlled for, if any, there might have been unmeasured factors that influenced the transmission rate. Second, operational definitions of exclusive breastfeeding in above studies were not identical. For example, Bobat et al. (1997) defined exclusive breastfeeding as "on breast-feeds only from birth with no supplementary milk feeds." Thus, non-milk supplementary foods, such as unsanitary water, could cause gut damage, and increase the transmission rate in exclusive breastfeeding group in some studies. In Olayinka's study (2000), the definition of exclusive breastfeeding was unavailable. Therefore, the controversy regarding the beneficial effects of exclusive breastfeeding on lower rates of vertical transmission requires further studies with improved study protocols.

Evidence for mother-to-child transmission of HIV via breastfeeding from a randomized trial

Nduati et al. (2000) determined the frequency of postnatal transmission through breastfeeding in their first randomized clinical trial in Nairobi, Kenya, where prevalence of HIV among pregnant women was 14%. Among 401 mother-infant pairs involved in the study, 197 pairs were randomly assigned to the breastfeeding group and 204 to the formula feeding group. Of 333 infants whose HIV status was known, 61 infants in the breastfeeding group (36.7%) and 31 infants in the formula feeding group (20.5%) were infected with HIV during the first two years of life. The excess transmission due to breastfeeding in this trial was 16.2% and the transmission risk attributable to breastfeeding was 44.1% of all transmission in the breastfeeding group. More than 60% of those additional risks occurred by six weeks and 75% by six months of age. Even though formula fed infants showed higher prevalence of diarrheal disease (RR=2.7), dehydration (RR=11.9), and upper respiratory infections (RR=1.3) for the first three months of life, morbidity and mortality during the two-year follow-up in both groups were not significantly different (Mbori-Ngacha et al. 2001). HIV free survival (neither dead nor HIV-positive) was significantly higher in formula fed infants than breastfed infants at 24 months (70% vs. 58%) (Nduati et al. 2000).

In a subsequent post-hoc analysis of this study, Nduati et al. (2001) found that breastfeeding by HIV-positive mother was harmful not only for infants but also breastfeeding mothers themselves. The two-year maternal mortality, 55% of which occurred by 6 months postpartum, was almost three times higher in breastfed women than in formula fed women (10.5% vs. 3.8%, RR=3.2). In other words, about two-thirds of the mortality in breastfed women could be attributed to breastfeeding itself and the association between breastfeeding and increased mortality was even stronger after controlling for plasma viral load, and CD4

counts at enrollment (RR=4.7). Increased mortality by breastfeeding was seen after controlling for postpartum weight loss, which was significantly correlated with breastfeeding (RR=2.9). Maternal death in this cohort had a negative impact on child survival as well; maternal death was significantly correlated with not only overall infant death (RR=3.1), but also subsequent infant death after their mothers' (RR=5.6). Post-hoc analysis of maternal death in this study had some limitations. For example, the median plasma viral load was higher in breastfeeding women and controlled variables used in the analysis (CD4 and viral load) were collected at delivery only with no subsequent data reported. Also, nutritional and clinical data of women, which might have provided information regarding the mechanism of mortality, were not collected in detail since the maternal mortality estimation was not intended when the study began.

This first randomized study of the effect of breastfeeding on MTCT clearly showed that breastfeeding is one of the major routes of HIV transmission among infants born to HIV-positive mothers. Considering significantly lower compliance rate of formula feeding group (70%), compared to that of ever-breastfed group (96%), the attributable risk of breastfeeding on MTCT of HIV might be an underestimation. Due to the early introduction of weaning food to most children (median=3.8 months), analyses of the current study were based on two simple groups (ever-breastfeed versus never breastfeed), even though information on exclusiveness of breastfeeding was available. Thus, this study failed to resolve the controversy regarding the effect of exclusive breastfeeding versus mixed feeding on MTCT of HIV. The post-hoc analysis of maternal mortality was also unsuccessful in providing a mechanism behind increased mortality of breastfeeding women. Therefore, further research

will be necessary to confirm the increased transmission among breastfed infants and elucidate the mechanisms of the high mortality in breastfeeding women.

Duration of breastfeeding and acquisition of HIV through breastfeeding

Although the magnitude of transmission via breastfeeding was different in each study, there was consensus that the risk of late postnatal transmission increased with duration of breastfeeding. According to Datta et al. (1994), duration of breastfeeding was significantly higher among 90 infected children (16.6 ± 8.7 mo) than among 130 uninfected children (14.0 ± 6.7 mo) in their study of 220 children born to HIV-positive mother and surviving more than 12 months in Nairobi, Kenya. Children breastfed beyond the age of 15 months showed a significantly increased risk of infection (OR=1.9). For instance, 61% of infected children were breastfed longer than 15 months, compared to only 43% of uninfected children. The attributable risk of breastfeeding more than 15 months was estimated to be 32% of total MTCT rates among all HIV-infected children.

Ekpini and colleagues (1997) measured the rate of late postnatal transmission¹ among children born to 138 HIV-1 positive women, 122 HIV-2 positive women, and 69 HIV-1 and HIV-2 co-positive women in Abidjan, Cote d'Ivoire, where mean duration of breastfeeding was 20 months. After adjusting for loss to follow-up at age 24 month, the estimated late postnatal transmission rate of HIV-1 was 12% among children whose mothers were HIV-1 positive. When children were breastfed longer than 24 months, the estimated rate of late postnatal transmission of HIV-1 increased to 20%. The children born to mothers who were co-infected with both HIV-1 and HIV-2 showed six percent increased risk of late postnatal

¹ Negative PCR at 3 or 6 months of age, followed by positive HIV PCR at ≥ 9 months and/or persistently seropositive at ≥ 15 months

transmission of HIV-1 after adjusting for loss to follow up. However, there was no case of late postnatal transmission identified among 132 children born to HIV-2 positive mothers.

From the international multicenter pooled data, Leroy et al. (1998) estimated the rate and timing of late postnatal transmission of HIV among 2804 children from industrialized countries and 902 from developing countries born to HIV-positive mothers known to be infected with HIV before or at delivery. When late postnatal transmission was defined as HIV infection that was diagnosed after age 2.5 months, all 49 children with late postnatal transmission were from developing countries where the median length of breastfeeding was 15.5 months. The overall estimated rate of late postnatal transmission was 3.2 per 100 child-years of breastfeeding follow-up with 95% CI of 3.1 to 3.8. Twenty of the 49 children with information on timing of transmission showed that the cumulative probability of acquisition of late postnatal transmission was 0.7%, 0.95%, 2.5%, 6.3%, 7.4%, and 9.2% at age 6 months, 9 months, 12 months, 18 months, 24 months, and 36 months, respectively. They concluded from the study results that only three out of 20 children would be infected if breastfeeding had stopped at age six months and there would be no late postnatal transmission if breastfeeding had ceased at age four months.

Miotti et al. (1999) also showed that the longer duration of breastfeeding increased the risk of late postnatal transmission of HIV even though transmission rate was higher during the first year of life than the second year. Among 672 infants who were born to HIV-infected Malawian mothers and HIV-negative at six weeks, 47 infants became infected via breastfeeding during the median follow-up of 11.5 months. The risk of transmission via breastfeeding, measured by the cumulative risk of transmission, was 3.5%, 7.0%, 8.9%, and 10.3%, at the end of 5 months, 11 months, 17 months, and 23 months, respectively.

While many studies confirmed the increased risk of HIV transmission by long duration of breastfeeding, other studies demonstrated that even a few months of breastfeeding substantially increased the risk of HIV transmission. Based on the observation of 168 ever-breastfed and 793 bottle-fed children born to HIV-positive mothers in Italy, De Martino et al. (1992) reported that transmission rates of infants who were breastfed even for one day was significantly higher than that of bottle fed infants, after controlling for age at case identification, year of child birth, and clinical status of mothers (OR=1.19). In this study, most of HIV transmission occurred within two months of breastfeeding and the additional breastfeeding continuously increased the risk of vertical transmission (OR=2.16, 5.55, 5.44, 6.41 for 1-20 days, 21-59 days, 60-92 days, and more than 92 days of breastfeeding, respectively). In a study showing a 39% of HIV transmission rate among exclusively breastfed children, Bobat et al. (1997) also found that vertical transmission increased with duration of exclusive breastfeeding, even though the association was not statistically significant; vertical transmission occurred 45%, 64%, and 75% of infants who were exclusively breastfed for one, two or three months of life

A recent report based on a two-year MTCT follow-up study in Nairobi, Kenya showed that for each liter of ingested breast milk from HIV-positive mother, the HIV transmission risk increased by 0.00073 for infants at or younger than four months and by 0.00076 for those older than four months (Richardson et al. 2000). They also estimated the risk of transmitting HIV per day of breastfeeding as 0.00042 and 0.00026 for infants at or younger than four months and for those older than four months, respectively. The probability of transmitting HIV by ingesting a liter of breast milk was higher in breast milk from women with higher plasma HIV RNA viral load than those with lower viral load. In a mathematical

model of HIV vertical transmission using three prospective and retrospective studies, Dunn et al. (1998) suggested that the effect of duration of breastfeeding on the risk of MTCT was dependent upon the degree of variation in maternal infectivity. In other words, most infection occurred in the early stage of breastfeeding when the maternal infectivity was high. When the maternal infectivity was low, vertical transmission of HIV through breastfeeding happened for the whole time of breastfeeding.

Most studies have clearly shown that breastfeeding increased HIV transmission, especially in the developing countries, where breastfeeding is common during the first two years of life. However, there is still controversy over the timing of HIV transmission by breastfeeding; some studies demonstrated increased transmission of HIV only with long duration of breastfeeding, while others suggested that even a short duration of breastfeeding (less than three months) could raise the probability of HIV transmission to a great extent. Such discrepancy might result from incomplete data with respect to breastfeeding; in many studies, breastfeeding was either ever-breastfed or never-breastfed and data, including duration of breastfeeding, were collected retrospectively. Operational definitions of late postnatal transmission also varied widely. A small number of subjects with complete information (both duration of breastfeeding and the timing of HIV acquisition) might lower the statistical power to detect the exact timing of MTCT of HIV.

Other factors associated with the increased risk of MTCT of HIV

The overall rates of vertical transmission vary significantly depending on health status of mothers and infants. Maternal and infant factors associated with the increased risk of MTCT of HIV found in breastfeeding population, except obstetric factors, are also believed to affect the risk of HIV vertical transmission through breastfeeding.

Maternal factors

Maternal disease status

The most important maternal factors that influence HIV transmission rate are maternal disease status such as advanced symptomatic AIDS, high viral load, and compromised immune defense system, indicated by low CD4 counts and high CD8 counts. For example, mothers showing HIV-associated AIDS symptoms at delivery showed 1.85 times higher transmission rate of HIV than those who were asymptomatic (De Martino et al. 1992). The European Collaborative Study (1992) based on 721 children born to 701 HIV-positive mothers showed that transmission rate tended to be higher among mothers with AIDS (31%), compared to those with no symptom (14%) or no advanced AIDS (17%). The same study indicated that MTCT rate was significantly higher among mothers with CD4 counts lower than 700 cells/ μ L. Transmission rate was 19% with CD4 counts less than 400 cells/ μ L, 22% for 400-699 cells/ μ L, and 6% for 700 cells/ μ L or more. Tess et al. (1998a) also reported that advance maternal HIV disease, defined by presence of AIDS or death from AIDS within 2 years of delivery, was a major factor that increased the rate of MTCT in 434 Brazilian mother-infant pairs. With 16% of overall MTCT rate, infants born to mother of advanced maternal HIV had significantly higher transmission rate than those born to mother who did not have an advanced maternal HIV disease (35% vs. 13%).

In a study of 29 HIV-positive infants and 131 HIV-negative infants of HIV-infected mothers in Rwanda, mean CD4 percent¹ and CD4: CD8 ratio² were significant predictors of

¹ The percentage of CD4 lymphocytes in T-lymphocytes of the whole blood; normal range = 37-75%

² T-helper (CD4): T-suppressor (CD8) ratio; In healthy individuals the ratio is about 1-1.5, but goes below 1 with HIV infection

HIV transmission (Weng et al. 1998). Mean CD4 percent and CD4: CD8 ratio were 0.28 and 0.63, respectively, among women of HIV-infected infants, compared with 0.35 and 0.88 among those of HIV-uninfected infants. Seven years of a nationwide follow-up of 848 infants born to HIV-positive mothers in France showed that the mothers with detectable p24 antigen¹ at the time of delivery had significantly higher risk of transmitting the virus to their infants (46% vs. 19%) (Mayaux et al. 1995). Even in an analysis of a sub-population (489 infant-mother pairs) who had complete data, mothers with p24 antigenaemia² had significantly higher transmission rate than those with negative p24 antigenaemia (OR=3.1).

According to Pitt et al. (1997) in the Women and Infants Transmission Study, a relationship between MTCT of HIV and immune status, as measured by CD4 and CD8 percentages, varied according to the viral culture results during pregnancy among 475 mother-infant pairs. For instance, a significantly positive relationship between MTCT of HIV and immune suppression was not found in mothers who were always positive on HIV viral culture, but positive association was observed in those who were not always culture-positive. This trend was observed in all the maternal lymphocyte subset phenotypes – CD4, CD8 and CD8 subtype percentages, and the effect of viral status was greatest in the quartile that was closest to normal.

On the other hand, when HIV-infected women were clinically symptom-free with normal or near-normal CD4 counts, HIV RNA level was useful for detecting the risk of HIV transmission (Burns et al. 1997). For 160 infants born to HIV-infected mothers in New

¹ A core protein fragment making up the nucleocapsid of the HIV virus; p24 was thought at one time to be a surrogate marker for disease progression, but it is recognized that some long term asymptomatics have relatively high elevations of p24, while others die never having been positive.

² The presence of p24 antigens in the blood; anything more than 10 pg/mole is effectively positive

York, the vertical transmission rate was proportional to the maternal level of third trimester HIV RNA ($p=0.003$, 106). The significant association between maternal HIV RNA level ($\geq 10,000$ vs. $< 10,000$ copies/ml) and risk of vertical transmission remained even after adjusting for CD4 cell level, duration of ruptured membranes, drug use, and frequency of sexual activity during pregnancy (OR=2.9). When this population was dichotomized into two groups by CD4 cell level as well to identify an effect modifier, the significant association disappeared in mothers with CD4 level at or less than 18% (228 cells/ μ L) (OR = 0.74), while the relationship became even stronger in those with CD4 level more than 18% (OR=4.00).

Similar trends were also observed in matched case-control study nested in New York City Perinatal HIV Transmission Collaborative Study Group by Thea et al. (1997). Even though the trend of increased vertical transmission of HIV with increased level of HIV-RNA persisted in all mothers regardless of CD4 cell counts, the effect of high viral load on perinatal transmission was significant only in mothers whose CD4 counts were greater than 500 cells/ μ L. The substantial effect in mothers without advanced HIV disease was not confounded by any of maternal or obstetric factors; mode of delivery, maternal age, duration of labour, duration of membrane rupture, gestational age, zidovudine use, smoking, or illicit hard drugs. Both studies failed to identify a threshold value of maternal RNA load that discriminated transmitters of HIV from non-transmitters.

Timing of maternal HIV infection

Meta-analysis of postnatal transmission through breastfeeding by Dunn et al. (1992) showed that the risk of MTCT was much higher among postnatally infected mothers (29%) than among mothers known to be infected at delivery (14%). This indirectly suggested that higher viral load after recent infection with less breast milk antibody was the risk factor of

transmission via breastfeeding (UNICEF/UNAIDS/WHO 1998a). However, other studies reported that transmission of HIV through breastfeeding could occur independently from stage of maternal HIV disease. For instance, Tess and colleague (1998b) found that the risk of HIV vertical transmission was higher in 168 ever-breastfed children (21%) than in 264 never-breastfed children (13%, OR=1.9). Risk of vertical transmission of HIV by breastfeeding was even higher after controlling for maternal stage of HIV (OR=2.2).

Mastitis

A study conducted in Malawi by Semba et al. (1999) reported that 88 HIV-positive women who transmit HIV to their infants had significantly higher proportion of mastitis, as measured by higher concentration of breast milk sodium (>12 mmol/L), than 240 mothers who did not transmit the virus to their children (28.4% vs. 12.5%). Fifty-five HIV-positive women with higher breast milk sodium concentration consistent with mastitis showed significantly higher plasma and breast milk HIV load as well as rates of MTCT at six weeks and 12 months, compared with HIV-positive women with a normal sodium level. In a logistic regression analysis done with a subsample who had a breast milk HIV viral load measurement (n=134), adjusted OR of transmitting HIV for mastitis was 2.38 and 2.31 at six weeks and 12 months, respectively. Another preliminary report of 504 milk samples from 145 HIV-infected South African mothers also confirmed that elevated sodium/potassium ratio significantly increased the HIV viral load, even though the positive relationship between viral load in milk samples and the transmission rate was not verified directly (Willumsen et al. 2000). In this study, mean viral load in milk samples with the sodium/potassium ratio higher than 1 was almost four fold higher than in those with the ratio at or less than 0.6.

Vitamin A deficiency

Inconclusive evidence showed that vitamin A deficiency ($<0.70 \mu\text{mol/L}$) might increase the vertical transmission of HIV, especially in the developing countries. In a study of 338 HIV-positive mothers whose infants had known HIV status and survived the first year of life in Malawi, there was a strong relationship between maternal vitamin A deficiency and MTCT of HIV (Semba et al. 1994). Mean vitamin A concentration of 74 women who transmitted HIV to their infants was significantly lower ($0.86 \mu\text{mol/L}$) than that of 264 mothers who did not transmit HIV to their babies ($1.02 \mu\text{mol/L}$). Also, the transmission rate at one year of age was proportional to the vitamin A status of the women. Relative risks of transmitting HIV to their child were 2.19, 3.56, and 4.38 for HIV-infected women whose vitamin A concentration was $1.05\text{-}1.39 \mu\text{mol/L}$, $0.70\text{-}1.04 \mu\text{mol/L}$, and $<0.70 \mu\text{mol/L}$, respectively, compared with those with vitamin A concentration of $1.40 \mu\text{mol/L}$ or higher.

In a study evaluating provirus shedding from cervical and vaginal specimens from Kenyan women, John et al. (1997) detected HIV DNA from 32% of 212 cervical samples and 10% of 215 vaginal samples. Vitamin A deficiency ($<0.7 \mu\text{mol/L}$) among this population was associated with vaginal shedding of HIV DNA in a logistic regression controlling for CD4 cell counts ($\text{OR}=2.5$), but not with cervical shedding of HIV DNA, which was correlated with breast milk HIV DNA. According to Nduati et al. (1995), the inverse correlation between the HIV DNA in colostrum and the level of vitamin A concentration in serum and plasma was dependent upon CD4 cell counts of women in their Kenyan study. For instance, among women with CD4 cell counts less than 400, women who also had severe vitamin A deficiency ($<0.7 \mu\text{mol/L}$) showed considerably higher level of

HIV DNA in their colostrum than those without vitamin A deficiency ($\geq 1.4 \mu\text{mol/L}$) (OR=20.4). However, the inverse correlation between serum vitamin A concentration and colostrum HIV DNA was not confirmed in women with CD4 cell counts at or higher than 400.

A study of a non-breastfeeding population in Maryland and New York, USA, where marginal vitamin A deficiency ($< 1.05 \mu\text{mol/L}$) was relatively common (32%), demonstrated a trend of higher transmission among vitamin A deficient women (Greenberg et al. 1997). HIV-positive women whose vitamin A concentration was less than $0.7 \mu\text{mol/L}$ during their third trimester showed a significantly higher vertical transmission rate (16%) than those who had a vitamin A concentration of more than $0.7 \mu\text{mol/L}$ (6%). Compared with those who had a vitamin A concentration of $1.05 \mu\text{mol/L}$ or higher, vitamin A deficient women ($< 0.7 \mu\text{mol/L}$) had about a five-fold increased risk of transmitting HIV to their infants after controlling for confounders including CD4 percentage, gestational age, duration of membrane rupture, and mode of delivery.

However, the inverse relationship between vitamin A status and HIV vertical transmission rate does not hold in a population where vitamin A deficiency was not common. According to Burger et al. (1997), there was no significant difference in the mean vitamin A concentration by MTCT group in a study of HIV-infected pregnant women from New York and Los Angeles metropolitan areas, where vitamin A deficiency ($< 0.7 \mu\text{mol/L}$) was rare and none had clinical symptoms of vitamin A deficiency.

Even though the clear biological evidence regarding the relationship between vitamin A deficiency and MTCT of HIV has not been found yet, researchers have postulated several modes of such relationship (Fawzi & Hunter 1998; Friis & Michaelsen 1998; John et al.

1997; Nduati et al. 1995; Peckham & Newell 2000; Semba et al. 1994). First, vitamin A deficiency might cause impaired immunity with compromised T and B cell function. As a result, it may increase the viral load and decrease antibodies against HIV, which are known risk factors of MTCT. Higher viral load in breast milk might also increase the MTCT of HIV via breastfeeding. Since vitamin A is an essential nutrient for maintaining the integrity of mucosal surfaces, vitamin A deficiency may contribute to weakening the integrity of mother's vaginal epithelium and placenta as well as epithelial lining in gastrointestinal lining of infants. Maternal vitamin A deficiency might also lead to an increased risk of MTCT by inducing growth retardation of fetus, which, in turn, is associated with known infant risk factors: prematurity and low birth weight.

Maternal age

A few studies also found an increased risk of vertical transmission with maternal age. Mayaux et al. (1995) noted that the MTCT rate among 848 French mother-child pairs was significantly increased with maternal age, independent of clinical status. For example, relative risks of transmitting HIV, compared to women < 25 y, were 1.9, 2.2, and 2.6 among women between 25 – 30 y, 30 – 35 y, and > 35 y, respectively. In a prospective cohort study of 672 infants born to HIV-infected women, older maternal age as well as higher parity were associated with lower postnatal MTCT rate (RR= 0.44 and 0.23, respectively) (Miotti et al. 1999). Other researches have not confirmed this result (Tess et al. 1998a)

Other maternal factors

Other maternal risk factors that have been associated with higher MTCT of HIV in some studies included sexually transmitted diseases during pregnancy (Mandelbrot et al. 1996; Weng et al. 1998), cigarette smoking (Turner et al. 1997; Weng et al. 1998), cracked

nipple with bleeding (Tess et al. 1998b), illicit drug use during pregnancy (Burns et al. 1997; Hershow et al. 1997; Moye et al. 1996; Rodriguez et al. 1996), unprotected higher frequency of sex during pregnancy (Burns et al. 1997) and co-infection of hepatitis C virus (Hershow et al. 1997). Some potential factors such as having a previous child with AIDS (Nesheim et al. 1996; Tess et al. 1998a) and history of colostrum intake (Tess et al. 1998b), however, were not associated with higher MTCT of HIV. HIV DNA was less frequently found in colostrum than in mature milk of HIV-positive mothers (Nduati et al. 1995).

Obstetric factors

Prolonged/premature rupture of membrane

Prolonged and/or premature rupture of membranes is also associated with the higher MTCT rates, probably related to increased duration of fetal exposure to infected blood and other fluids. According to the French Pediatric HIV Infection Study Group (Mandelbrot et al. 1996), premature rupture of membranes before the onset of labor significantly increased the transmission rate of HIV among 1632 singleton infants (23.8% vs. 17.1% with normal rupture). Although the transmission rate was not proportional to the duration of membrane rupture, membrane rupture 12 hours before delivery significantly increased the transmission rate. A significant increase of transmission was also observed in 32 cases of hemorrhage during labor (34.1% vs. 18.1% with no hemorrhage) and 68 cases of mothers who took amniocentesis and other needling procedures or amnioscopy (33.8% vs. 18.0% with no procedures).

Among 434 infants of mothers infected with HIV before or at delivery in the study by Tess et al. (1998a), there was a trend of increased risk of MTCT depending on duration of membrane rupture and membrane rupture 25 hours before delivery considerably increased

the MTCT of HIV (OR=3.9). Like the study by Mandelbrot et al. (1996), third trimester amniocentesis, independent of maternal HIV disease, substantially added to the risk of MTCT in this population as well (OR=4.1).

Vaginal delivery

Even though mode of delivery was not a risk factor after controlling for CD4 cell counts in two studies (Mandelbrot et al. 1996; Tess et al. 1998a), many studies have shown that cesarean section reduces the risk of MTCT. The European Collaborative Study (1992) of 721 children reported that elective cesarean section tended to be associated with a lowered risk of perinatal transmission (OR=0.65, 95% CI=0.30 – 1.04). In a 1994 report of the European Collaborative Study, based on 946 children delivered vaginally and 308 children delivered by cesarean section, cesarean section did significantly lower the transmission rate (OR=0.49), independently of breastfeeding, gestational age, intravenous drug user, maternal rate, and maternal CD4 counts. The protective effect of caesarean section was reported in both elective and emergency caesarean sections.

A similar result was found in the New York City Perinatal Transmission Collaborative Study (Kuhn et al. 1997). The risk of intrapartum infection tended to be lower in infants delivered by cesarean section (7.1%) than vaginal delivery (14.1%). Among 181 vaginally delivered infants of HIV-infected women, infants born after a longer duration of mothers' membrane rupture (more than four hours) had significantly higher intrapartum HIV infection (22.2%) than those born after a shorter duration of membrane rupture (9.0%).

A meta-analysis of data from 8533 mother-child pairs in 15 prospective studies showed that cesarean section almost halved the risk of vertical transmission even after controlling for use of antiretroviral therapy, maternal HIV stage, and infant birth weight

(OR=0.43) (International Perinatal HIV Group 1999). The perinatal HIV transmission rate among women receiving antiretroviral therapy and had elective cesarean section was only two percent, compared to 19% of transmission rate among women with no antiretroviral therapy and no elective cesarean section. Prenatal HIV transmission among women who had only elective cesarean section or only antiretroviral therapy were 10.4% and 7.3%, respectively.

Infant factors

Low birth weight

The mechanisms for the higher transmission rate among low birth weight infants are not clear yet, but several studies have shown such phenomena. Tovo et al. (1996) reported that infants with birth weight of 2500 g or less had a significantly higher HIV vertical transmission rate (24.9%) than those with birth weight of more than 2500 g (16.7%) among 1033 participants of the Italian Register for HIV infection in Children project. In another Italian study, children with birth weight of 3500 g or less showed 1.77 times higher transmission rate than those who weighed more than 3500 g at birth among 961 children born to HIV seropositive mothers (De Martino et al. 1992). Kuhn and his collaborators (1997) also found in the New York City Perinatal HIV Transmission Collaborative Study that more than 25% of low birth weight infants (<2500 g) were infected during labor or delivery while only 8.1% of infants with birth weight above 2500 g were infected.

Body measures of singleton infants who survived the neonatal period in the Weng et al. study (1998) also confirmed that not only birth weight, but also body proportionality, as measured by head circumference, Ponderal index (birth weight/length³*100), and weight/head circumference ratio were significantly different between HIV-positive infant and

HIV-negative infants of HIV-infected mothers. All four measures were significantly lower among HIV-positive infants than HIV-negative infants.

Prematurity

Several other studies have shown that prematurity was associated with an increased rate of MTCT. European Collaborative Study (1992) reported a higher frequency of HIV infection among children born before 33 weeks of gestation (33%) than those born after 33 weeks gestation (14%). After controlling several factors, including mode of delivery, clinical progression, and breastfeeding, the transmission rate was significantly higher among children born before 33 weeks gestation, with an OR of 3.8. Tovo et al. (1996) noted that premature birth tended to increase the risk of MTCT among Italian children who were older than 18 months of age at the last visit and born to HIV-positive mothers, even after controlling for maternal disease status, intravenous drug use, birth weight, delivery mode, and breastfeeding. A transmission rate among premature infants was significantly decreased with progression of pregnancy; the perinatal transmission rate was 30.7% among children with 32 weeks of gestation or less and that was decreased to 11.9% among children born at 42 weeks of gestation.

A substantially higher risk of HIV transmission among infants with shorter gestational period was also confirmed in the New York City Perinatal HIV Transmission Collaborative Study (Kuhn et al. 1997). Presumed intrapartum HIV transmission was lower among 218 term (≥ 37 weeks) babies (10.1%) than 54 preterm (<37 weeks) babies (25.9%). In addition, infants who were small-for-gestational age were significantly more likely to have presumed intrauterine infection (13.3% of 30 infants small for gestational age vs. 2.9% for 240 infants normal for gestational age). According to Weng and colleague (1998), mean

gestational age was significantly lower in 48 HIV-infected infants than 206 HIV uninfected infants of HIV-positive mothers in Rwanda, even after 10 infants who died before 28 days of age were excluded in the analysis (39.1 weeks vs. 39.6 weeks). This result persisted even after adjusting for possible confounders.

Several studies suggested the potential mechanisms of higher transmission among premature infants (European Collaborative Study 1992; Tovo et al. 1996; Weng et al. 1998). The first possibility is that infection in utero could affect fetal development and lead to premature delivery. Another possibility might be concurrent infections, such as those of the genital tract. Genital tract infection may increase the risk of not only premature delivery but also risk of intrapartum transmission of HIV infection. One more possibility is that infants born before 34 weeks might be more susceptible to intrapartum HIV infection because of the immature immune system with low concentration of acquired antibodies. Nevertheless, the clear mechanisms of higher transmission have not been found yet.

Other infant factors

Other infant factors, which increase MTCT of HIV, include oral candidosis among breastfed infants (Ekpini et al. 1997) and immature gastrointestinal and immune system (Stiehm 1996). For instance, Ekpini et al. (1997) reported that late postnatal transmission, measured by negative PCR at three or six months, but positive PCR at or later than nine months, was more common among breastfed children with oral candidosis. Among 88 children born to HIV-1 or HIV-1 and HIV-2 positive mothers, the transmission rate was 13% among children with oral candidosis while transmission rate among those without it was 3%.

The benefits of breastfeeding

Breast milk is the best possible source of nutrients for infants, and breastfeeding contributes to many aspects of health by decreasing infant mortality and morbidity, and fertility of women of childbearing age (UNICEF/UNAIDS/WHO 1998a). First, breast milk consists of all the nutrients that infants require for optimal brain and body growth through the first six months of their life and continues providing high quality nutrients for children two years or beyond. Also, breastfeeding lengthens the birth interval through amenorrhea and anovulation, which consequently promote maternal health as well as child survival (WHO Collaborative Study Team 2000; Work Group on Breastfeeding 1997). For example, in sub-Saharan Africa, breastfeeding reduced fertility by four births per women while reduction by contraception is less than one birth per women (Heymann & Brubaker 1997).

More importantly, human milk contains a large number of specific and non-specific immunologic and non-immunologic substances, which significantly improve child survival by protecting against diarrheal disease, pneumonia and many other potentially fatal infections. For example, human milk directly compensates for the developmental delays of immunologic factors, such as secretory IgA, lysozyme, and lactoferrin. Human milk also provides many cytokines that initiate or amplify the functions that are poorly expressed in the newborn infants. Cytokines in breast milk, such as colony stimulating factors, are believed to be present to promote the infant's immune development (Georgeson & Filteau 2000)

Human milk has agents that change the physiologic state of gastrointestinal tract to be suitable for extra-uterine life. The decreased permeability of the intestinal tract by epithelial cell growth factors, other growth factors, and nucleosides in breast milk in early infancy would be one example of such physiological changes (Georgeson & Filteau 2000). In

addition, human milk carries the anti-inflammatory agents such as platelet aggregating (activating) factor (PAF)-acetylhydrolase, which reduces inflammation by degrading PAF, and interleukin (IL)-10, which not only has anti-inflammatory activities, but also promotes T_{H2} and B cell development and activities. This may account in part for the decreased risk to necrotizing enterocolitis of newborn infants fed human milk. Because of its many anti-inflammatory components, breast milk may also protect the gut from damage caused either by food or by a large number of activated leukocytes (Murphy & Buescher 1993). As a result, human milk significantly improves child survival (Work Group on Breastfeeding 1997).

Breast milk also has been reported to have protective properties against HIV. Van de Perre et al. (1988) detected IgG antibodies in breast milk of four HIV-seropositive mothers. Mammary synthesis of HIV antibodies was also suggested by detecting IgA and IgM in two of the milk samples, but not in concurrently collected sera. Among HIV specific antibodies found in human milk of 215 HIV-positive Rwandan women, the persistence of HIV IgM antibodies through 18 months postpartum was significantly correlated with the absence of HIV infection in children (Van de Perre et al. 1993). A defective response of IgM in the presence of HIV-infected cells in breast milk collected 15 days postpartum was associated with a significantly higher rate of HIV transmission. The persistence of HIV IgA was also associated with a non-significant decrease of infection among children.

Using 34 milk and colostrum samples obtained from HIV-positive and negative women, Newburg et al. (1992) identified the anti-HIV activity of human milk. It was postulated that human milk contains factors that inhibited the binding of HIV to recombinant CD4 receptor molecule as well as that of glycoprotein (gp) 120 to CD4. Later Newburg et al.

(1995) found from the breast milk samples of 30 healthy HIV seronegative U.S. women that the binding of the HIV gp120 to CD4 was inhibited by glycosaminoglycan fractions, either chondroitin 4-sulfate or chondroitin 6-sulfate.

Wahl et al. (1997) also reported that breast milk from nursing mothers in Rwanda might prevent MTCT of HIV for the newborn infants by way of secretory leukocyte protease inhibitor (SLPI), which is believed to have antiviral activity. As in the saliva, colostrum samples had physiologic concentrations (0.1-10 $\mu\text{g/mL}$) of SLPI, which could effectively block infections. However, the concentration of SLPI in human milk declined to 10% of that in colostrum 10 days after delivery. Mean inhibitions of HIV infection in vitro by breast milk sample collected six months postpartum was only 18%, compared to 84% by saliva.

Strategies to reduce mother-to-child transmission of HIV through breastfeeding

Primary prevention

MTCT of HIV accounts for 90% of HIV infection among children under 15 years old (UNAIDS/WHO 1999). Thus, the most fundamental strategy to reduce the transmission of HIV by breastfeeding is to prevent HIV infection of women of childbearing age (UNAIDS 1999a). UNAIDS (1999a) suggested that HIV prevention programs should link to safer sex education, diagnosis and treatment of sexually transmitted disease, and the family planning services. Improvement of social and economic status of women through education in general would also decrease the vulnerability of girls and women who otherwise have to depend on marriage or prostitution for their necessity of life. Several studies have demonstrated that more educated people tend to have better knowledge on HIV prevention, which in turn increases the probability of employing safer sex behavior.

In addition, women need to know and accept their HIV status to make a fully informed infant-feeding decision. UNAIDS (1999a) recommended the expansion of access to VCT of HIV, possibly through the existing health care systems. However, a report from South Africa, where 'access to care, counseling, and support for HIV/AIDS and STDs' is one of top 10 priorities for the National Department of Health and GDP per capita is higher than most African countries, showed that a little more than half of clinics which should be the prime sites for VCT actually offered HIV testing due to a lack of resources and appropriate staff with adequate skills (Coovadia 2000).

Alternative feeding options

For an HIV-infected woman who wants to completely eliminate the risk of HIV transmission through breastfeeding, culturally acceptable, affordable, and accessible alternatives to breast milk is required from birth (UNICEF/UNAIDS/WHO 1998b). Currently, there are several alternatives for breastfeeding, each of which requires special attention: 1) formula including commercial infant formula, home-prepared formula, and unmodified cow milk, 2) heat-treated breast milk, and 3) wet nursing/breast milk bank.

Commercially produced formula has the closest composition of nutrients to breast milk. Even though there are relatively fewer nutritional problems with commercial formula, it requires careful instruction about the preparation of adequate and safe replacement feeds, including accurate mixing, cleaning and sterilizing of utensils and the use of cups to feed infants instead of bottles (UNICEF/UNAIDS/WHO 1998b). Home-prepared formula with fresh animal milk or dried milk needs to be fortified with nutrients including vitamin A, vitamin C, folic acid, zinc, and iron since the composition of animal milk is different from

that of breast milk. In case of unmodified cow's milk, infants need to be offered extra water after feeding to prevent dehydration.

Expressed and heat-treated milk would be another option for HIV-positive mothers who want to give their own breast milk without concerns regarding HIV vertical transmission (UNICEF/ UNAIDS/WHO 1998b). Heat treated milk, however, requires skill and access to the appropriate equipment that can heat the expressed milk to a minimum of 62.5 °C for 30 minutes. Some immunologic factors such as IgA and lactoferrin might be compromised during heating, but most of the nutrients and vitamins are reported to remain stable (Lawrence 1994). Pretoria pasteurization, which requires breast milk to be between 56 and 62.5 °C for up to 15 minutes of passive heat transfer, effectively inactivates HIV in human milk (Jeffery & Mercer 2000; Jeffery et al. 2000). The preliminary report by Chantry et al. (2000) also demonstrated that bringing breast milk to the boiling point effectively destroyed proviral DNA in eight milk samples collected from HIV-positive mothers. The recent development of a solar driven device showed that 30 minutes of pasteurization at 60 °C disinfected HIV as well as naturally occurring and added pathogenic bacteria in breast milk without destroying maternal immunoglobulins (Boisen & Jorgensen 2000).

Where it is culturally accepted and a substitute mother's sero-negative status is known, wet nursing is the second best, because a baby will get not only nutritional but also immunological benefits from the human milk. Yet, there is a potential risk of reverse transmission (infant to wet-nurse) during breastfeeding (Hormann 1997). Donor milk is a superior source of nutrients, even if immunologic benefits of heat-treated donor milk from a milk bank might be compromised. Unfortunately, a recent report from Brazil indicated that

the human milk bank was not realistic due to many factors including an insufficient number of banks and poor accessibility (Matida et al. 2000).

UNICEF, UNAIDS, and WHO (1998b) emphasized that the risk of illness and death from replacement feedings must be less than that of HIV transmission through breastfeeding. According to Kuhn and Stein (1997), the best results of alternative feeding could be obtained when all HIV-positive mothers avoided breastfeeding and all HIV-negative mothers breastfed their babies in a country where infant mortality among breastfed infants is less than 100 per 1000 live births and relative risk of infant mortality associated with totally avoiding breast milk versus optimal breastfeeding is 2.5. They also noted that universal early cessation of breastfeeding at 3 months could save more lives, if HIV testing was not available and infant mortality among breastfed infants of HIV-negative women were less than 60 per 1000 live births.

Antiretroviral therapy

Many studies in both breastfeeding and non-breastfeeding populations have shown that antiretroviral therapy is one of the best options for reducing MTCT of HIV, even though the efficacy of antiretroviral therapy was smaller in the breastfeeding population than in the non-breastfeeding population. The direct effect of antiretroviral therapy on the PMTCT of HIV through breastfeeding still needs to be determined.

Zidovudine (ZDV)

The first double-blind, randomized trial among a non-breastfeeding population in two developed countries showed that the combination of antepartum, intrapartum, and postpartum administration of zidovudine (ZDV) substantially decreased the rate of HIV vertical

transmission. In the placebo-controlled study of ZDV regimen¹ by Pediatric AIDS Clinical Trials Group (ACTG 076), 13 out of 180 HIV-positive mothers with CD4 counts above 200/mm³ in the ZDV treatment group transmitted virus whereas 40 out of 183 women in the placebo group did (Connor et al. 1994). In a further analysis of maternal virologic and immunologic data among ACTG 076 group after 18 months follow-up, Sperling et al. (1996) confirmed the earlier results of considerable reduction of HIV vertical transmission by ZDV therapy in 402 mother-infant pairs (7.6% in ZDV group vs. 22.6% in placebo group).

In 1996, Centers for Disease Control and Prevention (CDC) and Ministry of Public Health of Thailand (1998) initiated a placebo-controlled trial evaluating the efficacy of a simpler version of ZDV therapy that could be adapted even in resource-poor settings in a placebo-controlled trial. Even though the treatment was much shorter and simpler without a postpartum component given to infants in ACTG 076 trial, Thailand ZDV regimen² also halved the MTCT of HIV in the treatment group (9.4% of 194 mothers in treatment group vs. 18.9 % of 198 mothers in placebo group). Using PCR results on blood samples of 55 infected children collected within and after 72 hours of birth, the study confirmed that the efficacy of ZDV in reduction of vertical transmission was greater during the intrapartum period (61.4%) than the antepartum period (28.6%) (Shaffer et al. 1999).

Wiktor et al. (1999) implemented a placebo-controlled trial among breastfeeding HIV-infected women in Cote d'Ivoire using the same short ZDV regimen used in Thailand to

¹ ZDV regimen consisted of antepartum (five times of 100 mg of oral dose) and intrapartum ZDV (two mg/kg body weight given intravenously for one hour, followed by one mg/kg body weight until delivery). Newborns in the ZDV treatment group also received two mg/kg of ZDV orally every six hours for six weeks, beginning 8 to 12 hours after birth.

² The ZDV regimen of the Thailand trial included oral dose of 300 mg tablet twice daily starting from 36 weeks of gestation and every three hours from onset of labour until delivery.

assess the efficacy of ZDV for prevention of HIV vertical transmission among a breastfeeding population. Despite poor adherence of intrapartum doses (33% in placebo group vs. 20% in ZDV group) and a small number of study subjects due to early closing of enrollment (only 140 mothers in each group enrolled), the vertical transmission rate at four weeks postpartum was significantly lower in the ZDV group (12.2%) than in the placebo group (21.7%), with a ZDV efficacy rate of 44%. However, the efficacy in this breastfeeding population was declined to 37% at three months, which failed to reach a statistical significance.

Another double-blind placebo-controlled multicenter trial conducted in Cote d'Ivoire and Burkina Faso also assessed six month efficacy of oral ZDV regimen¹ (Dabis et al. 1999). In spite of no ZDV regimen given to infants, the estimated probability of infection at six months of age was 18% in 192 infants of ZDV treated women and 27.5% in 197 infants of placebo group, resulting in 38% reduction in vertical transmission. Again, the efficacy of ZDV was greatest before day three (49%) and the efficacy dropped 17% at day eight (32%) and remained almost constant until 6 months of age. Authors hypothesized that the decreased in efficacy was due to an overshoot of HIV viral load after treatment cessation, which was shown among five women, who stopped antiretroviral therapy early in the De Jong et al. study (1997). However, duration of breastfeeding had no effect on treatment efficacy in their analysis.

¹ ZDV regimen consisted of prepartum (300 mg tablet twice daily starting between 36 and 38 weeks of gestation), intrapartum (600 mg at the onset of labour), and postpartum (300 mg twice daily for seven days postpartum) doses

A randomized multicenter trial of three different combinations of ZDV/lamivudine (3TC) regimens, called the PETRA study, was conducted in Africa to evaluate the efficacy of each regimen for PMTCT (Gray 2000). Mostly breastfeeding subjects in this trial were randomized into one of four treatment groups; 1) antepartum (from 36 weeks of gestation until the onset of labour), intrapartum, and postpartum (one week for mother and child), 2) intrapartum and postpartum, 3) intrapartum only, or 4) placebo. A preliminary report of the study suggested that the efficacy of therapy was dependent on the timing of regimen given and breastfeeding canceled out the beneficial effects of antiretroviral drugs on prevention of vertical transmission. HIV-infected mothers in group one (8.2%) and group two (12.3%) transmitted HIV to their infant in a significantly lower rate than placebo treated mothers (19.1%) at six weeks postpartum (RR=0.48 for group one and RR=0.66 for group two). However, such a significant reduction in group one (21.3%) and group two (24.9%), compared with placebo group (26.8%), disappeared by 18 months of life, due probably to breastfeeding (RR=0.78 and RR=0.92). A combination of ZDV and 3TC given only at intrapartum failed to reduce the transmission rate at both six weeks and 18 months postpartum in this study.

Nevirapine (NVP)

In a preliminary report of HIVNET 012 trial, Guay et al. (1999) compared the efficacy of single-dose NVP with that of ZDV regimen¹ for prevention of HIV vertical transmission in Uganda, where more than 95% of subjects breastfed their children until 14

¹ Single dose NVP consisted of a single 200 mg oral dose at onset of labour and two mg/kg oral dose given to infants within 72 hours of life, where ZDV regimen consisted of 600 mg oral dose at onset of labour and 300 mg per every three hours during labour, four mg/kg syrup twice daily to babies for seven days

weeks postpartum. At age 6-8 weeks and 14-16 weeks, probability of MTCT of HIV was significantly lower in the NVP group than in the ZDV group. Administration of NVP reduced an additional 47% of vertical transmission at age 14-16 weeks, compared to reduction of MTCT by ZDV regimen (13.1% infection in the NVP arm vs. 25.1% infection in the ZDV arm). The significant reduction of HIV vertical transmission by NVP compared with ZDV was also confirmed in a recent update of the study (Deseyve et al. 2000). The MTCT rates at 14-16 weeks among 311 infants receiving NVP and 308 receiving ZDV were 13.6% and 22.1%, respectively. The infection rates were increased to 15.7% for the NVP arm and 24.1% for the ZDV arm at the end of first year of life. HIV free survival was also substantially lower in the NVP group (14.4%) than in the ZDV group (27.6%), with the efficacy of 48% reduction. In the quantitative analyses of maternal plasma at baseline (before intervention) and seven days postpartum, Mmiro et al. (2000) found that NVP significantly decreased HIV viral load, while ZDV regimen did not (1.03 log decrease by NVP vs. 0.17 log increase by ZDV). Changes in maternal viral load between baseline and seven days postpartum in NVP treated women were predictive of vertical transmission among those infected six weeks postpartum or later.

In South Africa, Moodley and McIntyre (2000) assessed the efficacy of a short course NVP regimen compared with the ZDV and lamivudine (3TC) combined regimen¹ for the PMTCT. As proven in the HIVNET study and the PETRA trial, both regimens significantly

¹ NVP regimen included intrapartum components of 200 mg single dose and postpartum components of 200 mg single dose for mothers and six mg single dose for infants. Combined regimen consisted of intrapartum administration of ZDV 600 mg at the onset, then 300 mg every three hours and 3TC 150 mg 12 times hourly and postpartum administration of ZDV 300 mg twice daily and 3TC 150 mg twice daily for 1 week for mothers, ZDV 12 mg twice daily and 3TC six mg daily for one week for infants

reduced the transmission rates below the documented transmission rate of more than 20% in a similar setting (14% in NVP and 10.4% in ZDV/3TC). Yet, both regimens focusing on intrapartum and short postpartum therapy resulted in the high intrauterine transmission, which might be improved by antiretrovirals in utero (8.5% in NVP and 7.4% in ZDV/3TC).

Mechanisms of antiretroviral therapy

The mechanisms of reduced rate of vertical transmission by antiretroviral therapy have not been sufficiently defined yet, but some of feasible mechanisms were proposed. According to Fowler and Mofenson (1997), antiretrovirals could reduce the maternal viral load, which could subsequently decrease the vertical transmission rate. For example, Shaffer et al. (1999) reported that viral load of women in their ZDV treatment group was three times lower at delivery than at study entry. Even though they emphasized that absolute viral load was a better indicator of vertical transmission than the percentage decrease, such reduction of viral load explained 80% of estimated study efficacy. However, maternal viral load reduction from study entry to delivery through ZDV in ACTG 076 group was not associated with reduced transmission rate of HIV. This demonstrated that the effect of antiretrovirals on vertical transmission was more than a simple function of reduced maternal viral load.

Another possibility of reduced transmission rate is through prophylactic effects of antiretrovirals, which were transmitted through placenta or given directly to infants in the postpartum period. A subanalysis of intrapartum and postpartum antiretroviral efficacy trial in breastfeeding population revealed that both NVP and ZDV were associated with lower transmission of HIV, compared with placebo (Guay et al.1999). In addition, the significantly lower transmission rate of HIV in NVP treated mother-infant pairs, compared with in ZDV treated pairs, was believed to attribute to NVP's characteristics: an ability to decrease HIV

RNA concentration significantly, an active form that can be immediately used against extracellular and intracellular virus, long half-life, and effective absorption resulting in high concentration in plasma, cord blood, as well as breast milk after a single dose (Guay et al. 1999; Musoke et al. 1999). However, there is lack of information that could directly identify the mechanisms of reduced transmission rate through antiretroviral therapy.

International guidelines and the challenges

Guidelines

Shortly after the discovery of MTCT of HIV through breastfeeding, Centers for Disease Control and Prevention (1985) recommended HIV-positive women not to breastfeed their babies when safe alternatives to breast milk were available. Yet, the World Health Organization (1992), in conjunction with UNICEF, advised women in countries where prevalence of malnutrition and infectious diseases was high, to continue breastfeeding regardless of their HIV status, since the infant mortality of not breastfeeding was higher than that of breastfeeding. However, with the growing evidence showing a significant risk of HIV transmission attributable to breastfeeding, UNAIDS, WHO, and UNICEF (1997) support the rights of HIV-infected women to choose either breastfeeding or safe alternatives to breast milk while continuously promoting breastfeeding among mothers of unknown HIV status and who are HIV-negative. Even though the risk and timing of MTCT through breastfeeding is still poorly understood and a great deal of debate regarding the best infant-feeding methods in developing nations continues, the current guideline states that infant-feeding methods should be decided by mothers (or parents, if possible) after they are fully informed about the risks and benefits of each infant-feeding option and their decision should be suitably supported. WHO currently recommends replacement feeding for HIV-positive women only

when it is “acceptable, feasible, affordable, sustainable, and safe.” Otherwise, exclusive breastfeeding, followed by early cessation is advised (WHO Technical Consultation 2001).

Challenges

Human rights

The guideline focuses on empowerment of HIV-positive women to make fully informed decisions about infant feedings, yet it also acknowledges that several factors prevent HIV-positive women, especially those in developing countries, from making such decisions. For example, the 1997 policy statement gave HIV-positive women the right to choose their reproductive health as well as infant-feeding methods based on human rights agreements. However, human rights of women, especially those with HIV/AIDS, have not been respected in many parts of the world. According to Hormann (1999), women not only in developing countries but also in developed nations cannot make a fully informed decision regarding infant-feeding methods as well as VCT of HIV albeit for the different reasons. For example, in the United States, a government official removed an infant from a HIV-positive mother who planned to breastfeed her baby (McCarthy 1999). In contrast, violation of human rights toward women with HIV/AIDS in developing countries appeared as several forms of violence. Temmerman and co-workers (1995) stated that 6% of 324 HIV-positive women participating in their study examining the effects of maternal HIV infection on pregnancy outcome in Kenya were subjected to the violence due to the HIV test results given to the participants (i.e., abandoned by their spouses, replaced by another wife, or beaten up). The violence rate dropped to two percent in the third year of their study when another 311 HIV-positive women were given a choice of not receiving the result of HIV status. However, two percent of violence rate would be an underestimation since only a third of

HIV-positive women who were subjected to the violence ever contacted the study group for the result, compared to 90% of return rate in their first two years of studies.

Stigmatization

Most women in sub-Saharan Africa breastfeed their children well into the second year, even though complementary feeding starts as early as the first day of life (Bassett 2000; Ghana Statistical Service & Macro International 1999). Feeding alternatives to breast milk in these settings means that they are out of the sociocultural norm and this behavior is one of the characteristics by which people are likely to be stigmatized and ostracized from the community (Bassett 2000; Leary & Schreindorfer 1998). Thus, it might not be easy for HIV-positive women to make fully informed decisions with respect to adapting the alternatives that can protect their babies from infection, while hiding the HIV status from her family and neighbors (UNAIDS 1999a). A study of knowledge and attitudes regarding infant feeding directly showed that choosing a breast milk substitute was almost impossible without being stigmatized in a community where breastfeeding is commonly practiced (Gottlieb et al. 2000). Most Zimbabwean women in their study indicated that not only a close relative decided the infant-feeding methods, but also family member would stigmatize them as HIV/AIDS if they were unable to breastfed.

In a multidisciplinary study of sociocultural factors that prevented HIV-positive women in Burkina Faso and Cote d'Ivoire from informed decisions regarding infant-feeding methods, Desclaux et al. (2000) found that the possibility of being stigmatized as “bad mother” by not giving breast milk was the most critical factor that hindered women from adopting the international guideline among many other factors. The study also noticed that lack of knowledge among health care workers as well as the economic difficulties were other

obstacles to the prevention of HIV vertical transmission. Another qualitative study conducted in Botswana also showed similar results (Rantona et al. 2000). Women in the study stated that lack of confidential HIV testing service, pressure from family members to breastfeed, and stigmatization by community members were the most frequently facing barriers in participating MTCT prevention program. According to Ross (2000), women's decisions regarding infant feeding were still compromised after counseling due to such factors as cultural norms that promote breastfeeding, and low socioeconomic status that prevent women from purchasing formula. As a result, more than half of 38 HIV-positive South African women in the study expressed anxiety related to stigma and fear of vertical transmission to their children after choosing infant-feeding methods of their own. In addition, women in this study viewed counseling as a time to express their concerns rather than receive enough information to make fully informed decision.

One of the noticeable facts is that health care workers in many African countries still believe that breastfeeding cannot be harmful for mothers and children in any way, thus breastfeeding should be continued as long as possible. According to Desclaux (2000), such ideas came partly in the 1970s when breastfeeding supporters made breast milk as a symbol of loving mother against multinational infant formula companies. Since then, with its nutritional and immunological superiority in addition to economic advantage, health care workers have ubiquitously encouraged breast milk for the last three decades. Such medical culture of health service regarding breast milk made it hard for health care workers to accept the fact that breastfeeding could transmit a deadly virus from mothers to their infants and they had to let HIV-positive women choose infant-feeding options on their own. Subsequently, many women perceived that health care workers' positive perceptions on

breast milk in addition to inadequate advice regarding alternative feeding options prohibited them from adopting preventive actions (Desclaux et al. 2000). For example, a qualitative study of 13 HIV-positive women in South Africa found that none of them received information on the risks of vertical transmission of HIV through breastfeeding during their pregnancy (Seidel et al. 2000). Also, all the women were encouraged by health care workers to breastfeed regardless of their personal preference in ignorance of their HIV status. Even though the transmission mode of their children was unknown (whether prenatal, perinatal, or postnatal), most mothers in the study were upset by the fact that they were not given any information about the possibility of HIV transmission via breastfeeding and health care workers persuaded them to breastfeed when they had fed formula.

The problems of stigmatization were also noticed in the antiretroviral intervention, which was proven to reduce MTCT of HIV. For example, very poor adherence of intrapartum ZDV regimen in Cote d'Ivoire, which was given every three hours from the onset of labour until delivery, was believed to be associated with problems of stigma (Wiktor et al. 1999). When family members and friends were present in the delivery room, HIV-infected women gave up taking ZDV to not disclose their HIV status. In another study conducted in Cote d'Ivoire and Burkina Faso, more than 80% of women took the intrapartum regimen since the trial required only one dose at the onset of labour. This was despite the fact that about 40% of women did not give birth at the study clinic (Dabis et al. 1999). Therefore, it is essential to develop positive and non-judgmental attitudes toward people with HIV or AIDS among health staff. Also it is important to change the negative attitudes of lay people toward people with HIV/AIDS through education or other modes before introducing the

antiretroviral therapy intervention or alternative feedings options among HIV-positive women (UNAIDS 1999a).

Availability and acceptability of VCT

VCT of HIV is imperative to make fully informed decisions about infant feeding as well as sexual practices and childbearing. A study conducted by Kuhn et al. (1999) clearly showed that knowing HIV status at the time of their child's birth would influence mother's decisions on infant-feeding methods. For instance, only 47% of women who knew HIV status at the birth of child fed breast milk, while 93% of those who did not know her HIV status breastfed. Even though almost half of women were unable to afford infant formula, 83% wanted to give formula to their next child. However, unlike many developed countries where counseling and testing of HIV among pregnant women is strongly recommended (or even mandatory which is considered as a violation of the human rights: Reuters Health Information 2001; Sherr et al. 2000), poor health care infrastructures in addition to the limited resources assigned to people with HIV/AIDS made it impossible to widely offer VCT of HIV in most developing countries (Hormann 1999; WHO/UNAIDS/UNICEF 1998). An international survey conducted in 1997 showed that VCT centers in nine resource-poor countries served about 150,000 to 3 million inhabitants per center (Cartoux et al. 1998a). According to the study, there was no VCT center available in Harare, Zimbabwe, where HIV-positive rate was 28% and 1.5 million people resided in 1996. Even in a country where HIV testing is relatively widely available such as Thailand, it was used to screen HIV-infected pregnant women so that those were advised to terminate the pregnancy or feed formula, instead of informing the implications of their HIV status and giving women the rights to choose (Nicoll et al. 1995).

In addition, there was a sizable difference between the number of women who accepted HIV testing and those who returned for the actual test results. For example, a survey conducted in West Africa showed that 81 to 95% of women accepted HIV testing depending on the study sites, and more than 92% expressed an interest in knowing the test results (Cartoux et al. 1996). Yet, their 1998 study conducted in Cote d'Ivoire and Burkina Faso showed that only 58-82% of those accepted to be tested (78-92% of interviewed women) returned for test results, resulting in an overall acceptability rate of 46-76% (Cartoux et al. 1998b). Ladner et al. (1996) also found that less than 70% of Rwandan women tested for HIV returned for the actual result, with about ten percent lower return rate among HIV-positive women.

The determinants of accepting or refusing VCT of HIV varied depending on the study sites. In general, knowledge of MTCT and available treatment, counseling services, universal testing, and perceived benefits were identified as predictors for VCT intervention uptake (Coovadia 2000). The reasons most frequently cited for not returning for the test results were perceived high risk for HIV, fear of discrimination (violence) following disclosure, uncertainty about spousal consent, and financial difficulties. For instance, higher perceived knowledge about HIV/AIDS predicted the use of VCT, while perceived risk of being stigmatized when HIV-positive was negatively associated with the acceptability of VCT among 181 Zambians (Bakari et al. 2000). According to the study, those with high-perceived knowledge about HIV/AIDS were more likely to accept the HIV testing after pre-counseling. Significantly higher proportion of those who knew someone with HIV or who were worried about being stigmatized when positive did not participate in both pre-counseling and testing of HIV. Even though almost half of women who received positive

test results in the study indicated their risk of being infected with HIV was ‘impossible’, such perceived unlikelihood was the reason that 74% did not get HIV testing. In a randomized trial measuring the effects of different methods of offering the test on uptake of antenatal HIV testing in Edinburgh, UK, most participants (88%) showed favorable attitudes about HIV testing, but the uptake was relatively low (<37% for all groups) (Simpson et al. 1998). In this population, the test being offered by the research midwife significantly increased the uptake of testing (35% for all women offered the test vs. 6% for the control group). Also, being younger (<30 years), unmarried, or previously tested was positively associated with acceptability of VCT. The uptake rate was significantly different by which midwife offered the test, while knowledge of HIV was not related with higher uptake of VCT. According to Abdool Karim et al. (1998), high participation of HIV testing and return rates for their study was due to participants’ perceived obligation to the study. More than 80% of participants agreed to be tested because they believed that they had no options even though they signed a consent stating voluntary participation of HIV testing.

Availability and affordability of breast milk substitutes

The effect of feeding breast milk substitutes in different situations is largely unanswered (White 1999). For instance, the availability and acceptability of replacement feeding in different settings has not been well identified yet. Whether or not breast-milk substitutes can be arranged for HIV-positive women without having a “spillover” effect to HIV-negative women has not been evaluated. The magnitude of detrimental “spillover” effects, which could increase the morbidity and mortality of infants born to HIV-negative mothers due to replacement feeding related infectious disease has not been identified either. Also, there is dearth of information on women’s ability to carry out nutritionally appropriate

replacement feeding among HIV-positive women, and impact of breast milk alternatives at personal as well as community level.

According to Chopra et al. (2000), the availability of free infant formula alone did not ease mother's decision about infant feeding. Even though the Provincial Health Department in Western Cape, South Africa provided short-course AZT and infant formula to HIV-positive pregnant women, they were not given information regarding the risks of replacement feeding and the adequate instruction about the formula preparation. Also most women reported to have insufficient formula.

Even though women with HIV/AIDS could prepare appropriate breast milk alternatives, the cost associated with replacement feeding is substantial even in the developed nations. A Kaiser Permanente survey conducted in the United State showed that additional cost of feeding a breast milk alternative for the first six months was more than \$1400 including powdered formula and the additional health care cost (Hormann 1997). A few studies from developed countries have also shown that exclusive breastfeeding for three months or more could save at least \$200 for direct medical costs during the first year of infants' life, compared with exclusive formula feeding (Ball & Bennett 2001; Hoey & Ware 1997). At the national level, additional medical cost for the treatment of four of the most common childhood disease diseases (diarrhea, respiratory infection, otitis media, and insulin-dependent diabetes mellitus) by not giving breast milk was estimated to be over one billions (Riordan 1997). According to Montgomery and Splett (1997), among healthy infants enrolled in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) and whose medical care was paid by Medicaid, 470 exclusively formula-fed infants used \$478 more per infants in WIC costs and Medicaid expenditures for the first six months

of life than 406 infants exclusively breastfed for at least three months. Even considering the formula manufacturer's rebate, exclusively breastfed infants saved \$161 in WIC costs and Medicaid expenditures.

Other studies have reported that cost was the main factor not to choose alternatives to breast milk in less developed countries (Bassett 2000; Kuhn et al. 1999; Morrison 1999). In Zimbabwe, where more than half of the population lives under the poverty line, feeding a baby on even the cheapest breast milk substitute costs more than half of the minimum wages, which simply made it impossible to choose breast milk alternatives (Bassett 2000; Morrison 1999). Infant formula was also unaffordable in Kenya because feeding one child cost 140-180% of minimum wage one can make (Hormann 1997). Using a survey with 220 women participating an antiretroviral intervention in South Africa, Sibiyi et al. (2000) have shown the direct relationship between family income and infant-feeding options. While about a half of breastfeeding women lived with a total family income of less than \$83, only a quarter of formula feeding women lived with such conditions. Likewise, the proportion of women living in a family whose total family income was more than \$160 was significantly higher in formula feeding women than breastfeeding women (43.8% vs. 27.9%). Also, the majority of women selected a high cost of formula as the reason to breastfeed their infants.

Constraints to exclusive breastfeeding

The benefits of exclusive breastfeeding during the first six months of a baby's life have been well documented in terms of low morbidity and mortality related to infectious disease (WHO Collaborative Study Team 2000). Several studies have also reported that exclusive breastfeeding carries a lower risk of transmitting HIV than mixed feeding (Coutsoudis et al. 1999; Coutsooudis et al. 2001; Taren et al. 2000; Tess et al. 1998b). Thus,

WHO recommends exclusive breastfeeding for HIV-positive women at least during the first months of babies' life, when she chooses to breastfeed (WHO Technical Consultation 2001). However, the cultural norm of mixed feeding and mothers' perception of insufficient breast milk often prevent exclusive breastfeeding in many African countries (Bland et al. 2000; Bland et al. 2002; Fowler et al. 1999). Currently, a little more than a third of infants in Sub-Saharan Africa were breastfed exclusively up to three months, even though mixed feeding continues almost two years (UNICEF 2001). According to Bland et al. (2000), only five percent of infants in South Africa were exclusively breastfed by six weeks of age, even though two out of five women intended to exclusively breastfeed their babies. The main reasons reported for not exclusively breastfeeding were perception of insufficient breast milk and concerns about an unsatisfied infant. A delay of the first opportunity for breastfeeding also limited exclusive breastfeeding.

Ghana

General child and maternal health statistics

Ghana is located in West Africa and shares its borders with Cote d'Ivoire to the west, Burkina Faso to the north, and Togo to the east. Ghana has a population of about 20 million with the population growth rate of three percent for the last decade (LaVerle 1995; UNAIDS/UNICEF/WHO 2002). According to 1998 Ghana Demographic and Health Survey (GDHS), health status of Ghanaians has improved dramatically (Ghana Statistical Service & Macro International 1999). Even though they were still high, both infant and under-five mortality were almost halved during the last two decades (99.6 and 197.2/1000 live births in 1975, 56.7 and 107.6/1000 live births in 1996, respectively). The survey also showed that such mortality was dependent on socio-economic and demographic factors. For example,

infant mortality for the ten-year period preceding the survey was 42.6/1000 live births in urban areas, compared with 67.5/1000 live births in rural areas. Under-five mortality was proportional to mothers' education; mortality rate of children born to mothers with no education was 131/1000 live births and declined to less than 60/1000 live births among those born to mothers with secondary education or higher. Previous birth interval of less than two years was also strongly associated with high infant and under-five mortality, compared with that of four years or more (105.5 and 163.7/1000 live births vs. 35.5 and 66.2/1000 live births, respectively).

Antenatal coverage was relatively high in Ghana and the majority of antenatal care was given by a nurse or a midwife (Ghana Statistical Service & Macro International 1999). More than three-quarters of pregnant women received iron and folate tablets, and checked blood pressure, urine and blood during pregnancy. The level of antenatal care varied depending on the socio-economic status. For instance, about one in five women with no education did not receive any antenatal care, while only one in 40 woman with secondary or higher education did not receive it. Such a difference by the level of mother's education was seen in delivery care as well. More than 85% of pregnant women who attended secondary school delivered their babies at a health facility, compared with 24% of those with no education. In general, only 50% of mothers who gave birth outside of a health facility had received any postnatal care and this might explain the high rate of neonatal death among Ghanaian children (30/1000 live births up to four years preceding survey).

Diarrheal diseases and acute respiratory infections among children under five were fairly common in Ghana. Overall prevalence of diarrhea during the two weeks preceding the survey was 17.9% with the highest prevalence among children in their second year of life

(26.4%), followed by 6-11 months old infants (25.4%). Acute respiratory infections, which can advance to pneumonia, occurred among 14% of children under five during two weeks prior to the survey, but only a quarter of the children were taken to a health facility. The second half of the first year was the most vulnerable period to acute respiratory infection, which declined at older ages. Both diarrhea and acute respiratory infections were less common among infants at or less than six months of age, which was probably due to universal breastfeeding.

Infant-feeding practices and nutritional status

Almost all (97%) children were ever-breastfed and such near universal breastfeeding did not differ by socio-economic or demographic characteristics of mothers (Ghana Statistical Service & Macro International 1999). More than half of infants were breastfed within one day of birth and one quarter of them within one hour of birth. Children born in urban areas, at a health facility, or with assistance by medically trained personnel were more likely to initiate breastfeeding within a day of birth.

Although the proportion of exclusively breastfed infants during the first two months was substantially higher in 1998 than 1993 (42.7% vs. 11.7%, respectively), exclusive breastfeeding was relatively uncommon after two months (Figure 1) (Ghana Statistical Service & Macro International 1994; Ghana Statistical Service & Macro International 1999). About 70% of infants were given something other than breast milk such as plain waters, water-based liquids, and complementary foods by two to three months of age and only one in five children breastfed exclusively by the age of four to five months. The median duration of breastfeeding was 21.5 months. Children born to mothers living in rural areas and attending no school received breast milk longer than those born to mothers living in urban areas and

receiving secondary education. Another sub-optimal infant-feeding practice included the late introduction of appropriated complementary feeding. For instance, one quarter of children aged 10-11 months did not receive solid foods.

Nutritional status of children, which has not changed at all since 1993, indicates that malnutrition is a serious problem among Ghanaian children. According to GDHS 1993 and 1998, about one quarter of children were stunted and/or underweight. Children older than one year showed considerably higher percentage of stunting and underweight than infants.

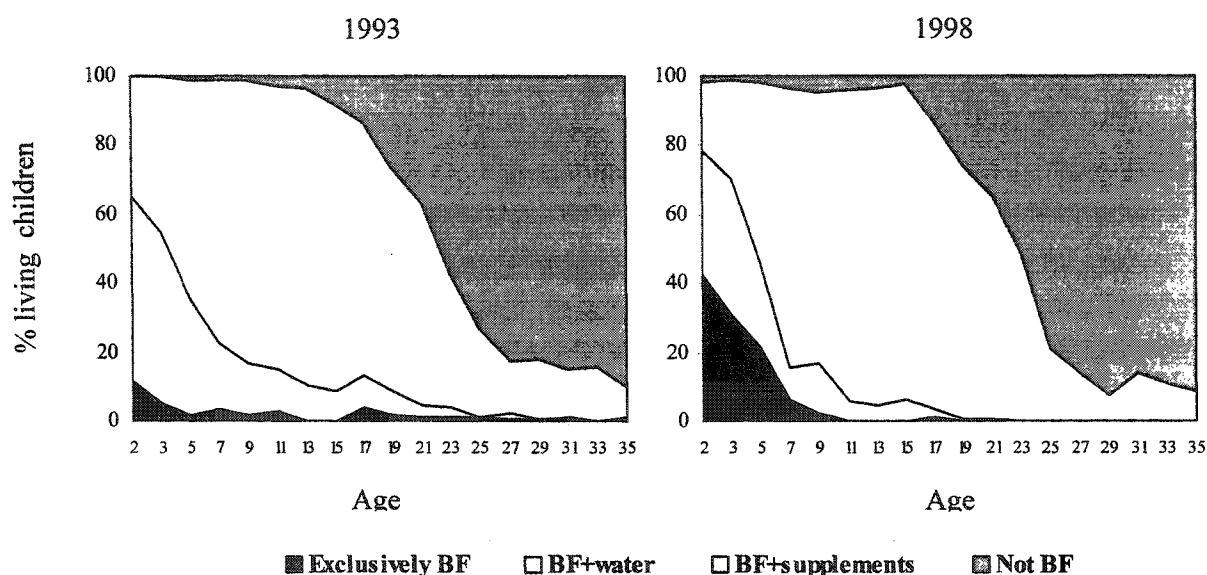


Figure 1. Distribution of living children by breastfeeding status (modified from Ghana Statistical Service & Macro International 1994; Ghana Statistical Service & Macro International 1999)

Longer birth intervals and lower birth order were also associated with lower rate of stunting and underweight among children under five years of age. The proportion of wasting was somewhat higher among children 12-23 months of age (20.1%) and 6-11 months of age (16.1%), compared with overall prevalence of wasting among children under 5 years of age (9.5%). All three nutritional indices were inversely related with a low level of maternal

education and living in rural areas (Ghana Statistical Service & Macro International 1994; Ghana Statistical Service & Macro International 1999).

Prevalence of HIV

Unlike the three adjacent countries that have shown some of the highest prevalence of HIV/AIDS in the West African region, the estimated HIV prevalence rate still remains under five percent in Ghana (3%: National AIDS/STI Control Programme 2001). However, recent data regarding estimated number of adults and children living with HIV/AIDS have clearly shown that HIV/AIDS is becoming one of the most serious health problems in Ghana. HIV infection became the second leading cause of death of both males and females aged 15 to 44 years and the number of people infected with HIV/AIDS rose to about 600,000 by the end of 2000 (Gyapong et al. 2002; National AIDS/STI Control Programme 2001). They also projected in the report that the number of HIV-infected individuals would reach up to 1.2 million in 2014, excluding those who would have died of AIDS.

The major route of HIV transmission in Ghana is heterosexual contact (80-90%). Like other sub-Saharan African countries (UNAIDS/WHO 2002), the infection among females outnumbers males two to one and MTCT accounts for over 90% of HIV infection among children in Ghana (Addo-Yobo & Lovel 1992; Ankrah et al. 1994; Cronin et al. 1991; Gyapong et al. 2002; National AIDS/STI Control Programme 2001; UNAIDS/UNICEF/WHO 2002). In a study of HIV seroprevalence of in-patients in Kumasi, female patients were twice more likely to be HIV-positive than male counterparts (17.6% vs. 8.8%) (Ankrah et al. 1994). Forty-five percent of female patients in the age group of 25 – 29 y turned out to be HIV-positive. According to an update on HIV/AIDS and sexually transmitted infections (STI) published jointly by UNAIDS, UNICEF, and WHO (2002), median HIV prevalence

among pregnant women in major urban areas increased from less than one percent in 1990 to over 3.4% in 1998 and 3.8% in 2000. HIV prevalence among STD clinic patients in Accra increased from two percent in 1988 to nearly nine percent in 1991. Twenty seven percent and 39% of female STI patients in Accra were tested positive for HIV in 1998 and in 1999, respectively. Data from a 1998 survey showed that a maximum of 27% of female STD patients tested in Adabraka, Accra, were HIV-positive. The increased rate of HIV prevalence was more drastic among sex workers. HIV-positive prevalence rates among sex workers were about two percent in 1986, but increased to nearly 40 percent in 1991. HIV prevalence among a group of sex workers tested in Accra in 1997 was 73%.

As the prevalence of HIV among females increased, magnitude of HIV vertical transmission also rose to 15%. De Cock et al. (2000) reported that relative proportion of transmission due to breastfeeding may be up to 50% in populations where breastfeeding through 18 to 24 months is common. Breastfeeding is the cultural norm in Ghana, with an almost universal initiation of breastfeeding and a mean duration of over 21 months (Ghana Statistical Service & Macro International 1999). Considering such breastfeeding practices, up to 7.5% of the estimated HIV case in Ghana may be due to breastfeeding by mothers with HIV.

Knowledge and attitudes toward HIV/AIDS and people with HIV/AIDS

Ghanaians have shown high awareness about HIV/AIDS, but their knowledge with respect to the mode of HIV transmission varied significantly. In a study of 211 outpatients in the Ashanti region, sexual contact was the only mode of transmission that majority of subjects identified (Addo-Yobo & Lovel 1992). Less than half of subjects realized that inoculation, such as injections and sharing shaving sticks or razor blades, or blood

transfusion were modes of HIV transmission. Only 50% of subject knew that there was no cure for AIDS. In a national survey conducted in 1993, more than 85% of Ghanaians could correctly identify sexual contact as a mode of HIV transmission (Ghana Statistical Service & Macro International 1994). Many Ghanaians held the misconception that HIV could be acquired by insect bites (68.5% in women, 63.8% in men), kissing (54.0% in women, 52.8% in men), sharing eating utensils (40.4% in women, 36.0% in men) and hand shaking (19% in women, 15.4% in men). Even though less than two percent of Ghanaians could spontaneously answer that AIDS could be transmitted from HIV-positive mother to her child, more than 80% of them could correctly select MTCT of HIV as a mode of transmission from the list of possible transmission routes. By 1998, about 80% of Ghanaians also identified MTCT of HIV through breastfeeding as a possible route of infection (Ghana Statistical Service & Macro International 1999).

A collaborative education study conducted in Accra and Kumasi, Ghana, reported that HIV related knowledge among health care workers was relatively high (Cronin et al. 1991). Most participating nurses of the five-day workshop correctly identified HIV transmission risk factors, such as blood, semen, and breast milk, but 58% of subjects mentioned even saliva as a mode of transmission. More than one quarter of participants also believed that urine and tears could transmit HIV. Even though the five-day workshop regarding HIV/AIDS improved nurses' attitudes toward people with HIV/AIDS in a clinical setting, some were still reluctant to perform clinical procedures. The main reason of unwillingness given by health care workers was the possibility of infection during the medical care. For example, 54% and 31% of participants were very or somewhat reluctant to perform mouth-to-mouth resuscitation in the pre- and post-workshop surveys, respectively.

Ghanaians' attitudes toward people with HIV/AIDS were dichotomized; when asked in 1993 what actions the government should take with people who have AIDS, 42% of women and 37% of men indicated that government should provide free medical treatment. Almost the same number of both men and women (37% and 40%, respectively) also recommended free medical treatment for people who had AIDS in 1998. On the other hand, more than 30% of women and 40% of men stated in 1993 that the government should "isolate or quarantine" people with AIDS. More extremely, about 10% Ghanaians suggested the government "eliminate (kill)" them. In a 1998 survey, a similar percent (34% of women and 40% of men) responded that the government should "isolate AIDS patients" (Ghana Statistical Service & Macro International 1994; Ghana Statistical Service & Macro International 1999).

Theoretical framework

Theory of Reasoned Action

The Theory of Reasoned Action (TRA) is an individual behavior model that was designed to examine the effects of attitudes and subjective norms on intentions toward a behavior (Ajzen & Fishbein 1980; Fishbein & Ajzen 1975). The fundamental assumption underlying the theory is that people generally behave in a rational manner because they use available information and understand the implications of their behaviors. According to the theory (Figure 2), a person's intention to engage in a behavior is the immediate factor that determines the behavior. In turn, the intentions are determined by a person's attitudes toward the behavior and subjective norms regarding the behavior. Attitudes are determined by behavioral beliefs and evaluations of those beliefs, while subjective norms are determined by normative beliefs and motivations to comply. Attitudes are a person's positive or negative

evaluation of the expected results of a certain behavior. Subjective norms are a person's perceptions about social pressure to perform or not to perform a behavior and the social pressure may come from people whose opinion one values, such as family, friends, co-workers, and peers (Ajzen & Fishbein 1980; Fishben & Ajzen 1975). Thus, information or salient beliefs affect behavioral intentions through attitudes toward the behavior and/or through subjective norms. The theory allows that additional variables other than those explained in the TRA are supposed to influence intention and subsequent behavior only to the extent that they modify either attitudes toward a behavior and/or subjective norms about that behavior (Fishben & Ajzen 1975).

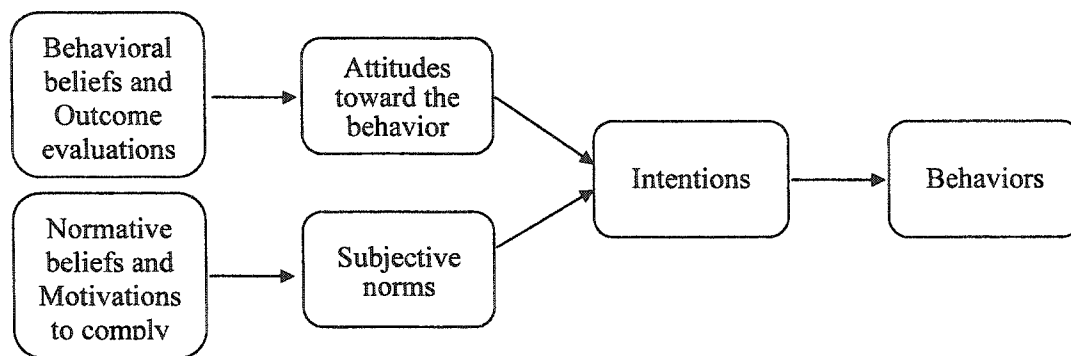


Figure 2. Theory of Reasoned Action (adapted from Ajzen & Fishbein 1980)

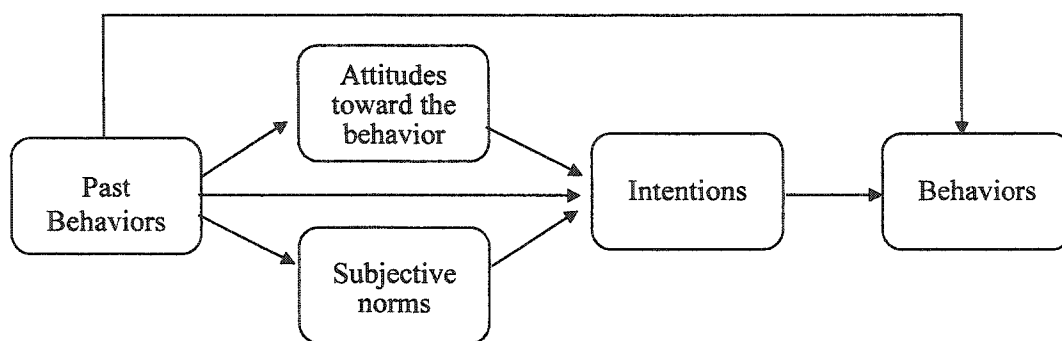


Figure 3. The extension of the Theory of Reasoned Action that incorporates past behavior (modified from Albarracin et al. 2001)

An extension of the TRA incorporating past behavior as a variable, which can independently determine a behavioral intention and following behavior, has been proposed (Figure 3) (Bagozzi & Warshaw 1990; Bagozzi et al. 1992; Bentler & Speckart 1979; Kashima et al. 1993; O'Callaghan et al. 1997). Previous studies have shown that past behavior is significantly correlated with both behavioral intentions (Bagozzi & Warshaw 1990; Bagozzi et al. 1992; Bentler & Speckart 1979; Kashima et al. 1993; O'Callaghan et al. 1997) and future behavior (Bentler & Speckart 1979; Kashima et al. 1993). A possible explanation of the correlation between past behavior and intentions for future behavior is that past behavior influences attitudes toward future behavior. Personally engaging in a behavior in the past positively influences attitudes about it and these attitudes stabilize the intention to perform or not to perform the behavior (Kashima et al. 1993). Another possibility is that personally engaging in a behavior in the past is also based on information and salient beliefs sufficient that a person is not likely to change their position in response to additional information. Also, successful performance of a behavior in the past makes people able to acquire the necessary resources and skills to increase the perceived control needed to perform the behavior in the future (Kashima et al. 1993; O'Callaghan et al. 1997).

For accurate measurement of the correlation between the behavior and TRA constructs, the behavior of interest should be clearly stated in terms of action, target, context, and time. When the behavior of interest is a complex goal as is the case in this study (i.e., making a fully informed infant-feeding decision), one needs to specify a series of component behaviors (e.g., obtaining a voluntary HIV testing at least once during the current pregnancy, feeding breast milk exclusively to my baby for a month, or introducing formula to my baby during the first month) needed to achieve the complex goal and assess the relationship of the

simpler behaviors and theory constructs (Ajzen & Fishbein 1980; Conner & Sparks 1996). Accurate measurement of the correlation between behavioral intention and the behavior itself depends upon the precision of intention measurement and the time interval between the measurement of intention and the observation of actual behavior (Ajzen & Fishbein 1980; Fishben & Ajzen 1975). To predict a specific behavior, one must assess equally specific intentions. For instance, one should ask, “I intend to have (action) a voluntary HIV testing (target) at least once (context) during the current pregnancy (time frame).” rather than “I intend to take a HIV testing.” Since behavioral intentions may change after they are measured, the longer the time interval between the measurement of intention and the observation of behavior, the lower will be the correlation between them (Ajzen & Madden 1986)

TRA has been used successfully to predict a range of widely different health-related behaviors such as alcohol use (O’Callaghan et al. 1997), condom use (Kashima et al. 1993), fat consumption (Shepherd & Stockley 1987), regular exercise, maintenance or attainment of recommended weight, stress management (Pender & Pender1986), contraceptive behavior (Alder et al. 1990), breast self-examination (Hill et al. 1985) and mammography participation (Montano & Taplin 1991). TRA also has been commonly employed to explain and predict relationships among attitudes, subjective norms, and intentions toward certain HIV preventive behaviors (Baker et al. 1996; Bandawe & Foster 1996; Basen-Engquist & Parcel 1992; Ford & Norris 1995; Jemmott & Jemmott 1991; Ross & McLaws1992). Most studies using the TRA have shown that both attitudes and subjective norms were significant predictors of behavioral intentions. The relative importance of the predictors – attitudes or

subjective norms – varied with personal characteristics and the situation (Bagozzi et al. 1992; Chen 1991).

Like many other individual health behavior theories, the TRA has several limitations because of their general assumption (UNAIDS/Penn State 1999). First, the theory assumes that individuals can exercise total control over their behavior or the behavior is based on rational, volitional thinking under no cultural, gender, or emotional influence (Ajzen 1988; Fishben & Ajzen 1975; Glanz et al. 1997; Madden et al. 1992). However, taking voluntary testing of HIV and introducing formula in Ghana might not be one of such behaviors. The TRA also assumes that there is a simple, linear relationship between knowledge, attitudes, subjective norms, intentions and behavior. As stated above, the theory does not allow additional variables to directly influence intentions and subsequent behavior (Fishbein & Ajzen 1975). Choi et al. (1998) also pointed that current behavior change models confine the predictability of intention and behavior due to the exclusion of social influence.

Theory of Planned Behavior and Health Belief Model

To complement the TRA to explain the pregnant women's intentions regarding the voluntary HIV test participation and infant feeding, a few constructs of other intrapersonal health behavior theories, such as perceived behavioral control in the Theory of Planned Behavior, and perceived susceptibility and severity, and cues to action in Health Belief Model, were added to the TRA (Ajzen 1991; Rosenstock 1974; Janz & Becker 1984). The Theory of Planned Behavior (TPB), proposed by Ajzen (1991), is an extension of TRA that encompasses perceived behavioral control as one function of behavioral intentions and the subsequent behaviors (Ajzen 1991) (Figure 4). Although the TRA generally predicts intentions and behaviors under volitional control to a great extent, Ajzen (1991) found that

the behavior of interest was not always under volitional control due to lack of requisite opportunities and resources (e.g., time, money, skills, cooperation of others). Perceived behavioral control, measured by the function of control belief and perceived power, is one's perception that one can access resources and, therefore, have the opportunity to do the behavior of interest. In other words, perceived behavioral control, which is the combination Bandura's (1982) concept of self-efficacy and Rotter's (1966) concept of locus of control, is one's perceptions of the ease or difficulty of performing the behavior based upon their controllability of the action (Glanz et al. 1997).

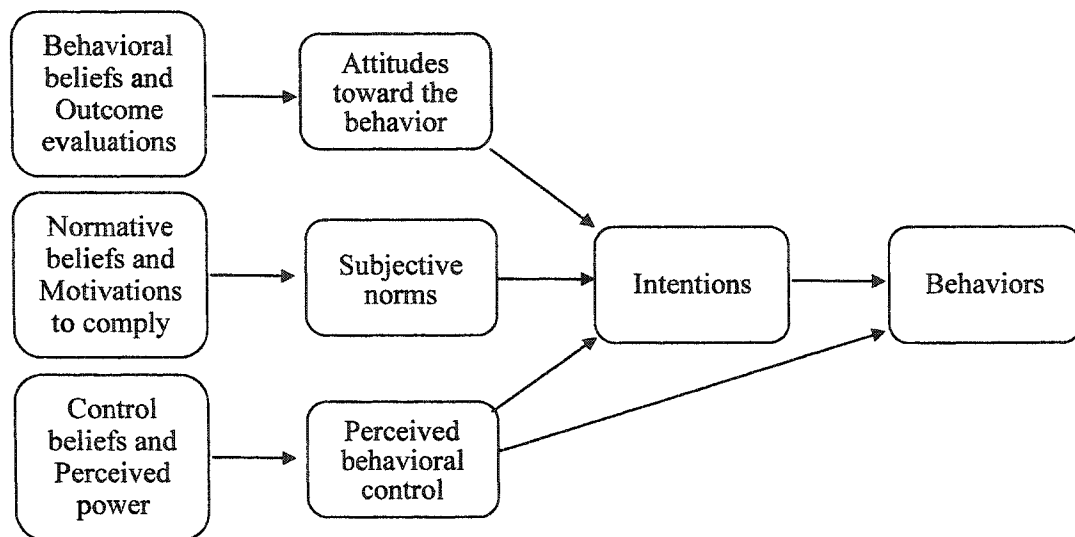


Figure 4. Theory of Planned Behavior (adapted from Ajzen 1991)

The TPB has been less extensively used in predicting health-related behaviors than the TRA and the predictability of intentions toward the behavior and the subsequent behavior by perceived behavioral control varied substantially. The addition of perceived behavioral control significantly increased the predictability of smoking intention in public and actual smoking behavior (Godin et al. 1992) and school children's physical activity intentions (Mummery et al. 2000). However, a meta-analysis of condom use showed that perceived

behavioral control did not increase the predictability of intention and condom use despite the high correlations between perceived behavioral control and both intention and condom use (Albarracín et al. 2001).

Past behavior, like in the TRA, seems to increase the predictability of both intention and behavior after taking account of TPB constructs. According to Conner and Armitage (1998), past behavior, on average, explained 7.2% of behavioral intention controlling for attitudes, subjective norms, and perceived behavioral control and 13 % of behavior accounting for intention and perceived control in their meta analysis using 11 studies in prediction of intention and 5 studies in prediction of behavior. Yet, the process of how past behavior influences intention and future behavior is not clearly identified. Ajzen (1991) stated that the effects of past behavior on intention and future behavior should be mediated by perceived behavioral control since frequent performance of a behavior might be under the control of habitual process. However, a meta-analysis of relationships between the past behavior and constructs of TPB showed that past behavior was most strongly correlated with future behavior, followed by intention (Conner & Armitage 1998). Aarts et al. (1998) suggested that moderation of TPB constructs by past behavior in predicting intention might only come with non-habitual (less frequently performed) behavior while habitual behavior might be directly influenced by past behavior since people tend to use simplified decision rules rather than going through the rational decision mechanism proposed by the TRA and TPB.

The Health Belief Model (HBM) is one of the most frequently used conceptual frameworks for a wide range of preventive health behavior researches including HIV preventive behavior researches (Allard 1989; Carmel 1991; Hingson et al. 1990;

Montgomery et al. 1989; Steers et al. 1996; VanLandingham et al. 1995). Based on Lewin's field theory (1951), HBM was created in early 1950's to explain the decisional mechanisms of preventive behaviors, such as obtaining chest X-ray for an early detection of tuberculosis, which then revised to include illness behaviors and sick-role behaviors (Becker 1974; Hochbaum 1958; Janz & Becker 1984).

According to the model (Figure 5), health-related behaviors are the function of "the value placed by an individual on a particular goal (e.g., the desire to avoid illness or get well, if ill)" and "the individual's estimate of the likelihood that a given action will achieve that goal (e.g., the belief that a specific health action will prevent or ameliorate illness)" (Maiman & Becker 1974; Janz & Becker 1984). The HBM, which focuses on threat perception and behavioral evaluation of individual's health and health behavior, has five components; 1) perceived susceptibility, 2) perceived severity, 3) perceived benefits, 4) perceived barriers, and 5) cues to action (Glanz et al. 1997). Perceived susceptibility is one's subjective perception of the likelihood of experiencing a condition that would adversely affect one's health, while perceived severity is one's beliefs and evaluations regarding the medical, clinical, and possibly social consequences (e.g., death, disability, pain, family life, and social relations) of contracting the condition. The combination of perceived susceptibility and severity represents perceived threat of disease. Perceived benefits are the beliefs regarding the effectiveness of the given action on which the particular course of action depends. Perceived benefits can be health-related (e.g., reduce the risk of contracting illness) or non-health-related (e.g., look better, save money by quitting smoking). The perceived negative aspects of a health behavior, which impede the undertaking of the recommended behavior, are termed the perceived barriers. Perceived barriers are the cost of chosen action (e.g.,

expensive, dangerous, unpleasant, inconvenient, or time-consuming). Cues to action are the stimuli to activate one's readiness, which may come from internal (e.g., symptoms) or external (e.g., mass media communications, reminder postcards from health care providers) sources (Janz & Becker 1984; Glanz et al. 1997).

Two meta-analyses of HBM studies showed that perceived barriers were the strongest predictor of preventive health behavior, in terms of both frequency and strength, followed by susceptibility, benefits, and severity (Janz & Becker 1984; Harrison et al. 1992). However, a few studies showed that the HBM had the limitations to explain HIV-preventive behavior due to its complexity (Abraham et al. 1992; Sheeran & Abraham 1996). Unlike other diseases, a long asymptomatic latent period of HIV along with limited transmission routes decreased the perception of susceptibility, while the fatal outcome increased perceived severity of the disease. This combination of low perceived susceptibility and high severity drove people away from adopting preventive behavior and continued on risk behavior as a way of denial mechanism (Van der Pligt et al. 1993).

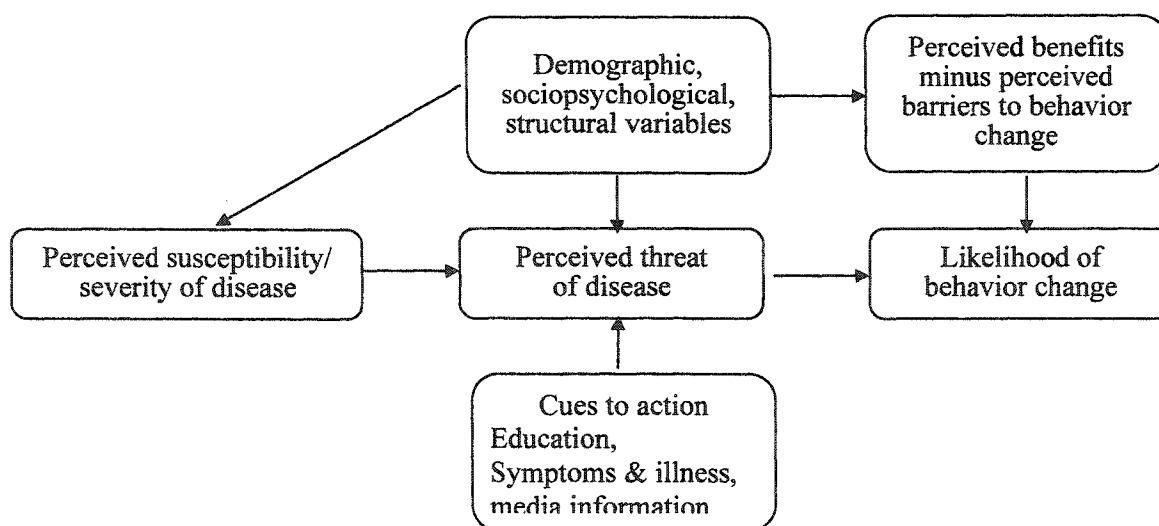


Figure 5. The Health Belief Model (adapted from Glanz et al. 1997; Rosenstock 1974)

Previous researches showed that TRA/TPB and HBM shared functional similarities and the significant proportion of behavioral intentions and the actual behaviors are well explained by both theories (Maddux & DuCharme 1997; VanLandingham et al. 1995; Wulfert et al. 1996). For example, Maddux and DuCharme (1997) stated that outcome expectancy, a person's beliefs about the consequences of some behavior, appeared as perceived benefits and costs in the HBM, while attitudes toward behavior components represented it in the TRA/TPB. Even though, the concept is a little different, one's ability to perform a behavior is termed as self-efficacy in HBM, whereas it is labeled as perceived behavioral control in TPB. Therefore, this study employed the unique components of the TPB and HBM in addition to the theory constructs of TRA; perceived behavioral control, perceived susceptibility/severity of disease, cues to action, and past behavior. Perceived susceptibility and severity of HIV/AIDS, which was regarded as a part of attitudes toward behavior by some researchers (Maddux & DuCharme 1997; VanLandingham et al. 1995; Wulfert et al. 1996) were included separately in this study to measure their influence on Ghanaian women's perception of MTCT through breastfeeding and infant-feeding decisions. Additional factors which have shown to influence HIV/AIDS preventive behavior as well as infant-feeding behavior, such as socioeconomic status, culture, gender relations, spirituality, family support were also be utilized (Bunting & Seaton 1999; Lutter 2000; UNAIDS/Penn State 1999; Wagner et al. 2000).

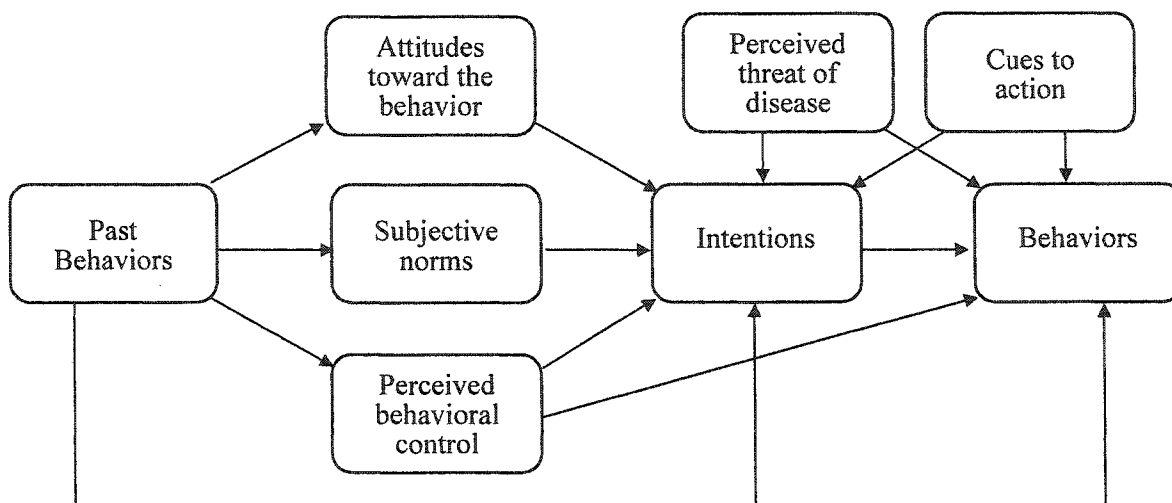


Figure 6. A proposed model based on the Theory of Reasoned Action, the Theory of Planned Behavior and the Health Belief Model

CHAPTER 3. GENERAL METHODS

Study design for data collection

This study utilized triangulated data collection methods to identify the behavioral, socioeconomic, and cultural factors that influence pregnant women's intentions with respect to using voluntary counseling and testing of HIV as well as making an informed decision regarding infant-feeding options. First, focus group discussions were conducted with pregnant women attending antenatal clinics (ANCs) as well as health professionals working with pregnant women. Using the results of the focus group discussions, a survey instrument was developed. In-person interviews were then carried out using the structured questionnaire with 403 pregnant women in the polyclinics. A sub group sample was followed for in-depth interviews and the measurement of the intended behavior. Approval to conduct the study was obtained from the Iowa State University Institutional Review Board for the Protection of Human Subjects and Ghanaian Ministry of Health.

Study site

The current study was conducted in the two polyclinics with the greatest number of pregnant women attending ANCs in Accra, Ghana (Figure 1): Mamprobi and Kaneshie polyclinics (Figure 2). Both clinics provided outpatient services of general medicine as well as specialty clinics in ophthalmology/optometry, tuberculosis, antenatal/postnatal, family planning, immunization, community psychiatry, and a nutritional rehabilitation center, community psychiatry, an emergency department as well as maternal and child health outreach services.

Mamprobi polyclinic, located in Ablekuma sub-district, had one doctor and 36 nurses/midwives working at the antenatal department and maternity ward on a rotating base.

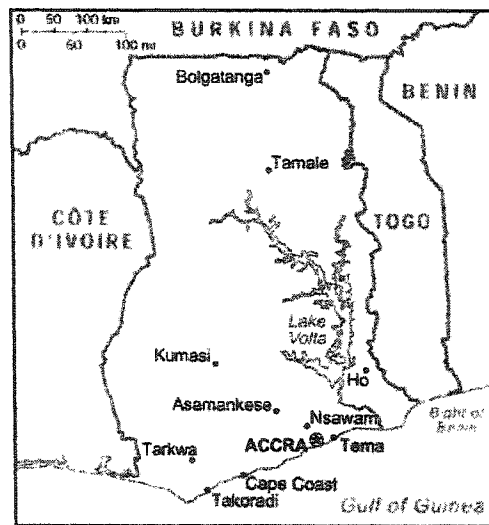


Figure 1. The location of Accra (The World Factbook 2002).

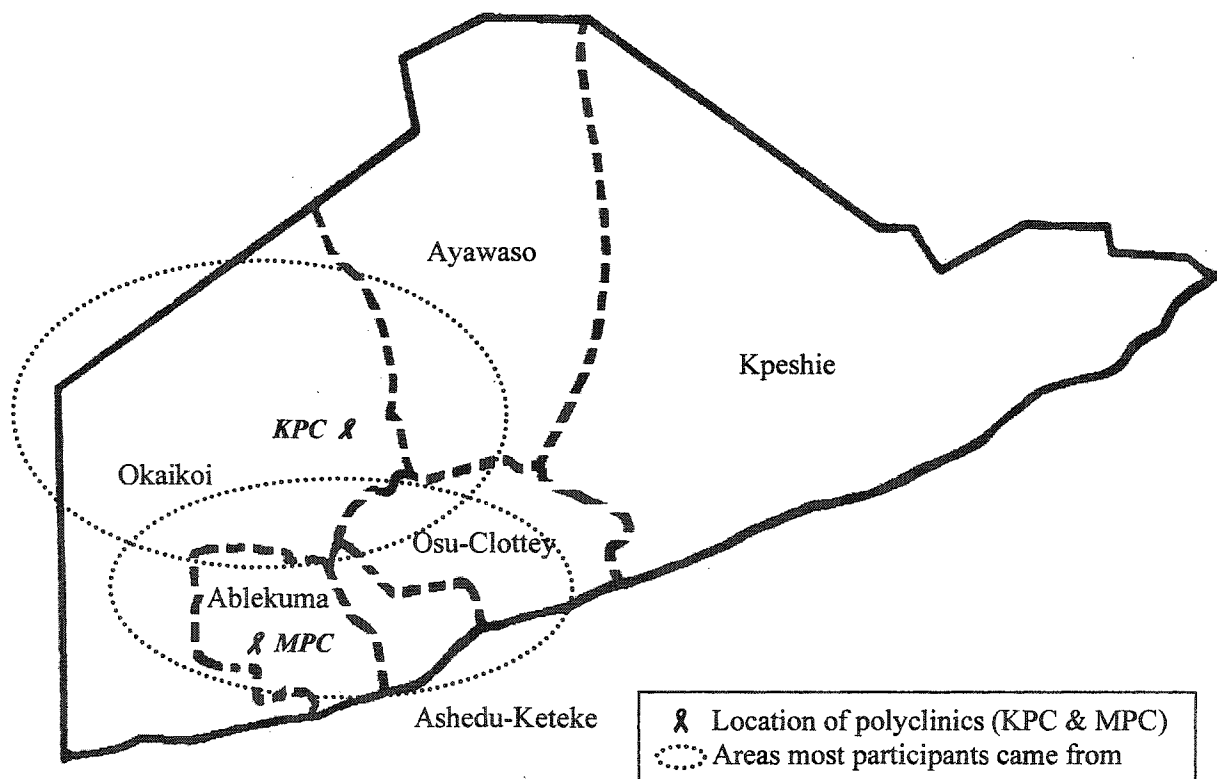


Figure 2. The location of study sites and areas from which subjects came

Antenatal care at the clinic included general examination (palpation and auscultation), blood pressure and weight monitoring, antenatal screening of urine (albumin and glucose) and blood (blood type, hemoglobin, erythrocyte sickling, antibody screening for sexually transmitted disease), ultrasound scan, as well as prenatal health and nutrition education including self-care in pregnancy, prevention/treatment of malaria, preparation for confinement, HIV/AIDS, and breastfeeding. If needed, iron, folate and/or multivitamin supplements were prescribed by the attending nurses. Ill patients were referred to a consultant in one of the specialty clinic for the further treatment and care. Normal delivery was usually carried out in the maternity ward of the clinic. Pregnant women with sickle cell, pre-eclampsia/eclampsia, or history of cesarean section were referred to the Korle-bu Teaching hospital for delivery at the beginning of third trimester. In 2001, 28,783 pregnant women (5,969 new patients and 22,815 returning patients) utilized the antenatal care services in Mamprobi polyclinic. Kaneshie clinic, which is located in the less crowded area of Okaikoi sub-district, also provided full range of antenatal services, but in a much smaller scale. Ten nurses/midwives attended about 13,990 pregnant women (3,576 new patients and 10414 returning patients) in 2001. Since Kaneshie polyclinic did not have maternity ward at the time of this study, pregnant women were referred at 34th week to private midwives, other polyclinics, or hospitals for delivery. Both sites provided antenatal care four days per week.

Focus group discussion

Part 1. Pregnant women

During the first phase, a total of seven focus group discussions were conducted with pregnant women attending antenatal services at Kaneshie and Mamprobi polyclinics. Since Kaneshie and Mamprobi polyclinics were located in areas with distinct ethnic backgrounds, a

one-page socioeconomic background survey was conducted with a random sample of 66 ANC clients before the focus group discussions to determine the language and education level of the usual clinic attendee and the appropriate composition of the focus groups. Based on the survey results, discussion participant characteristics in language and education were determined and pregnant women with the desired characteristics were invited to participate in the focus group discussions until six women per group had accepted (Table 1). All the invited women agreed to participate in the study.

Table 1. Characteristics of focus group discussions (FGDs)

FGD	No. of participants	FGD Site ^a	Language used	Level of participants' education ^b
1 (pilot)	6	KPC	Twi	High
2	6	MPC	Ga	Low
3	6	MPC	Twi	High
4	6	KPC	Twi	Low
5	6	KPC	Ga	— ^c
6	6	MPC	Ga	High
7	6	KPC	Twi	Low

^a KPC: Kaneshie polyclinic, MPC: Mamprobi polyclinic

^b High: Junior secondary school (JSS; equivalent 9th grade in the U.S.) completed or higher, Low: JSS uncompleted or lower

^c Participants were selected regardless of level of education due to insufficient number of pregnant women who could speak Ga in Kaneshie polyclinic

Before each session began, the purpose of the study was explained and written consent (English or local language) was obtained from participants (Appendix 1-a). An open-ended individual interview regarding their intentions about infant-feeding methods and prenatal VCT participation was carried out to help the participants review their personal intentions and those factors that influenced their decisions (Appendix 1-b). Then, a focus group discussion was held by a trained Ghanaian moderator who could speak both English and the local languages (Ga and Twi). The focus group discussions were organized based on the proposed model combining the TRA, TPB, and HBM. Themes in the discussion included

knowledge, attitudes, subjective norms, perceived behavioral control, and perceived threats to disease regarding breastfeeding, alternative feeding, HIV/AIDS, and prenatal VCT.

Information on socioeconomic, cultural, and gender issues that were identified to influence intention and decision making in the previous focus group discussions were added to the next focus group discussion (Appendix 1-c). Each session ran about one to one and one-half hours and the entire session was recorded. A snack was provided during the sessions and a small gift was given to the participants at the end of discussions. For the consistency of focus group discussions, one moderator who was familiar with the subject was trained by focus group discussion experts and led all the focus group discussions with an assistant. Recorded tapes were transcribed into English by two individuals for the content analysis (Bernard 1995; Portney & Watkins 1993).

Part 2. Health care workers

Three additional focus group discussions (two with nurses and one with doctors) were conducted with health care workers from the two chosen ANCs and Korle-bu Teaching Hospital to understand part of the socio-cultural environment in which Ghanaian women make decisions regarding VCT of HIV and infant-feeding methods. The specific aims of these focus group discussions were to identify health care workers' (1) knowledge and attitudes about HIV/AIDS and/or people with HIV/AIDS and (2) knowledge, attitudes, subjective norms, perceived control, and practices with respect to VCT of HIV, prevention of MTCT, and fully informed decisions on infant-feeding methods.

To increase the efficacy of the focus group discussions, four to nine health professionals of the same profession were invited through an informant for each session. The

informant contacted and explained the purposed of the study to the nurse or doctor in charge, who then invited interested staff to the discussion scheduled about a week later.

Before the discussions, the specific aims of the study were explained to the participants and written consent was obtained (Appendix 1-d). The two nurse-group discussion participants were also asked to fill out a pre-discussion, open-ended questionnaire regarding (1) their knowledge about the infant-feeding policy changes and (2) attitudes and practices regarding VCT of HIV and infant-feeding methods (Appendix 1-e). Current practices and the influencing factors, such as knowledge, attitudes, subjective norms, and other socio-cultural factors among health care workers, were elicited through the discussion using a semi-structured discussion guide, which was based on the constructs from the proposed model (Appendix 1-f). All three focus group discussions were conducted in English, audio taped and transcribed for analysis. A snack and/or lunch were provided for each session.

Data Analysis

The transcripts of the focus group discussions were reduced using content analysis by two individuals to increase the validity (Bernard 1995; Portney & Watkins 1993). Each pattern or theme found in the focus group discussions was first categorized into the constructs of the proposed model: attitudes, subjective norms, perceived behavioral control, and perceived severity and susceptibility of disease. Other recurring themes were placed in appropriate categories. These themes were then employed to modify a pre-developed survey instrument used in the next phase of the study.

Survey instrument and pilot survey

Survey instrument development

A draft of the survey instrument was produced based on the questionnaire used in Ndola Demonstration Project (NDP) in Zambia by Horizons (2000) as well as other surveys on HIV/AIDS and MTCT related to knowledge, attitudes, and practice in Horizons AIDSQuest. Then, the questionnaire was modified using identified factors from the focus group discussions that influenced women's intention regarding the use of VCT of HIV as well as the infant-feeding decision. The final survey instrument (Appendix 2) consisted of seven major sections: (1) socio-demographic characteristics of study participants as well as the head of household; (2) current antenatal care and obstetric history (if applicable); (3) past infant-feeding history (if applicable); (4) intention regarding infant feeding and influencing factors; (5) knowledge and attitudes about HIV/AIDS; (6) intention about prenatal HIV testing and its determinants; and (7) opinions about MTCT.

After face and content validation of the developed questionnaire was completed, the instrument was verbally translated to local languages (Twi and Ga). Then, validity of translation in each language was checked by back translation of questionnaire into English by two individuals who were not familiar with the study subject.

Field staff training

Six interviewers, who could speak at least English, Twi, and Ga fluently, were locally recruited and trained before the data collection started. Two interviewers had completed secondary education and had at least 6 months of nutrition-related fieldwork experience. The other four interviewers were third-year nutrition and food science students at the University of Ghana. During the two-week training session, interviewers were trained in interviewing

techniques using the General Interviewing Techniques Manual for Survey Operations (Statistical Laboratory, Iowa State University, unpublished). The translation of questions into two local languages was standardized by the interviewers for consistency. For the inter-interviewer reliability of response translation into English, several interview sessions were simulated. All interviewers completed human subjects research assurance training through Iowa State University Human Subjects Research Office.

Pilot testing

After a two-week interviewer training session to standardize the translation of questions into local languages (Twi/Ga) among interviewers, two pilot testings of the interview were conducted. The first pilot testing with 12 pregnant women was done in a group of two interviewers to check inter-interviewer reliability of translation for questions and answers. Based on the comments from the interviewers and interviewees, the translation of questions was slightly modified. Then, the second pilot interviews were conducted with another 12 women to check the ease of administration and understandability of questionnaire by the interviewee.

Main survey

Sampling

Since there was no information regarding the number of the target population (pregnant women aged 18-49 who attended ANC at least once in Accra), the number was estimated based on proportion of pregnant women, pregnancy outcome, and live births that received antenatal care described above. From these statistics, the number of target

population was estimated to be 21,240¹. This may be an underestimation considering the fact that women usually do not know their pregnancy in the early stage and women who gave a stillbirth might have received antenatal care.

The number of subjects needed for the interview was then calculated using a standard sample size equation for estimating proportions from definite population at the 0.05 level of precision and 95% level of confidence (Cochran 1977).

$$n = \frac{n_0}{1 + [(n_0 - 1)/N]}, \text{ when } n_0 = \frac{\text{Var}(p)^2 \times Z_{(1-\alpha)}^2}{\Sigma^2}$$

n=	Sample size	377
Var(p)=	Desired variance of the sample proportion	(0.5)
Z _(1-α) =	Level of confidence	(α=0.05)/(Z _{0.95} =1.96)
Σ=	Level of precision	(0.05)
N=	Population	(21,240)

Sample selection

Sample selection and interview process is described in Figure 3. Since there was no fixed sampling frame available, participants were recruited by a systematic sampling until it reached 414²; every third woman placing her antenatal card on the registration desk in the ANC was invited to the interview twice weekly from each clinic. Due to the repeated visits of pregnant women for their antenatal care during the period of this study, quite a few pregnant women were selected again (n=43). When a previously interviewed woman (including focus group discussions and pilot studies) was chosen, she was dropped from the list and the next third woman was selected. In addition, those who were unable to speak Twi,

¹ 841,533 (female population in Accra Metropolis) × .5 (women aged 18-49 years old) × 0.064(% pregnant) × 0.849 (live birth) × 0.929 (% who received antenatal care) (Ghana Statistical Service 2002a; Ghana Statistical Service 2002b; Ghana Statistical Service & Macro International 1999)

² 37 additional women than required sample size were interviewed to compensate for a rate of 10% incomplete questionnaires

Ga, or English (n=3), who were too sick to participate (11), or who were under 18 years old (n=9) were excluded. The process was continued until the required number of subjects was interviewed. Out of 598 selected and eligible women, 10 women refused to participate and 174 women left the clinic before the field workers approached for an interview. Considering the greater number of pregnant women attending ANC at Mamprobi polyclinic, about 60% of participants were drawn from Mamprobi, and the rest was recruited from Kaneshie polyclinic.

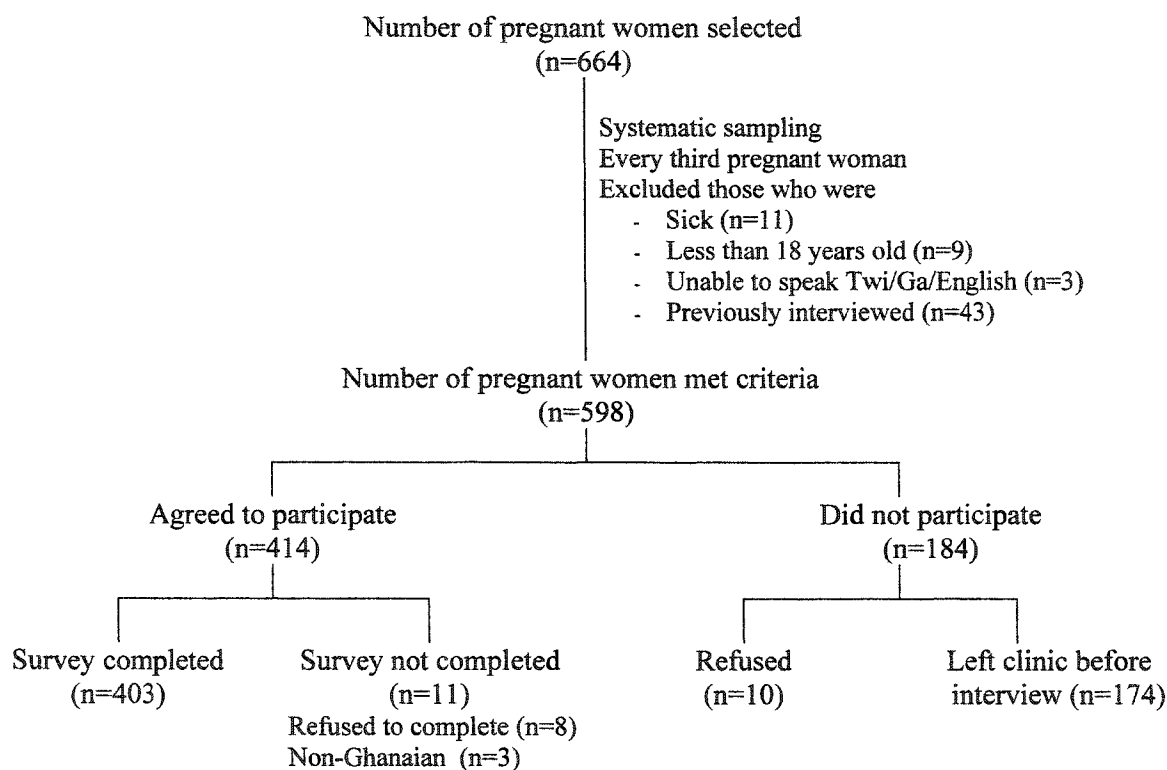


Figure 3. Main interview sample selection and interview process

Data collection

The pre-tested structured questionnaire was used to conduct in-person interviews for the 414 pregnant women recruited between June and August, 2002. When a participant was selected for an interview, she was called to a designated interview area and screened for her

age (18-49 years) and pregnancy. She was provided with information regarding the survey and a written informed consent (signature or thumbprint) was obtained before the interview began. Then, one of the six field staff interviewed the selected woman in the language of her choice (Twi, Ga, or English). Each interview ran about forty minutes to one and one-half hours depending on subjects' familiarity and interests of topics. The early morning interviews, which were conducted before the clinic began (06:30-09:00), and the afternoon interviews, done after antenatal care (12:30-14:30) usually had no interruptions and were finished within an hour. For quality control purposes, the survey was reviewed right after completion to check the consistency and completeness of responses. When the questionnaire was incomplete or there were responses contradictory to each other, the interviewer was required to ask those questions again. The participants were presented with a small gift after the interview was completed. At the end of each week, the questionnaires were reviewed and edited by other interviewer for coding.

Sub-sample follow-up

There was very limited published information regarding VCT participation and infant-feeding choices of pregnant women and most information was on intentions rather than actual behaviors (Bassett 2000). To develop a better understanding of the relationship between intentions that could be changed during the course of pregnancy and actual postpartum behaviors, this study followed-up a purposive sample of pregnant women who (1) were in the sixth to eighth month of pregnancy and (2) had a perceived risk of getting HIV or the intention to participate in prenatal voluntary HIV testing. Follow-up visits occurred within six weeks of the first interview at the clinic (prepartum), at five to seven days as well as one month postpartum.

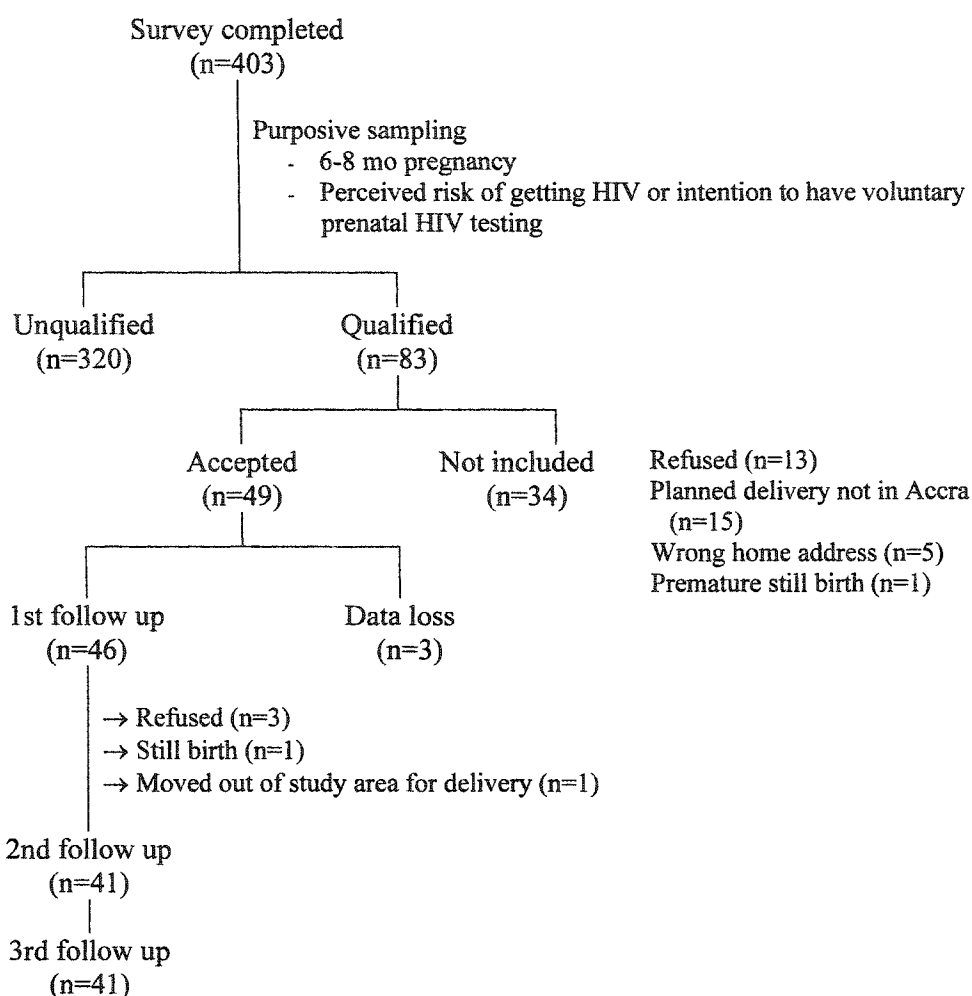


Figure 4. Follow-up sample selection

Sample selection

After each interview at the clinic, the questionnaire was reviewed by the field supervisor or other field staff to check whether the woman was qualified for the follow-up study. If she was qualified, the interviewer explained the purpose of follow-up study. If she agreed to participate, a field staff followed her home after the clinic visit to locate her residence (Accra houses do not have street addresses). When a field staff was not available to follow her up immediately, detailed information on the location of the residence was obtained by an interviewer and given to a field worker, who verified it within a week. Out of

eighty-three women qualified for the follow-up, 13 women refused and 15 women intended to deliver babies in their hometown outside Accra. Another five agreed to participate and gave information about the location of the house but their house could not be located by two field workers. One subject had a premature stillbirth in her seventh month of pregnancy before the first follow-up interview. Field staff misplaced the information of three subjects and five participants dropped out of the study due to various reasons during the study period, resulting in 41 follow-up study participants (Figure 4).

Survey instrument

The structured questionnaire used in the clinic survey was modified to be a semi-structured open-ended questionnaire for the first prenatal follow-up to provide more insight about their perceptions regarding infant feedings (Appendix 3). Those questions adapted were attitudes, subject norms, perceived behavioral questions, perceived threats to disease, and intentions regarding exclusive breastfeeding and formula feeding within a month as well as having prenatal HIV testing. The perception of social support for both exclusive breastfeeding and formula feeding was measured in terms of the relationship with the social support provider, the type and adequacy of social support, and the confidence of receiving the mentioned social support. In addition, the first follow-up questionnaire included open-ended questions regarding alternative feeding and its acceptability, affordability, safety, availability, and ease and confidence of preparation. Knowledge about infant feeding as well as maternal and child nutrition was also measured.

The second and third follow-up questionnaires mainly consisted of questions about maternal and child health status and detailed infant-feeding practices. The second follow-up questionnaire also included a 13-item breastfeeding checklist, measuring body positioning

and suckling as well as questions regarding prenatal HIV testing and factors promoting or prohibiting their behavior. The third follow-up questions contained questions about social support received during the first month postpartum.

Data collection

A field worker visited a participant's home between four to six weeks after the interview at the clinic. The purpose of the follow-up study was explained and written consent was obtained. For the confidentiality of the participants, the interview was conducted in a secluded area away from family or neighbors, if there were any in the house. One participant used Twi as well as Ewe to explain her views and another participant received help from her neighbors to translate the name of foods from Hausa to Twi, since they were not fluent enough to explain in-depth information in one of three languages used in survey (Twi, Ga, and English). The first interview lasted up to two hours.

The second follow-up was conducted five to seven days after the baby's birth, either at home or in a clinic. A scheduling staff contacted participants by phone or visited their house twice weekly to check on the delivery status and an appropriate visiting time was arranged after the baby was born. The structured questionnaire was administered and breastfeeding practice was observed by two field workers; the visit lasted about an hour.

The same field worker visited the participant one month after the baby's birth to administer the third follow-up questionnaire. After the structured questionnaire interview, the participant was further asked about her views on alternative feeding, stigma of non-breastfeeding and having HIV/AIDS, as well as social support she received from mutual help societies. The questions for the in-depth interview were tailored for each person based on her

responses in the previous interviews. This interview, which lasted about 20 to 60 minutes, was recorded and transcribed for the further analysis.

Additional data collection

Acceptability, availability and affordability of breast milk alternatives are important factors of fully informed decisions regarding infant-feeding methods. The price of alternative foods that were found to be acceptable to Ghanaian pregnant women through the focus group discussions and interviews was recorded through market research. Then, the cost of providing each alternative to an infant was compared to the daily minimum wage.

Statistical analysis

Data management

Responses were coded each week during the editing session and all the coded data were checked for accuracy. The responses for open-ended questions of the main survey were appropriately categorized before data entry. Data were then entered using a Microsoft Excel and the printout of the entered data was checked by two staff against the questionnaires. Inconsistencies were corrected by a field supervisor by referring to the original questionnaire. Responses for the open-ended questions and in-depth interviews from follow-up survey were recorded verbatim for the further analysis.

Quantitative data analysis

Statistical analyses of coded questionnaire data were performed using SAS 8.2 (1999-2001, SAS Institute Inc., Cary, NC) software and $p < .05$ was used, unless indicated, as the standard for statistical significance. Eight cases that did not complete a significant portion of interview and three cases that were not Ghanaian were dropped from all the analysis, resulting in 403 usable interviews. The number of participants that answered each question

varied due to no response and “don’t know/don’t remember/not sure/not applicable” responses. These responses were mostly kept as they are, but dropped when necessary for analysis.

Descriptive statistics (percentage, mean \pm SD) were used to summarize all quantitative questions; (1) characteristics of survey participants and their family (2) intentions and influencing factors for prenatal voluntary HIV testing and infant feeding based on the constructs of proposed model, (3) knowledge and opinions about prenatal voluntary HIV testing and infant feeding, as well as (4) those for HIV/AIDS and MTCT.

The chi-squared statistics (maximum likelihood ratio) were then used to compare sociodemographic characteristics, knowledge, and opinions between intenders and non-intenders of 1) prenatal voluntary testing of HIV and 2) exclusive breastfeeding/formula feeding. Analysis of variance (ANOVA) was also employed to explain the level of their perception based on the theory constructs with regard to having prenatal voluntary testing of HIV as well as infant feeding by sociodemographic characteristics, intentions, and practices.

The strength of relationships between intentions and the determinants of the intentions were assessed using Pearson’s correlation coefficient. Multiple regression analysis was employed to examine the ability to predict the intention of exclusive breastfeeding and formula feeding from variables reflecting attitudes, subjective norms, perceived behavioral control, perceive susceptibility/severity of disease, cues to action, and past infant-feeding experience. The relative contributions of these variables to predict intentions toward infant-feeding practices were identified using standardized beta coefficients. For the prediction of prenatal voluntary HIV testing intention and by theory constructs as well as other sociodemographic characteristics, logistic regression was used and relative contribution was

measured as an odds ratio. The strength of factors that differentiate breastfeeding and exclusive breastfeeding spillover groups from non-spillover groups were also measured as odds ratio using logistic regression.

Qualitative data analysis

Content analysis of in-depth interviews from sub-sample follow-up was performed using NVivo 1.3.146 (QSR International Pty. Ltd) to identify the underlying beliefs regarding the exclusive breastfeeding and formula feeding. The major categories of themes were identified from the transcripts without preset clusters.

CHAPTER 4. INTENTION OF GHANAIAAN PREGNANT WOMEN TO HAVE A PRENATAL HIV TESTING AND ITS DETERMINANTS

A paper to be submitted to *AIDS*

Yi-Kyoung Lee, Grace Marquis, Anna Lartey

Abstract

Objective: The specific aim of this study was to examine the intentions of Ghanaian pregnant women to have a prenatal voluntary HIV testing and the factors influencing their intentions.

Design and Methods: A systematically selected 403 women attending antenatal clinics in Accra, Ghana was interviewed using a theory-based, structured questionnaire.

Results: Twenty-eight percent of participants intended to have prenatal voluntary HIV testing, but health professional's request would have increased the intention to 96%. Their intention about voluntary testing was well predicted by high self-efficacy about the testing and no history of previous HIV testing. Participants generally had a high knowledge about transmission modes of HIV including mother-to-child transmission (MTCT), but misconceptions were also common. Lack of knowledge about the prevention methods of MTCT was evident and this was strongly associated with a lower intention of having a prenatal voluntary testing.

Conclusions: An 'opt-out' approach of HIV testing accompanied with pretest counseling, which focuses on rectifying the misconceptions regarding HIV and MTCT, educating prevention methods of MTCT, and increasing positive attitude toward the prenatal testing, would increase the acceptability of prenatal HIV testing. Educational efforts must be intensified to raise self-efficacy of pregnant women regarding HIV testing as a mode of

prevention of MTCT by increasing social supports for prenatal HIV testing and decreasing unrealistic optimism regarding HIV.

Introduction

By the end of year 2002, people living with human immunodeficiency virus (HIV) and acquired immunodeficiency syndrome (AIDS) reached 42 million globally; one half of whom were women [1]. As a result of the expanding epidemic and growing evidence of mother-to-child transmission (MTCT) of HIV through breastfeeding, pregnant women with HIV have been encouraged to make a fully informed decision about the best way to feed their infants [2]. Voluntary counseling and testing (VCT) of HIV is the first step to make such a decision by helping pregnant women know their HIV status [3]. Previous studies have confirmed that decisions about infant feeding are influenced by mothers' knowledge of their HIV status at the time of giving birth [4-5].

The acceptability of HIV testing has ranged from 35-100% and the factors that influence the acceptability have varied across studies [5-11]. Acceptance of HIV testing was positively influenced by available treatment options [11-13] and counseling services [7], universal testing [14-15], as well as perceived obligatory test [16]. Women who perceived it easy to talk about HIV testing to their partner [17], contemplated taking an HIV test before they became pregnant [9], and have been tested previously [5, 8, 17] were also more likely to intend to have a prenatal HIV test. The reasons most frequently cited for not receiving a test offer were fear of HIV/AIDS [8, 18], no perceived risk of getting HIV [5], and spousal consent [5, 8], while that for accepting a test offer was desire to prevent MTCT [5]

The rate of actual testing and returning for the test results has had an even higher variability than just accepting the test offer (1.7% to 95%) [7-9, 19-21]. Failure to return for

test results was associated with a high perceived risk for HIV infection and confirmed positive test results [7-8, 20-21]. Partner or family's disapproval of testing, being in the last trimester of pregnancy [8, 22], fear of violence in the event of disclosure of seropositive HIV status [23], and transportation or financial difficulties [8, 24] were also reported as reasons not to take the test or return for test results. History of being tested previously, however, was correlated with higher rate of actual test [7, 19].

Recent data on the prevalence of HIV have shown clearly that HIV is reaching epidemic proportions in Ghana. The National AIDS/STD Control Program and the Ghanaian Ministry of Health estimated that about 3% of the entire adult population was infected with HIV in 2001 [25]. There may be up to one million HIV-infected people by 2009 [26]. About two-thirds of the reported AIDS cases in Ghana are among adult females. Although 15% of HIV transmission occurs through MTCT [26-27], there is little documentation of the use of the HIV counseling and testing services by pregnant women. This theory-based study was conducted to examine the intentions of Ghanaian pregnant women to use prenatal voluntary HIV testing and the factors influencing their intentions.

Methods

Study site

The study was conducted in two polyclinics with the greatest number of pregnant women attending antenatal clinics (ANC) in Accra, Ghana: Mamprobi and Kaneshie. Both clinics offered a full range of antenatal care four days per week. Mamprobi polyclinic also had a maternity ward to attend normal deliveries at the time of study. Pregnant women attending Kaneshie polyclinic were referred at the 34th week to private midwives, other polyclinics, or hospitals for delivery.

Sample selection

No fixed sampling frame was available therefore the sample size of 377 was calculated using a standard sample size equation [28] based on proportion of pregnant women, pregnancy outcome, and live births that received antenatal care in the Greater Accra Region [29-31] with a 0.05 level of precision and 95% level of confidence. Twice weekly from June to August 2002, every third woman placing her antenatal card on the registration desk in the ANC at each polyclinic was invited to the interview. An over-sampling assumed a rate of 10% incomplete questionnaire. Out of 598 women selected and qualified (18 - 49 y) for the study, 414 enrolled in the study and 403 completed the survey; 10 women refused to participate and 174 women left the clinic before they were approached for an interview. The sample was recruited proportionally from the two polyclinics according to the size of the patient population: 60% from Mamprobi and 40% from Kaneshie.

Survey instrument

Conceptual framework

The study was based on the integration of three theories to identify the determinants of the behavioral intentions of interest: Theory of Reasoned Action (TRA), Theory of Planned Behavior (TPB), and Health Belief Model (HBM) (Figure 1). All three theories assume that people reason out the consequences of their behavior based on the belief system formulated through a rational examination of available information. The TRA examines the effects of attitudes (one's positive or negative evaluation of the expected results of a certain behavior) and subjective norms (one's perception about the social pressure to perform or not to perform a behavior) on intentions, which are immediate determinants of the subsequent behavior under volitional control [32-33]. The TPB, an extension of the TRA, encompasses

perceived behavioral control (one's perception that one has ability – skills, resources, or opportunities - to perform a given behavior) as one function of behavioral intentions and the subsequent behaviors. By adding the perceived behavioral control to the TRA, the TPB increases the predictability of behavioral intentions and the actual behaviors that are influenced by external factors or the perception about external factors [34]. The HBM focuses on examination of health behavior and threat perception [35-36]. From the HBM perspective, one's behavioral decision is formulated by a systematic evaluation of relative efficacy and cost of a disease preventive behavior balanced by the perceived threat of disease. The intention to carry out a recommended preventive behavior is influenced by internal or external cues to action, which lead to behavior change [37-39]. Taken together, the unique constructs from these three theories were used to examine the factors that influence intentions of prenatal voluntary HIV testing among Ghanaian pregnant women.

Instrument development

A draft of the survey instrument was developed based on the questionnaire used in Ndola Demonstration Project (NDP) in Zambia by Horizons as well as other surveys on knowledge, attitudes, and practices about HIV/AIDS and MTCT [40]. The questionnaire was modified to include factors, identified through pilot focus group discussions, that influence women's intentions to have prenatal HIV testing as well as that determine their infant-feeding decisions.

The final survey instrument consisted of seven sections: (1) sociodemographic characteristics of study participants; (2) current antenatal care and obstetric history; (3) past infant-feeding history; (4) intention regarding infant-feeding; (5) knowledge and attitudes about HIV/AIDS; (6) intention about prenatal HIV testing; and (7) opinions about MTCT.

Determinants of intentions about infant feeding and VCT were indicators of the constructs from the conceptual model; the constructs were defined as follows:

- Intention: willingness to have a prenatal HIV test voluntarily
- Attitude: evaluation of expected results of having a prenatal HIV test
- Subjective norm: perceived social pressures/support about having a prenatal HIV test
- Self-efficacy: perceived belief about ability to have a prenatal HIV test
- Locus of control: perceived belief about source of control over having a prenatal HIV test
- Perceived severity: perceived belief about the seriousness of HIV
- Perceived susceptibility: perceived belief about the likelihood of getting HIV
- Cues to action: factors that activate one's readiness to adopt behavior
- Past behavior: experience of having been tested for HIV

Each of these constructs was measured using two to five questions on a five-point Likert scale, except past behavior and cues to action. Past behavior was measured by a single yes/no question and cues to action was measured by summing the positive answers (yes=1) of dichotomous responses of whether the woman had any illness during the current pregnancy, knew anybody with HIV/AIDS, previously discussed personal risk or concerns about HIV/AIDS with anyone, and was afraid that her baby might get HIV. After face and content validation of the developed questionnaire, the instrument was verbally translated to local languages (Twi and Ga) by six field assistants. Then, validity of translation in each language was checked by back translation of questionnaire into English by two individuals who were not familiar with the study.

Data collection

Once a participant was selected for an interview, she was called to a designated interview area at the clinic and screened for her age (18-49 years) and the term of pregnancy. She was provided with information regarding the survey and either signature or thumbprint was obtained before the interview began as a proof of informed consent. The field staff then interviewed the woman in the language of her choice (Twi, Ga, or English) using the structured questionnaire. For quality control purposes, the survey was reviewed right after completion to check the consistency and completeness of responses. When the questionnaire was incomplete or there were responses contradictory to each other, the interviewer asked those questions again. At the end of each week, the questionnaires were reviewed and edited by another interviewer for coding. Approval to conduct the study was obtained from the Iowa State University Institutional Review Board for the Protection of Human Subjects and the Ghanaian Ministry of Health.

Statistical analysis

This paper presents only information related to knowledge and attitudes about HIV/AIDS and intention about prenatal HIV testing and its determinants. Additional information collected on infant feeding is presented elsewhere. Descriptive statistics were used to summarize (1) participant characteristics, (2) knowledge and attitudes about HIV/AIDS and MTCT, and (3) intentions and influencing factors of prenatal VCT. The chi-squared statistic was used to compare knowledge and attitudes of those intending and not intending to have prenatal VCT.

Logistic regression analysis was then used to predict Ghanaian pregnant women's intention to have prenatal VCT from variables reflecting attitudes, subjective norms,

perceived behavioral control, perceived susceptibility/severity of disease, cues to action and past behavior. The relative contributions of these variables to predict intenders of prenatal VCT were measured as odds ratios. Due to the strong predictive power of these theory constructs, other variables (such as, socioeconomic status) did not stay in the model. To identify other characteristics of prenatal VCT intenders, another logistic regression analysis with forward stepwise selection was used excluding theory constructs. All statistical analyses were performed using SAS 8.2 (1999-2001, SAS Institute Inc., Cary, NC) software and $p < 0.05$ was used as the standard for statistical significance.

Results

Characteristics of participants

Summary characteristics of 403 pregnant women attending antenatal care in Kaneshie and Mamprobi polyclinics, Accra, Ghana are shown in Table 1. Fifty-six percent of participants were in their third trimester and 38% were in the second trimester. Only 51% had planned the current pregnancy and 37% were primiparous. Even though they lived in an urban area, more than one-third of participants did not have piped water or toilet in their compounds. The majority stayed in one bedroom rented place and used charcoal or kerosene for cooking. The average amount of money spent to purchase food per person per day was less than 8000 cedis (\cong US \$1) among 51% of participants. Almost all women (95%) had an occupation, but 42% women did not work at the time of survey.

Knowledge and attitudes about HIV/AIDS

Most participants could name sexual intercourse (95%) and sharing a sharp instrument like a blade or needle (81%) with an HIV-positive person as a mode of HIV transmission. However, participants who could spontaneously mention blood transmission or

MTCT as one of transmission routes were only 12% and 3%, respectively. When prompted with the responses, the proportion of pregnant women who believed that a mother could give the virus to the baby during pregnancy or through breastfeeding was 94% and 86%. Most participants (84%) believed that an HIV-positive pregnant woman would always infect her unborn baby. When the participants were asked about ways to reduce the baby's chance of getting HIV had they been tested positive, 40% of participants indicated that MTCT could not be avoided and another 14% did not know how to prevent MTCT. About 24% and 9% of participants believed that taking medicines and giving no breast milk would reduce their chances of transmitting HIV to their baby, respectively. About 11% said they would seek advice from health care workers.

More than one-third of the participants also indicated that a person could get infected with HIV through mosquito or insect bites (35%) or through evil spirits (38%). Perceived prevalence of HIV was high in this group; at a median of 20% in the general public and 10% among pregnant women. Nonetheless, only 45% had ever discussed their personal risk or concern about HIV with someone and more than 83% believed that they had no risk of getting HIV during the next 12 months, primarily because of their monogamous relationships. Most women (82%) learned about HIV/AIDS from mass media such as radio (42%) or television (40%), while only 4% of them reported that health professional as the main source of information about HIV/AIDS.

Knowledge and attitudes about prenatal HIV testing

Participants had mixed feelings about prenatal HIV testing. Almost all the participants believed that having an HIV test before delivery could help her know her health status, and to get proper care for herself as well as her baby if she had been tested positive.

On the other hand, about 60% of them indicated that HIV testing would cause emotional distress and waste money that could be used for something else. One-third (35%) of the participants also thought that having a test itself could stigmatize her. Only 4% indicated that the test results could be kept private when a person tested positive. About 77% and 58% of women believed that a positive test result should be available to the family and spouse/partner, respectively.

Table 2 shows participants' belief regarding VCT of HIV and HIV itself. Participants generally showed positive attitudes and strong subjective norms about a prenatal HIV test. Fifty-six percent of the participants perceived that their spouse/partner would approve their having a prenatal HIV testing, but 16% believed that they would disapprove. Health care workers were perceived to be supporters of HIV testing by 16% of the participants, while 18% regarded their friends and neighbors as possible opponents. Unlike their perceived locus of control, which was relatively high, perceived self-efficacy was low.

Previous HIV testing

Only 8% of participants (n=31) had had a HIV test previously. All but one of them received the results and shared the result mainly with their spouse/partner. Pre-counseling was given to 74% of those who had been tested and post-counseling to 70% of those who received the test results at the teaching hospital or other locations. Forty-two percent took the test before their marriage and 23% took it because of sickness or health professionals' recommendation. Almost twice as many spouses (n=64) as participants had had an HIV test.

Intentions and determinants of intentions regarding prenatal HIV testing

Thirty-seven percent of the participants had heard of prenatal VCT. Even though 87% believed that prenatal HIV testing should be mandatory, only 28% intended to be tested

voluntarily. However, most women (96%) indicated that they would be tested if a health care professional requested it.

The bivariate analyses showed that women who agreed with universal testing of the people, pregnant women, and prostitutes were more likely to intend to have a prenatal HIV testing. Those with favorable attitudes toward VCT of HIV, knowledge about prevention of MTCT, faith that God could protect from getting HIV no matter what, or that HIV could be cured by taking medicine or nutritious foods at the initial stage of infection, had a stronger intention to have a test. Those who believed HIV/AIDS was, however, a spiritual disease had a lower intention to have a test.

The results of logistic regression analyses predicting intenders of prenatal HIV testing are presented as odds ratios in Table 3 and 4. The intention of Ghanaian pregnant women about prenatal voluntary HIV testing was best predicted by their self-efficacy score (Table 3). As self-efficacy increased one unit in the five points Likert scale, their intention to have a prenatal HIV test increased 6.5-fold. Those who had previously taken an HIV test were 80% less likely to intend to have another test during the current pregnancy. Self-efficacy of taking prenatal voluntary HIV test was higher when the women had strong subjective norms (OR=1.95), high-perceived risk of getting HIV (OR=1.53), and low perceived severity of HIV (OR=0.75) in this population.

A second logistic regression model also identified several sociodemographic and knowledge factors that predicted intention of having a prenatal voluntary HIV testing without controlling for perceptions including self-efficacy (Table 4). Intention was significantly higher among pregnant women who spent most of their life in the coastal region, where the prevalence of HIV was higher. Participants, who wanted an implementation of universal

testing and who mistakenly believed AIDS as a curable disease at the initial stage of infection by taking medicine and nutritious foods, were significantly more likely to intend to test. On the contrary, intention of a prenatal HIV testing was significantly decreased as the pregnancy advanced and the number of children increased. Those who believed that HIV could be transmitted through evil spirits and that HIV-positive people should be allowed to have a baby were considerably less likely to intend to take a prenatal HIV test.

Discussion

Participants of this study generally had a high knowledge about MTCT compared to other studies conducted in Ghana or in other countries, but misconceptions about HIV transmission routes including insect bites and evil spirits were still common [10, 19, 31, 41]. Lack of knowledge about the prevention methods of MTCT was evident and this was strongly associated with a lower intention of having a prenatal voluntary testing, as has been noted by other studies [10, 13, 17]. This study showed Ghanaian pregnant women had “unrealistic optimism” regarding HIV/ AIDS [42]; they believed that it was a serious disease and prevalent in their neighborhoods, but they believed that it had nothing to do with them since they were faithful to their spouse. Unlike the results from the 1998 GDHS where almost one half of the subjects considered themselves to be at risk, only 17% of the participants of the current study felt that they had some risk of getting HIV [31]. This might be due to the higher proportion of married women in our study participants (71.7%) compared to 1998 GDHS (52%).

The results of this study also clearly showed that health care workers could play an important role in the acceptance of VCT as one component of MTCT prevention. Even though only one quarter of participants would have a prenatal HIV testing of their own free

will, almost all of the participants intended to have a test if a health care worker asked them to do so. The intention of having a prenatal voluntary HIV testing among the Ghanaian pregnant women was well predicted by self-efficacy, as shown in many HIV preventive behavior studies [43-45]. This might explain the discrepancy between the acceptance rate and actual HIV testing rate in the previous studies [8, 20, 46]; pregnant women might agree to testing due to the perceived pressure from the health professionals in the clinic, but those with low self-efficacy would not come back for the test, resulting in a low test rate [16]. Previous studies proposed that a long asymptomatic latent period of HIV along with limited transmission routes decreased the perception of susceptibility [42, 47]. When this was coupled with high perceived severity of the disease, people were less likely to adopt preventive behavior. Similar results were seen among Ghanaian pregnant women; perceived low susceptibility and high severity in combination with low self-esteem and low subjective norms were associated with a lower likelihood to have a test. In the absence of a cure or accessible treatment options, high perceived severity of the disease may only increase the level of stress and not motivate action. When these women did not perceive themselves at a high risk and did not receive strong support to take the test, low self-efficacy may have limited their attempt to overcome the barriers of HIV testing which resulted in low intention [48-49].

According to earlier studies, acceptability of HIV testing among pregnant women was significantly higher among those who have been tested previously [5, 9, 19]. However, the participants who previously had an HIV test in this study were considerably less likely to plan a prenatal voluntary HIV testing. This might be due to misinterpretation of the negative result of HIV testing. Indeed, one quarter of the participants believed that if she tested

negative, she would be free from HIV for six months. Another possible explanation may be that they tested negative previously and perceived their life-style to be at no risk of getting HIV, thereby they had no plan of having another test during the current pregnancy.

The interpretation of these results is limited due to several factors. The two clinics where we collected the data were located in western Accra. Thus, our sample might not truly represent pregnant women in Accra. Also, a cross-sectional survey of sensitive issues like HIV/AIDS and MTCT of HIV using in-person interview might have influenced participants' responses. For example, our sample indicated far lower perceived risk of getting HIV than those in 1998 GDHS survey. This might be due to the nature of a face-to-face interview in the clinic where they received antenatal care regularly. In addition, we measured pregnant women's intentions, which were hypothetical and could be changed by many other factors. Therefore, actual acceptance of prenatal HIV testing could be different.

In conclusion, only 28% of Ghanaian pregnant women intended to have prenatal voluntary HIV testing, but health professional's request would have increased the intention to 96%. Their intention about voluntary testing was well predicted by self-efficacy about the testing and HIV testing history. Pregnant women's knowledge about HIV/AIDS was higher than before, but misconceptions about HIV/AIDS and MTCT were still prevalent. Considering the situation, an 'opt-out' approach of HIV testing, in which all women are tested unless they specifically choose to not be, accompanied with pretest counseling would increase the acceptability of VCT. Pretest counseling should focus on rectifying the misconceptions regarding MTCT, educating on prevention methods of MTCT, and increasing positive attitude toward the prenatal VCT. Also, educational efforts must be intensified to raise self-efficacy of pregnant women regarding VCT of HIV as a mode of

prevention of MTCT, by increasing social supports for VCT, possibly through the leaders of the communities, and decreasing unrealistic optimism regarding HIV.

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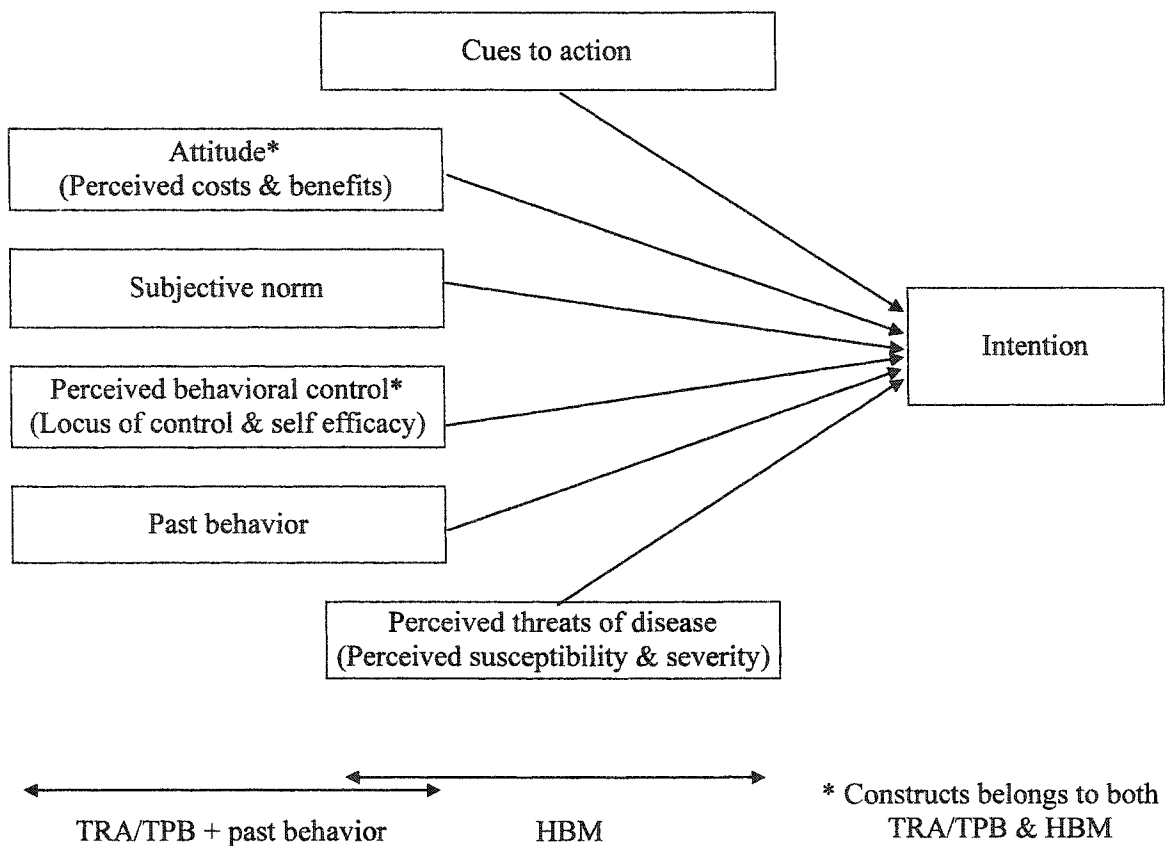


Figure 1. A proposed model based on the TRA, TPB, and HBM

Table 1. Sociodemographic characteristics of participants (N=403)

Characteristics of participants	Number ^a	Percent
Age (y)		
<21	33	8.2
21-25	133	33.0
26-30	148	36.7
≥31	89	22.1
Ethnicity		
Akan	219	54.3
Ga/Adangbe	93	23.1
Ewe/Guan	66	16.4
Others	25	6.2
Region the participant spent most of her life		
Coastal (including Accra)	290	72.0
Other	113	28.0
Marital status		
Married: living with spouse	289	71.7
Married: not living with spouse	27	6.7
Living with a man	50	12.4
Never married/not living with a man/divorced	37	9.2
Level of education ^b		
None/primary entered	54	13.4
Primary completed/JSS entered	74	18.4
JSS completed/SSS entered	203	50.4
SSS completed/higher	72	17.9
Usual profession		
None/housewife/student	19	4.7
Trader/market seller	185	45.9
Vocational worker ^c	173	42.9
Office worker	26	6.5
Religion		
Christian	373	92.6
Muslim/Other/None	30	7.4
Characteristics of family		
House ownership		
Owned by participant/head of household	28	7.0
Owned by family/relatives/employer	123	30.5
Rented from a landlord	252	62.5

Table 1. Sociodemographic characteristics of participants (continued)

Characteristics of participants	Number ^a	Percent
No. of rooms for sleeping		
1	273	67.7
≥2	130	32.3
Type of toilet most members of family use		
Water closet	108	26.8
Other (Ventilated improved pit/latrine/traditional pit)	153	38.0
Commercial/no facility	142	35.2
Main source of drinking water		
Piped water in house	238	59.1
Commercial tap/public tap/sachet	164	40.7
Rain	1	0.2
Main cooking fuel		
Electricity/Gas	145	36.0
Charcoal/kerosene	258	64.0
Family income/person/day (cedis ^d)		
≤3000	61	16.1
3001-5000	66	17.5
5001-8000	66	17.5
8001-10000	62	16.4
>10000	123	32.5
Money spent for foods/person/day ^e (cedis)		
≤3000	56	14.1
3001-5000	148	37.3
5001-8000	108	27.2
8001-10000	53	13.4
>10000	32	8.1

^aNumber of participants varies due to missing values.

^bJunior Secondary School (JSS) and Senior Secondary School (SSS) are equivalent to middle and high school in the U.S.

^cVocational worker includes hairdresser, seamstress, and caterer.

^d\$1 ≅ 7900 cedis

^eA few women reported higher amount of money spent for foods/person/day than family income/person/day because they included foods they received regularly from extended family members or they used their savings to buy foods.

Table 2. Participants' belief regarding prenatal voluntary testing of HIV

Perceptions	Mean±SD ^a	% women with responses ^b		
		Negative	Neutral	Positive
<i>Attitudes</i>				
Having an HIV test during this pregnancy is				
Enjoyable ^c	3.61 ± 1.78	33.3	1.0	65.8
Beneficial	4.68 ± 0.99	6.7	0.0	93.3
Valuable	4.62 ± 1.06	7.9	0.5	91.6
Good	4.73 ± 0.90	5.2	0.0	94.8
Necessary	4.65 ± 1.07	8.2	0.0	91.8
<i>Subjective norms</i>				
Most people who are important to you think you should have an HIV test during this pregnancy.				
	3.60 ± 1.78	30.6	6.0	63.4
The people whose opinions you value would approve your having an HIV test during this pregnancy.				
	3.57 ± 1.80	32.1	4.0	63.9
Most people who are important to you had an HIV test.				
	1.79 ± 1.19	71.2	18.6	10.3
<i>Self-efficacy</i>				
It is possible for you to have an HIV test during this pregnancy.				
	2.53 ± 1.77	58.3	5.2	36.5
You could have an HIV test during this pregnancy.				
	2.78 ± 1.85	52.6	2.7	44.7
<i>Locus of control</i>				
It is mostly up to you whether or not you have an HIV test during this pregnancy.				
	4.05 ± 1.46	23.1	1.2	75.7
You believe you do have control over having an HIV test during this pregnancy.				
	4.25 ± 1.32	18.4	0.5	81.1
<i>Perceived severity of HIV</i>				
	1.24 ± 0.64	5.3	1.8	93.0
<i>Perceived susceptibility of getting HIV</i>				
	4.73 ± 0.87	95.4	2.6	2.1
<i>Cues to action^d</i>				
	2.90 ± 0.98	37.5	36.0	26.6

^a Mean ± standard deviation was measured on a 5-point Likert scale

- Attitudes, subjective norms, self-efficacy, locus of control; 1=strongly disagree to 5=strongly agree

- Perceived severity of HIV; 1=not serious at all to 5=very serious

- Perceived susceptibility of getting HIV and cues to action: 1=none to 5=very high

^b Subjects who chose 1 or 2 on a 5-point Likert scale were categorized negative, 3 as neutral and 4 or 5 as positive

^c The main reasons pregnant women stated that it was enjoyable included (1) "The test would tell me my HIV status and how to live depending on the status: in case of HIV infection, I could protect my baby from getting the virus and a doctor would take care of me" and (2) "I knew I am HIV-negative. That's why it's enjoyable to do the test since I can confirm that I don't have the disease".

^d Cues to action was measured by combining dichotomous responses of whether she had any illness during pregnant, knew anybody with HIV/AIDS, discussed personal risk or concerns about HIV/AIDS with anyone, and was afraid that her baby might get HIV (1=none to 5=yes to all four questions).

Table 3. Logistic regression predicting Ghanaian pregnant women's intention about having prenatal voluntary HIV testing using constructs from the conceptual model

Perceptions	Odds ratio	95% confidence interval	
		Lower CI	Upper CI
Attitudes	0.83	0.45	1.54
Subjective norms	1.03	0.72	1.47
Self efficacy	6.47	4.02	10.41
Locus of control	0.85	0.62	1.15
Perceived severity of HIV	0.67	0.42	1.07
Perceived susceptibility of getting HIV	0.81	0.50	1.31
Cues to action	1.25	0.85	1.84
Past behavior: had been tested for HIV previously			
Yes	0.17	0.04	0.67
No			

Table 4. Logistics regression predicting Ghanaian pregnant women's intention about having prenatal voluntary HIV testing among sociodemographic and attitudinal factors ^a

	Odds ratio	95% confidence interval	
		Lower CI	Upper CI
<i>Obstetric and SES characteristics</i>			
Month of pregnancy	0.85	0.74	0.97
Number of children	0.76	0.60	0.96
Region the participant spent most of her life			
Coastal (including Accra)	2.02	1.12	3.64
Other			
House ownership			
Owned by participant/head of household	2.79	1.11	6.99
Owned by family/relatives/employer	0.77	0.44	1.34
Rented from a landlord			
<i>Knowledge and Opinions about HIV/AIDS</i>			
HIV is transmitted though evil spirits			
Yes	0.59	0.35	0.99
Don't know/not sure	0.11	0.02	0.54
No			
All people should be tested as a requirement			
Yes	3.54	1.78	7.03
No			
At the initial stage of infection, you can cure AIDS by taking medicine and nutritious foods			
Yes	3.19	1.53	6.67
No			
People with HIV can also have a baby			
Yes	0.52	0.31	0.88
No			

^a Odds ration was measured by logistic regression with forward stepwise selection; Due to the strong predictive power of theory constructs, which drops all the SES and attitudinal variables from the regression model, this regression was run excluding theory constructs.

CHAPTER 5. KNOWLEDGE, ATTITUDES, INTENTIONS, AND INFANT-FEEDING PRACTICES AMONG GHANAIAI MOTHERS

A paper to be submitted to *Social Science and Medicine*

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Abstract

Objectives: The specific aims of this study were to examine 1) Ghanaian pregnant women's perceptions and intentions about exclusive breastfeeding and formula feeding and 2) the relationship between their intentions and actual feeding behaviors.

Design and Methods: A systematically selected 403 women attending antenatal clinics in Accra, Ghana was interviewed using a theory-based, structured questionnaire. Then 41 purposely selected participants were followed-up three times (prepartum, 1wk postpartum, 1mo postpartum) to identify in-depth information about their perception and actual feeding behaviors.

Results: The majority of participants knew exclusive breastfeeding is recommended for 6 months, but a little more than one half of them intended to exclusively breastfeed their infants for the first six months mainly due to their perception of insufficient breast milk to satisfy the baby. Most participants were aware of protective power of breast milk especially in early life, thereby favored exclusive breastfeeding, compared to formula feeding. They reported, however, a limited knowledge about the maternal benefits of breastfeeding. Intentions of both exclusive breastfeeding and formula feeding during the first month were well predicted by self-efficacy, followed by attitudes toward each feeding method. Out of 41 follow-up study participants, 39 reported to breastfeed their infants exclusively, but 7 infants were already introduced non-breast milk items such as plain water, koko, honey, and cod

liver oil. Those who introduced liquids/semi-solid foods had a lower intention, less favorable attitudes, and weaker locus of control about exclusive breastfeeding prenatally. No one introduced formula during the first month.

Conclusions: An infant-feeding education program should reinforce exclusive breastfeeding promotion by increasing self-efficacy of the mothers regarding exclusive breastfeeding and educating maternal benefits of breastfeeding to increase the positive attitudes toward exclusive breastfeeding. A special education program incorporating hygienic preparation of formula should be developed for HIV-positive women to make a fully informed decision.

Introduction

The benefits of exclusive breastfeeding during the first six months of infants' life have been well documented in terms of lower morbidity and mortality related to infectious disease (Georgeson & Filteau 2000; UNICEF/UNAIDS/WHO 1998; Van de Perre, Simonon, Hitimana, Dabis, Msellati, Mukamabano et al., 1993; WHO Collaborative Study Team 2000; Work Group on Breastfeeding 1997). However, with reliable evidence of mother-to-child transmission (MTCT) of human immunodeficiency virus (HIV) through breastfeeding (Bertolli, St. Louis, Simonds, Nieburg, Kamenga, Brown et al., 1996; Datta, Embree, Kreiss, Ndinya-Achola, Braddick, Temmerman et al., 1994; De Martino, Tovo, Tozzi, Pezzotti, Galli, Livadiotti, Caselli et al., 1992; Dunn, Newell, Adex, & Peckham, 1992; Ekpini, Wiktor, Satten, Adjorlolo-Johnson, Sibailly, Ou et al., 1997; European Collaborative Study 1992; Leroy, Newell, Dabis, Peckham, Van de Perre, Bulterys et al., 1998; Miotti, Taha, Kumwenda, Broadhead, Mtimavalye, Van der Hoeven et al., 1999; Nduati, John, Mbori-Ngacha, Richardson, Overbaugh, Mwatha et al. 2000) and the consensus that the risk of postnatal transmission increases with duration of breastfeeding (Bobat, Moodley, Coutsoodis,

& Coovadia, 1997; Datta et al., 1994; De Martino et al., 1992; Ekpini et al., 1997; Leroy et al., 1998; Miotti et al., 1999; Richardson, John, Hughes, Nduati, Mbori-Ngacha, & Kreiss, 2000), the United Nations Programme on HIV/AIDS (UNAIDS), with the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF) recommended 'informed choice' of infant-feeding methods by HIV-positive mothers (UNAIDS/WHO/UNICEF, 1997; WHO/UNAIDS /UNICEF, 1998; WHO Technical Consultation, 2001). Pregnant women infected with HIV need to be given the currently available information regarding the risks and benefits of each feasible infant-feeding option to make a specific choice of infant-feeding methods. This recommendation has sparked much debate about the risks and benefits of introducing a breast milk substitute to infants born to HIV-positive women in all resource-poor countries (Andiman, 2002; Giugliani, 2002; Humphrey & Iliff, 2001; Weinberg, 2000): Unlike the resource-rich settings, where breast milk substitutes are readily available, safe, and commonly used, breastfeeding is not only the sociocultural norm, but also one of the most effective and practical childcare options (Andiman 2002; Kriebs, 2002). Further debate arose when Coutsooudis and colleague (1999) reported that the estimated proportion of HIV infection among exclusively breastfed infants was significantly lower (14.6%) than that among mix-fed infants (24.1%) and even formula-fed infants (18.8%) by three months of age. Even though the proportion of HIV transmission by the end of 15 months follow-up was higher among exclusive breastfed children (24.7%) than never breastfed children (19.4%), it was still lower than that of mix-fed children (35.9%) (Coutsooudis, Pillary, Kuhn, Spooner, Tsai, & Coovadia, 2001). Consequently, when alternative feeding is not 'acceptable, feasible, affordable, sustainable, and safe', WHO advised HIV-positive mothers to breastfeed their infants exclusively at least during the first

months of babies' life, followed by early abrupt cessation of breastfeeding' (WHO Technical Consultation, 2001).

Recent data on the prevalence of HIV have clearly shown that HIV is becoming one of the most serious health problems in Ghana: The National AIDS/STI Control Program and Ministry of Health (2001) estimated that about 3% of the entire adult population of the country is infected with HIV. Also HIV infection became the second leading cause of death of both males and females aged 15 to 44 years (Gyapong, Tachie, & Nutakor, 2002). Like other sub-Saharan African countries (UNAIDS/WHO, 2002), the infection among females outnumbered males two to one and MTCT accounts for over 90% of HIV infection among children in Ghana (Gyapong, Tachie, & Nutakor, 2002). A long duration of mix feeding which is believed to increase the vertical transmission of HIV is widespread in Ghana in recent studies; almost all children were breastfed for a median duration of 21.5 mo, regardless of socioeconomic or demographic characteristics of mothers, yet exclusive breastfeeding was relatively uncommon after two months (Ghana Statistical Service & Macro International, 1994; Ghana Statistical Service & Macro International, 1999). Even though breastfeeding is universally practiced and exclusive breastfeeding is strongly recommended, Ghanaian pregnant women's perceptions about exclusive breastfeeding have not been well documented yet. Also, there is little information available about their perceptions toward alternatives to breast milk that can be introduced when breastfeeding is not recommended. The objectives of this study were to examine Ghanaian pregnant women's perceptions and intentions about exclusive breastfeeding and formula feeding and to examine the relationship between their intention and actual feeding behavior.

Method

Main survey

Participant selection and data collection

Details of the study method were reported elsewhere (VCT study). In brief, pregnant women aged 18 to 49 years old who attended Kaneshie or Mamprobi polyclinics for their antenatal cares. The interviews were conducted using a pre-tested, structured questionnaire in the language of choice by participants (Twi, Ga, or English) in a designated area at the clinics. During our twice-weekly visits to each polyclinic from June to August 2002, 598 pregnant women were eligible to participate in the study and 403 of them completed the survey; 174 left the clinic before the interview, 10 refused to participate, and 11 did not complete the survey.

Survey instrument

Conceptual framework

The study was based on the integration of three theories to identify the determinants of infant-feeding intention among Ghanaian pregnant women: Theory of Reasoned Action (TRA), Theory of Planned Behavior (TPB), and Health Belief Model (HBM) (Figure 1). The fundamental assumption underlying these theories is that people generally behave in a rational manner by using available information and understanding the implications of their behaviors. According to the TRA, information or salient beliefs affect behavioral intentions through attitudes toward the behavior, a person's positive or negative evaluation of the expected results of a certain behavior, and/or through subjective norms, a person's perceptions about social pressure to perform or not to perform a behavior (Ajzen & Fishbein 1980; Fishben & Ajzen 1975).

The TPB, proposed by Ajzen (1991), is an extension of TRA that incorporates one's perceptions of the easiness of performing a behavior, called perceived behavioral control, as one determinant of behavioral intentions and the subsequent behaviors. When the behavior of interest is not under the volitional control due to lack of requisite opportunities and resources such as time, money, skills, and cooperation of others, perceived behavioral control is expected to increase the predictability of the intention and/or the behavior significantly (Ajzen, 1991).

As a value-expectancy model, HBM focuses on threat perception and behavioral evaluation of individual's health and health behavior as its components - perceived susceptibility and severity of disease as well as perceived benefits and barriers (Glanz, Lewis, & Rimer, 1997; Rosenstock 1974). HBM claims that internal and/or external stimuli, called cues to action, are also required to make one actually perform the appropriate health behavior (Janz & Becker, 1984; Maddux & DuCharme, 1997; Sheeran & Abraham, 1996).

Previous researches showed that TRA, TPB and HBM shared functional similarities and the significant proportion of behavioral intentions and the actual behaviors are well explained by these theories (Maddux & DuCharme, 1997; VanLandingham, Suprasert, Grandjean, & Sittitrai, 1995; Wulfert, Wan, & Backus, 1996). For example, Maddux and DuCharme (1997) stated that outcome expectancy, a person's beliefs about the consequences of some behavior, appeared as perceived benefits and costs in the HBM, while attitudes toward behavior components represented it in the TRA/TPB. One's ability to perform a behavior is termed as self-efficacy in HBM, whereas it is labeled as perceived behavioral control in TPB. Therefore, this study utilized the unique components of three theories - attitudes, subjective norms, perceived behavioral control, perceived susceptibility/severity of

disease, cues to action, and past behavior - to examine the determinants of the infant-feeding intention of Ghanaian pregnant women. Perceived susceptibility and severity of HIV/AIDS, which were regarded as a part of attitudes toward behavior by some researchers (Maddux & DuCharme, 1997; VanLandingham et al., 1995; Wulfert et al., 1996) were included separately in this study to measure their influence on Ghanaian women's perceptions and intentions about infant-feeding decisions.

Instrument development

A questionnaire was drafted from questions used for other studies on the MTCT of HIV (Horizons, 2000) and modified for this study with salient beliefs of the study population collected through focus group discussions. The survey instrument included question about sociodemographic and obstetric characteristics of the participants, infant-feeding history, and intentions about and determinants of exclusive breastfeeding and formula feeding.

After the content validation of the questionnaire, the survey was pilot tested twice with a group of laywomen and pregnant women attending Kaneshie polyclinic. The questionnaire was then translated into two local languages (Twi and Ga) and back-translated before being used for the survey. Approval to conduct the study was obtained from the Iowa State University Institutional Review Board for the Protection of Human Subjects and the Ghanaian Ministry of Health.

Statistical analysis

Descriptive statistics (percentage, mean \pm SD) were used to summarize 1) characteristics of the study participants, 2) previous infant-feeding experience, 3) salient beliefs about exclusive breastfeeding and formula feeding, and 4) perceptions regarding the two feeding methods. Analysis of variance was used to examine the duration of exclusive

breastfeeding and total breastfeeding by the characteristics of the study participants. Chi-squared analyses were also used to identify the characteristics of previous formula users, formula feeding intenders, as well as exclusive breastfeeding intenders during the first month. Ghanaian pregnant women's intentions to feed only breast milk and to introduce formula during the first month were tested with multiple regression analyses. The predictability of each theory construct was measured using standardized beta coefficients. Since there was no difference in coefficients of the constructs after controlling for age and the level of maternal education, the standardized coefficients were measured without controlling for those two factors. All statistical analyses were performed using SAS 8.2 (1999-2001, SAS Institute Inc., Cary, NC) software and p -value < 0.05 was used, unless indicated, as the standard for statistical significance.

Sub-sample follow-up

Participant selection

To develop a better understanding of perceptions and intentions that could be changed during the course of pregnancy and actual postpartum behaviors of infant-feeding, a sub-sample of pregnant women were recruited from the clinic survey participants. Inclusion criteria were 1) in the sixth to eighth month of pregnancy and 2) having a perceived risk of getting HIV or the intention to participate in a voluntary prenatal HIV testing. Out of 83 women who qualified, 49 women initially agreed to participate in the study; 13 refused to participate, 15 planned to deliver outside Accra, 5 could not be located due to wrong residence information, and 1 had a still-birth before the follow-up started. Three women refused to continue the participation after the first follow-up interview, 1 moved out of the

study area for delivery, 1 had a stillbirth, and 3 were dropped due to missing data, leaving a total of 41 follow-up participants.

Survey instrument

The structured questionnaire used in the clinic survey was modified to be a semi-structured open-ended questionnaire for the first prenatal follow-up to provide more insight about their perceptions regarding infant feedings. Those questions adapted were attitudes, subject norms, perceived behavioral controls, perceived threats to disease, and intentions regarding exclusive breastfeeding and formula feeding within one month of delivery. The second and third follow-up questionnaires consisted of questions about maternal and child health status and detailed infant-feeding practices. The second follow-up questionnaire also included a 13-item breastfeeding checklist, measuring body positioning of mothers and suckling of infants.

Data collection

A field worker visited a participant's home between four to six weeks after the interview at the clinic. The purpose of the follow-up study was explained and written consent was obtained. For the confidentiality of the participants, the interview was conducted in a secluded area away from family or neighbors, if there was any in the house. The first interview lasted up to two hours.

The second follow-up interview was conducted either at home or in a clinic five to seven days after the infant's birth. A scheduling staff contacted participants by phone or visited their house twice weekly to check on the delivery status and an appropriate visiting time was arranged after the baby was born. The structured questionnaire was administered and breastfeeding practice was observed by two field workers using a 13-point body position

and suckling checklist (WHO CDD Programme & UNICEF, 1993); the visit lasted about an hour. The same field worker visited the participant at one month after the baby's birth to administer the third follow-up questionnaire.

Statistical analysis

The socioeconomic and obstetric characteristics of follow-up participants as well as the health status and feeding history of their infants were summarized (percentage and mean \pm SD). The sociodemographic characteristics and infant-feeding perceptions of exclusive breastfeeding and non-exclusive breastfeeding groups at one month were compared using chi-squared analysis with a significant level of <0.05 unless otherwise indicated using SAS 8.2 (1999-2001, SAS Institute Inc., Cary, NC) software.

Qualitative analysis

Content analysis of responses to the open-ended questions regarding their perception toward the exclusive breastfeeding and formula feeding was carried out for each construct to differentiate the baseline salient beliefs (Bernard, 1995; Portney & Watkins, 1993). The major categories of themes were identified from the transcripts without preset clusters and supporting quotes were added. Nvivo 1.3.146 (QSR International Pty. Ltd) software was used for qualitative analysis.

Results

Main survey

Characteristics of participants

The detailed characteristics of 403 participants have been presented elsewhere (VCT study). Participants were 27.4 ± 5.2 years; 70% were in their 20's. A little more than one half of participants (54%) were Akan, and one-quarter (23%) was Ga. About 91% of women

were either married or living with a partner. While 18% and 50% finished senior secondary school (SSS: equivalent high school) and junior secondary school (equivalent to middle school), respectively, 13% did not finish primary school or had no education. Over one-third of the women (39%) had lived in the current house for less than two years and 68% shared their compound with more than three households. Forty-one percent did not have piped water in the house or compound and 35% used pay-per-use commercial toilets. The majority of women first attended an antenatal clinic at the first (43%) or second (55%) trimester. Thirty-seven percent were primiparous; multiparous women (63%) had a median of two children. One-half of women (51%) had not planned the current pregnancy. Fifty percent of women had illnesses such as malaria, high blood pressure, and fever during the current pregnancy.

Previous infant-feeding experience

Infant-feeding history of the youngest child of multiparous women is shown in Table 1. Out of 238 pregnant women who had children, all but one breastfed the youngest child. The mean duration was 18.1 ± 5.7 mo (median=18 mo) with 3.7 ± 2.5 mo of exclusive breastfeeding (median=4 mo). Plain water (58%), porridge (24%), or formula (11%) was introduced as the first liquids or foods. Duration of exclusive breastfeeding was much shorter among women who worked as marketers or street sellers (3.2 mo vs. 4.5 mo), spoke Twi (3.4 mo vs. 4.3 mo) and were Akan (3.3 mo vs. 4.2 mo), compared to vocational/office workers, non-Twi speakers, and non-Akan, respectively. Compared to women whose youngest children were older than 5 y, those with children less than 5 y old were more likely to have fed only breast milk longer (2.6 mo vs. 4.4 mo). Women who had lived most of their life in the coastal region (4.1 mo vs. 2.6 mo) or had completed SSS or higher (4.8 mo vs. 3.5

mo) were also more likely to exclusively breastfeed longer than women who had spent most of their life in other region or who did not completed SSS. However, total duration of breastfeeding was significantly longer among women with no or little education (21.3 mo vs. 17.6 mo) and who were Northerners (21.9 mo vs. 17.8 mo) than women who at least finished primary school and who were non-Northerners, respectively.

A little more than one-half of the women (55%) fed formula to their youngest child and 54% of those who fed formula did so before the child was six months of age. A chi-squared analysis showed that children who were younger than 3 y old at the time of survey were significantly more likely to have been fed formula than those older than 3 y old. Among women who used formula, 64% of them with children younger than 3 y old introduced formula after 6 mo, while 79% with children older than 5 y old fed it before 6 mo. Children born to women who were Akan, had finished SSS or higher, worked as vocational or office workers were also more likely to have been fed formula.

Salient belief about exclusive breastfeeding and formula feeding

The majority of the women indicated that exclusive breastfeeding is recommended for six months (79%) and one should continue breastfeeding for at least 18 months (77%). Sixty-nine percent stated that infants should be fed on demand, but 18% indicated that an infant needs to be breastfed less than eight times per day (range: 2-7 times). Two percent also believed that infants could be fed at the mother's convenience.

Unlike the high level of knowledge about the benefits of exclusive breastfeeding to their infants, participants had poor knowledge about breastfeeding benefits for themselves (Table 2). Two-thirds of the participants did not know that exclusive breastfeeding could decrease the risk of some cancers and 20% were not aware of contraceptive effects of

exclusive breastfeeding. More than 40% believed that exclusive breastfeeding could make their breasts saggy and prevent them from working outside the home. A significantly higher proportion of women with previous breastfeeding experience knew that exclusive breastfeeding could help with child spacing and save money for the family. Compared to primiparous women or multiparous women who fed only breast milk to their youngest child, those who fed both breast milk and formula were more likely to think that breastfeeding exclusively their infants during the first month could make their breasts sore and sagged.

Attitudes toward formula feeding varied among participants. About two-thirds and one-third of participants believed that formula could make the infant bouncy (big) and intelligent, respectively; however, more than 60% of mothers indicated that formula would cause diarrhea, vomiting, and malnutrition. Primiparous women were more likely to believe that formula feeding would do their infants good; provide all the necessary nutrients and make them satisfied, intelligent, and big. Women who had fed formula previously thought that formula feeding was more likely to make their infants have diarrhea and malnourished as compared to women who had no previous infant-feeding experience or who fed only breast milk.

Perception about exclusive breastfeeding and formula feeding

Exclusive breastfeeding during the first month was perceived better than formula feeding by the study participants. Women highly valued exclusive breastfeeding, expected more support from people whose opinion they valued, and were more confident to breastfeed exclusively. Participants believed that their infants' risk of getting diseases such as diarrhea, constipation, and cholera would be much lower when their infants were fed only breast milk. Eighty-seven percent and 65% of participants had received information about exclusive

breastfeeding and formula feeding, respectively (Table 3). The majority of participants (71%) considered that their spouse/partner would support their feeding only breast milk during the first month. They also stated that their mother (44%), other family members (39%) and health professionals (15%) would approve of exclusive breastfeeding. One half of women (49%) believed that nobody would disapprove of exclusive breastfeeding, while 37% and 17% did not think that their family members, including their mother and friends would support exclusive breastfeeding during the first month, respectively. Although 60% of participants did not believe that anybody would approve of her feeding formula within one month, 16% and 19% of them indicated that their friends or family would approve of it, respectively. Spouse (57%), participants' mother (37%), other family members (31%), and health professionals (11%) were considered those who would disapprove of using formula.

Intention about infant feeding and its determinants

Participants intended to exclusively breastfeed their infants for a mean duration of 4.5 \pm 2.1 mo and 58% of them for the first six months. Thirty-one percent of participants, however, intended to introduce foods before four months and about eight percent planned to do so within the first month. Mothers planned to introduce porridge or formula before six months mainly because they believed that breast milk would not be sufficient to satisfy their infants. In addition, they intended to introduce porridge to make their infants healthy and strong, while formula was more likely to be introduced when they had to go back to work or school. Women's perception that infants would be thirsty led them to plan to introduce water before six months.

Determinants of exclusive breastfeeding intention

In chi-squared analyses, participants who were Akan and/or younger than 21 years old were less likely to intend to exclusively breastfeed during the first month: those who perceived getting support from mutual help societies or other affiliations or considered her spouse/partner as the head of household, compared to those who believed herself or other members of family as a head of household, were more likely to intend to feed only breast milk. These factors, however, did not remain in the multiple regression models when constructs from the theories were added.

In the multiple regression analysis, the intention to exclusively breastfeed was predicted by self-efficacy, followed by attitudes toward exclusive breastfeeding (Table 4). Theories containing self-efficacy as a construct such as TPB and HBM, therefore, explained much larger percentage of the variance of pregnant women's intention to exclusively breastfeed during the first month. Inclusion of past exclusive feeding behavior did not explain additional variance.

Determinants of formula feeding intention

Chi-squared analyses showed that women who perceived no support from mutual help societies or owned less household goods were more likely to plan formula feeding within the first month. As with exclusive breastfeeding, participants' intention to introduce formula within the first month was well predicted by their self-efficacy and attitudes toward formula feeding (Table 5). When self-efficacy about formula feeding was not included in the model, subjective norms also predicted the intention to introduce formula within the first month well, even though the predictability was much weaker than that of attitudes toward formula feeding. Having fed formula during the first month in the past to their child was also

strongly correlated with participants' intention to feed their infants formula within the first month.

Sub-sample follow-up

Characteristics of follow-up study participants

The follow-up study participants (n=41) were not significantly different from non-participants in terms of age, ethnicity, education, occupation, and current income. However, they were significantly more likely to have spent most of their life in the coastal region including Accra (88% vs. 70%), own a house (17% vs. 6%), and have lived in the same house (9.4 y vs. 5.9 y, $p<0.01$), compared to non-participants of the follow-up study. They were also more likely to come from a larger family (4.3 persons vs. 3.5 persons) and own more household goods (3.7 items vs. 3.2 items out of 7 items).

The follow-up study participants and non-participants reported the similar intentions, attitudes, subjective norms, self-efficacy, and locus of control regarding the exclusive breastfeeding and formula feeding in the clinic survey. The only significant difference between them was perception about severity of diseases such as malaria (4.0 vs. 4.4 on a 5-point scale), tuberculosis (4.1 vs. 4.6, $p<0.01$), and HIV (4.3 vs. 4.8, $p<0.01$), where non-participants believed each was more serious.

The first follow-up: changes in feeding intentions and perception during pregnancy

Intentions about exclusive breastfeeding and formula feeding during the first month, measured at four to six weeks after the initial survey, did not change significantly from those measured in the clinic survey. However, the intended duration of exclusive breastfeeding significantly increased (change: 0.6 ± 1.7 mo). Participants' attitudes and self-efficacy about exclusive breastfeeding during the first month did not change, but subjective norms

significantly increased (0.49 ± 1.43) while internal locus of control was decreased considerably (-0.78 ± 1.94). There was no significant change in participant's intention and perceptions based on the proposed model regarding initiating formula-feeding during the first month.

Perceptions about exclusive breastfeeding

Most women held positive attitudes toward exclusive breastfeeding. Much was said about the benefits of exclusive breastfeeding during the first month, but most of them were regarding those for their babies.

There is a difference between babies who are exclusively breastfed and fed other foods. My kids who did not have breast milk at all were big, but anytime they got sick, it was serious. My youngest child who was breastfed was not big, but his weight gain was encouraging. Also, whenever he was sick, he recovered quickly.

If you exclusively breastfeed for the first six months, the baby is protected from diseases; the baby gets strong and bouncy (big), his eyes become clear and his skin smooth without any cracks. Then, the baby is liked by all.

Women did not know the maternal benefits of exclusive breastfeeding, except for the benefits of saving money and time.

Breast milk would not bring any sickness to the baby; the sickness in baby could affect the parents by making them take the baby to the hospital and wait for a long time before they see a doctor, and wasting money.

You do not have to waste time on anything. The breast milk is already cooked. So, there's no need to set the fire and boil the water. You also do not need to waste time washing the bottle before feeding...It's just a matter of wiping the breasts and giving to the baby.

The majority of them also believed that their significant others supported exclusive breastfeeding mainly for the protective nature of breast milk for their infants.

...They (parents) said the baby could not get sick if I give only breast milk...they also said that one breast is water and the other is food, so there is no need to introduce water at one month.

My mother said breast milk would not only give the baby strength, but also make the baby intelligent and grow well...

However, some women reported receiving pressure against exclusive breastfeeding.

My mother said they gave water in addition to koko during their times and there was nothing wrong with the babies...she said breast milk alone is not adequate for the baby. So unless adding foods to the breast milk, the baby would not grow big.

The only reason given for not exclusively breastfeeding was that exclusive breastfeeding would not satisfy thirst of the infants, based on their previous feeding experiences.

I know I would give the baby water because that's how it has been with the other children. I am going to feed the same way. Our mothers did it, so I also did it...I have never exclusively breastfed. Baby would look too miserable for me. Imagine a grownup who is thirsty. It is more serious for the baby since he cannot complain of thirst.

Regardless of their decision about whether they feed their babies only breast milk or not, women generally thought that it was their right to choose what to feed their infants since they would give birth and spend the most time with the baby.

If the baby gets sick, my spouse would pay for the medical bills; but it would affect me most since I am going to take care of the baby all day long. I would feel it most so it is up to me alone. It may harm the baby, but in turn, I would feel the pain most. So it is best for me to exclusively breastfeed...

Perceptions about formula feeding

The majority of women did not favor giving formula during the first months because of its negative effects on infant health associated with unsafe formula itself or unhygienic preparation.

Baby can get sick from taking formula because most formula has been expired before being brought into the country...

While preparing formula outside, the child inside may start crying. When you go in for the baby, flies or dirt may blow over it without your knowledge... formula can then give the baby diarrhea and other diseases

Women also did not want to feed formula because of the financial burden. Some women did not want to feed formula during the first month, but they indicated their intention of using formula at a later time.

I do not have money to buy formula and even if I have money, I would not buy formula...I'll save the money for my child's upkeep.

It's not a good time for the baby to start eating formula. By three months, the baby's stomach and intestines are well opened to take formula...

They stated that people who were important to them had the same opinion about formula feeding as theirs: it would waste money that could be used for something else and bring sickness.

They (sister and brother-in-law) said there is no need to feed baby with formula. It is wasting of money and I may not continue feeding formula because it is expensive...they advised me to use that money to prepare foods such as palm soup to produce enough breast milk.

(My parents said)...if the baby is left with someone, formula may be prepared unhygienically, thus making baby sick. If someone else is sent to buy formula, it could be the expired one, so I must be careful.

One woman stated that her mother did not think formula was for humans because it was made from animal milk.

...(My mother said) when I feed my baby with formula, the baby grows and thinks like an animal because the formula was made from animal milk. But when I feed breast milk, the baby thinks like a human.

Like breastfeeding, the majority of women thought that they were in control of the decision about whether they introduce formula because the consequences of any foods introduced to

the infants would be mostly theirs. However, lack of money and pressure to exclusive breastfeed often made some women believe that formula feeding would be beyond their control.

...If I feed her with any other foods apart from breast milk and the baby gets sick, no one would help me. The cries of baby or the discomfort of the baby would bring me unhappiness...no one else worries.

I may not have the money to buy formula and should I ask my husband, he might tell me baby is not old enough to take formula... baby can be constipated if fed formula or other foods like koko.

The second follow-up: obstetric characteristics of follow-up participants and their infants

Out of 41 follow-up study participants, 36 delivered at a polyclinic or a hospital and the rest at a private maternity home. Four women gave birth by cesarean section, three of which were emergency interventions. The mean duration of gestation was 37.0 ± 1.5 wk (range: 34-40 wk). One quarter and one-fifth of mothers reported to have an illness before and after the birth, respectively; cold/flu and high blood pressure were the most common illnesses reported before the delivery, but women mostly complained of delivery related symptoms such as painful abdomen, excessive bleeding, and joint pain after the delivery . One-half of the newborns were male (n=21) and the mean birth weight was 3.11 ± 0.45 kg (range: 2.15-4.00 kg). One infant was born with Talipes; five babies were jaundiced and two had impetigo in the first week.

The second follow-up: infant feeding at the first week

All the participants initiated breastfeeding and 44% of them did so within one hour of birth. The rest of women could not breastfeed their infants within an hour because the mothers had cesarean section (n=4) or fell asleep after hard labor (n=9). Other reasons reported included that the infants were asleep (n=5) or were brought to them late (n=4). One

participant could not breastfeed immediately because the midwife believed the baby should not touch the blood of the mother and took the baby away from her for a day.

All but one mother who gave plain water on day one reported that they were exclusively breastfeeding their infants during the first week. When they were asked further using an infant food frequency and open-ended questions, four mothers stated that they already introduced cod liver oil (n=2), Gripe water (herbal solution used to help relieve the symptoms associated with baby colic, n=2), multivitamin (n=2) and/or oral rehydration solution (n=1).

The third follow-up: infant feeding at one month

All of infants were still breastfeeding at one month and 39 mothers reported that they were exclusively breastfeeding their babies. Like the previous follow-up results from the first week, however, 14 women introduced liquids or semi-liquids other than breast milk, contrary to their belief that they were still exclusively breastfeeding; Gripe water was most commonly introduced (n=9), followed by multivitamin (n=7), and cod liver oil (n=3). Two mothers introduced plain water, one koko and another honey. Gripe water was often used to relieve stomach problems or to increase the bowel movement, while they frequently used multivitamin drops such as Abidec to increase the appetite of the baby or to make baby big and healthy. Cod liver oil was used for various reasons including, to clear phlegm and to ease a stomachache or constipation. In addition, 11 babies were given medicines such as analgesics and antibiotics. Nobody, however, reported the introduction of commercial formula during the first month.

Analysis of variance showed that the seven women who reported having introduced plain water, koko, honey, or cod liver oil had indicated a significantly lower intention of

feeding only breast milk during the first month before delivery, compared to those who fed only breast milk or breast milk and supplements such as multivitamins or Gripe water (3.9 vs. 4.9 on a 5-point scale). They also had considerably less favorable attitudes toward exclusive breastfeeding (4.4 vs. 4.9) and weaker internal locus of control (3.9 vs. 4.9, $p<0.01$), compared to those who exclusively breastfed. Neither their exclusive breastfeeding intention nor perceptions on the proposed model predicted exclusive breastfeeding at one month in a logistic regression analysis due probably to small sample size. The only difference in socioeconomic characteristics between exclusive breastfeeding and non-exclusive feeding mothers were the regions where they spent most of their life. Sixty percent of women who spent most of their life in non-coastal areas already introduced liquids or semi-liquids in addition to breast milk, while only 11% of women from coastal regions (including Accra) fed something other than breast milk ($p<0.01$).

Discussion

The study showed that the majority of participants knew exclusive breastfeeding is recommended for six months. However, only a little more than one half of them intended to exclusively breastfeed their child for the first six months mainly because of their perception of insufficient breast milk to satisfy the baby. According to the 1998 Demographic and Health Survey of Ghana (GDHS), only one in five women exclusively breastfed their child for the first 6 months (Ghana Statistical Service & Macro International, 1999). Forty percent of multiparous women who had infant-feeding experience reported that they had exclusively breastfed their youngest child more than 6 months. A possible explanation of higher proportion of 6 months exclusive breastfeeding in our study compared to that in GDHS would be the study setting at urban health facilities. As a part of antenatal care, pregnant

women were given information about the benefits of exclusive breastfeeding by a nurse before a routine prenatal examination.

A sub-sample follow-up study, however, showed that the term 'exclusive breastfeeding,' which was asked as 'feeding only breast milk, nothing else, not even plain water' was interpreted very differently among Ghanaian pregnant women. Even after introducing non-breast milk items such as honey and cod liver oil, some reported that they were exclusively breastfeeding. They used these substances to treat various symptoms of babies, so they might have believed that these were medicine, not foods. Such misinterpretation of infant-feeding methods was not limited in our study. In a study conducted in Botswana, 21% of HIV-positive women who reported to exclusively formula feed also indicated that they put the infant to the breast maybe to comfort the infant (Program Review Team, PMTCT Advisory Group, & Infant Feeding Study Group, 2002). These results have important implications for future studies evaluating the effect of infant-feeding methods on MTCT of HIV.

As shown in other studies (De Paoli, Manongi, Helsing, & Klepp, 2001; Pool, Nyanzi, & Whitworth, 2001; Talawat, Dore, Le Coeur, & Lallemand, 2002), the participants were more favorable to breastfeeding than formula feeding. According to Rice and Naksook (2001), Thai women in Australia preferred breast milk because it has many health advantages for both babies and mothers. The participants in our study, however, favored exclusive breastfeeding due mainly to its protective power of their children, but not themselves. For the successful promotion of exclusive breastfeeding, the nutrition education in antenatal clinics should include the benefits of exclusive breastfeeding for mothers and correct breastfeeding technique, which would further motivate mothers to breastfeed exclusively

with fewer problems like prolonged sore nipples and mastitis. Reassurance of their self-efficacy, which was strongest predictor of exclusive breastfeeding intention in this study and breastfeeding outcomes of many previous studies, (Blyth, Creedy, Dennis, Moyle, Pratt, & DeVries, 2002; Buxton, Gielen, Faden, Brown, Paige, & Chwalow, 1991; Ertem, Votto, & Leventhal, 2001; O'Campo, Faden, Gielen, & Wang, 1992) by health care professionals will also increase the exclusive breastfeeding rate. Hands-on experience of the correct breastfeeding technique using a baby doll in the clinic during the antenatal care or counseling about the possible problems and management skills of breastfeeding with a lactation consultant may help (Dennis, 1999; Dennis, 2002).

Unlike Ugandan women who believed formula feeding was good (Pool et al., 2001), participants of this study considered it unsuitable for infants for at least the first month. Interestingly, multiparous women who had fed formula to their youngest child previously had more negative attitudes about formula feeding than those multiparous women who had not fed formula or primiparous women.

Such an unfavorable attitude toward formula feeding especially for the first month is very encouraging in terms of exclusive breastfeeding promotion in the general public, yet it would be a major obstacle for HIV-positive women who want to feed formula. With a weaker internal locus of control about formula feeding due probably to financial reasons, the HIV-positive women might end with mixed-feeding under the pressure from significant others who were favorable to breastfeeding, but unfavorable to formula feeding.

This study also found that complementary formula feeding was much more common among women whose last child was younger than 3 years old and this certainly needs attention to prevent unnecessary use of formula. This might be due simply to the increased

availability of formula in the market. To prevent undernutrition from low nutrient density traditional complementary food, *koko*, which was made from fermented maize dough, Ghanaian Ministry of Health has promoted to add high protein and nutrient rich foods such as legume and fish powder in the porridge (Lartey, Manu, Brown, Peerson, & Dewey, 1999; Lartey, Manu, Brown, Peerson, & Dewey, 2000). This information was regularly given to pregnant women or postpartum women in the clinics by attending nurses and misinterpretation of this might have supported the use of formula as a source of protein among women who recently had children (<3 y). Out of 127 multiparous women who had fed formula to their youngest child in our study, 59 (46%) of them actually started feeding their last child formula after six months.

The results of this study should be used with caution. Since the interviews were conducted in the clinic, the participants' responses may have been influenced by a social desirability bias. The results of the first follow-up study, which repeated the same questions at their home, however, were almost identical to those of the clinic survey. Actual feeding behavior was evaluated in only 10% of the purposive sample of the clinic survey participants. Therefore, the results cannot be generalized to all the pregnant women.

In conclusion, considering an unfavorable view about introducing formula at early age and high value placed on breastfeeding among Ghanaian mothers, exclusive formula feeding from birth among children born to HIV-positive mother does not seem to be an acceptable option. Exclusive breastfeeding for a short period of time, followed by exclusive formula feeding would be more feasible in Ghana. There are still a lot of obstacles for this recommendation. First of all, the effects of exclusive breastfeeding on the prevention of MTCT of HIV should be clarified with further studies before this recommendation can be

brought forward. As women themselves were well aware of, there is a risk of increased illnesses among children due to unhygienic preparation of formula. Even though our study was conducted in Accra, 41% women did not have piped water in the house or compound and charcoal was the main source of cooking fuel by the majority of participants. Hygienic preparation of formula is questionable without intense education by trained health professionals. Also, self-medication of children by mothers using food items was not uncommon and this might increase the transmission of HIV by damaging infants' immature gastrointestinal track (Coutsoudis et al., 1999; Murphy & Buescher, 1993). In addition, our follow-up study showed that pregnant women perceived more pressure about exclusive breastfeeding as the pregnancy advanced. Abrupt weaning from exclusive breastfeeding to exclusive formula feeding, thus, needs supports from spouse and other members of family. However, spouse and family members were not typically included in the prenatal care. Therefore, a new infant-feeding/nutrition education program that reinforces exclusive breastfeeding promotion by increasing self-efficacy of the mothers and addresses these challenges should be developed for HIV-positive women to make a truly informed decision.

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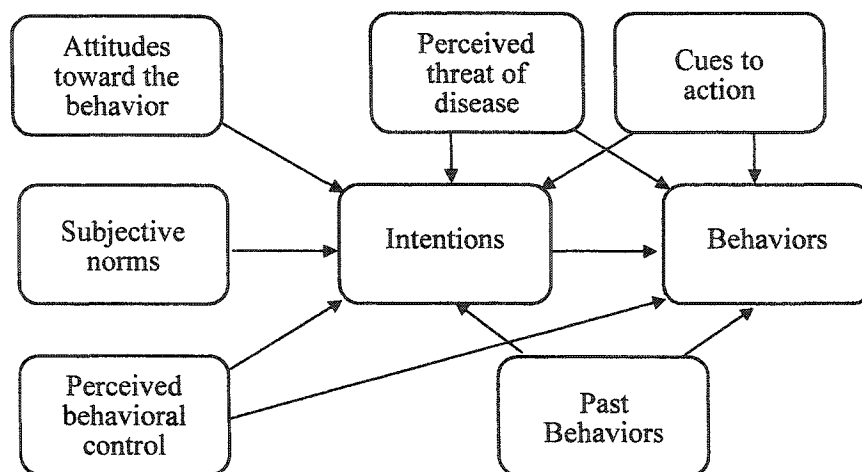


Figure 1. A proposed model based on the TRA, TPB, and HBM

Table 1. Feeding patterns of the youngest child of multiparous women (n=238 ^a)

	N	(%)
Age of the youngest child (y)		
< 3	71	29.8
3-4	78	32.8
≥ 5	89	37.4
<i>Breastfeeding</i>		
Ever breastfed previously		
Yes	237	99.6
No	1	0.4
Fed colostrum		
Yes	215	92.7
No	17	7.3
Duration of exclusive breastfeeding (mo)		
< 1	55	23.4
1-3	49	20.9
4-5	37	15.7
≥ 6	94	40.0
Duration of breastfeeding (mo)		
< 12	19	8.0
12-17	60	25.3
18-23	101	42.6
≥ 24	57	24.1
<i>Formula feeding</i>		
Ever fed formula		
Yes	130	54.6
No	108	45.4
Age when formula was first given (mo)		
< 1	11	8.7
1-3	31	24.4
4-5	26	20.5
≥ 6	59	46.5
Duration of formula feeding (mo)		
0-3	55	44.7
4-6	26	21.1
7-12	26	21.1
≥ 13	16	13.0

^a The questions were asked to those who had at least one child and the responses referred to the youngest child. The number of respondents was not always 238 due to missing cases. 'Don't know', 'don't remember' were treated as missing.

Table 2. Salient beliefs a about exclusive breastfeeding and formula feeding (n=403)

	% women with responses		
	No	Don't know	Yes
Feeding only breast milk during the first month			
<i>Baby-related salient beliefs</i>			
Makes baby stronger	0.5	0.0	99.5
Makes baby grow well	0.7	0.0	99.3
Makes baby Intelligent	0.7	0.5	98.8
Provides all the nutrients baby needs	1.5	0.0	98.5
Protects baby from getting sick	1.7	1.7	96.5
Makes baby thirsty	89.8	1.0	9.2
Makes baby hungry	95.8	0.0	4.2
<i>Mother-related salient beliefs</i>			
Increases bonding of mom and baby	0.5	0.0	99.5
Saves money for the family	3.5	0.3	96.3
Helps your postnatal recovery	3.0	4.2	92.8
Helps you with child spacing	13.4	6.2	80.4
Prevents you from working outside	51.9	0.5	47.6
Makes your breasts saggy	54.8	3.2	41.9
Reduces your chances of getting a cancer	27.8	36.7	35.5
Makes your breast/nipple sore	67.5	6.0	26.6
Takes too much of your time	88.1	0.0	11.9
Feeding formula within the first month			
<i>Baby-related salient beliefs</i>			
Makes baby mal/under-nourished	25.6	4.0	70.5
Makes baby have diarrhea	19.9	10.2	70.0
Makes baby big (bouncy)	32.3	4.5	63.3
Makes baby vomit	25.1	12.7	62.3
Makes baby satisfied (full)	34.7	3.7	61.5
Makes baby grow nicely	55.3	4.5	40.2
Makes baby intelligent	62.8	8.7	28.5
Ensures that baby gets all the nutrients	71.2	8.9	19.9
<i>Mother-related salient beliefs</i>			
Wastes money for the family	8.7	0.7	90.6
Gives an option not to show your breast in public	18.6	0.7	80.7
Helps you work outside sooner	25.6	1.7	72.7
Gives you more free time	39.2	2.0	58.8

^a Salient beliefs asked were identified through focus group discussions prior to the survey

Table 3. Participants' perception regarding exclusive breastfeeding and formula feeding

Constructs measured	Breast milk only*			Formula*				
	Mean±SD ^a	% women with responses			Mean±SD	% women with responses		
		Negative	Neutral	Positive		Negative	Neutral	Positive
<i>Attitudes</i>								
Feeding (*) during the first month is								
Enjoyable	4.67 ± 0.99	7.2	1.0	91.8	1.55 ± 1.20	85.1	2.2	12.7
Beneficial	4.83 ± 0.76	4.0	0.3	95.8	1.62 ± 1.29	83.1	1.5	15.4
Valuable	4.84 ± 0.74	3.7	0.3	96.0	1.62 ± 1.30	82.8	1.5	15.7
Good	4.86 ± 0.72	3.2	0.0	96.8	1.62 ± 1.31	82.1	2.0	15.9
Convenient	4.72 ± 0.94	7.2	0.0	92.8	1.73 ± 1.40	79.6	1.5	18.9
<i>Subjective norms</i>								
Most people who are important to you think you should feed (*) during the first month.								
	4.31 ± 1.38	14.4	4.5	81.1	1.49 ± 1.18	86.1	3.5	10.5
People whose opinions you value would approve your feeding (*) during the first month.								
	4.43 ± 1.30	12.7	2.5	84.9	1.49 ± 1.21	86.3	2.2	11.4
<i>Self-efficacy</i>								
It is possible for you to feed (*) during the first month.								
	4.71 ± 0.97	6.5	1.0	92.6	1.22 ± 0.85	93.8	1.0	5.2
If you want, you could feed (*) during the first month.								
	4.68 ± 1.02	7.4	0.5	92.1	1.48 ± 1.21	87.1	1.2	11.7
<i>Locus of control</i>								
It is mostly up to you whether or not you feed (*) during the first month.								
	4.66 ± 0.95	7.7	1.0	91.3	3.95 ± 1.60	25.4	0.8	73.9
You believe you do have control over feeding (*) during the first month.								
	4.73 ± 0.86	6.0	0.3	93.8	3.95 ± 1.58	25.1	0.5	74.4
<i>Perceived susceptibility when feeding (*)</i>								
Diarrhea	1.15 ± 0.58	95.8	2.2	2.0	3.96 ± 1.29	14.3	6.3	79.5
Cholera	1.06 ± 0.35	97.8	1.7	0.5	3.40 ± 1.56	27.4	8.5	64.1
Upper respiratory infection	1.14 ± 0.59	94.8	3.5	1.7	3.20 ± 1.58	31.3	14.5	54.3
Constipation	1.42 ± 1.04	86.3	3.0	10.7	3.81 ± 1.41	18.3	6.8	75.0
Tuberculosis	1.11 ± 0.53	95.8	3.0	1.2	2.62 ± 1.62	47.2	14.8	37.9
Malaria	1.27 ± 0.83	91.6	2.7	5.7	3.04 ± 1.65	38.3	6.3	55.5
HIV	1.43 ± 1.15	87.3	3.0	9.7	1.68 ± 1.28	76.9	9.0	14.0

Table 3. Participants' perception regarding exclusive breastfeeding and formula feeding (continued)

Constructs measured	Breast milk only*			Formula*				
	Mean±SD ^a	% women with responses			Mean±SD	% women with responses		
		Negative	Neutral	Positive		Negative	Neutral	Positive
<i>Perceived severity</i>								
Diarrhea	4.22 ± 1.19	12.9	6.5	80.7				
Cholera	4.60 ± 0.97	7.6	2.5	89.9				
Upper respiratory infection	4.60 ± 0.96	7.2	2.2	90.5				
Constipation	3.70 ± 1.44	27.6	8.7	63.7				
Tuberculosis	4.58 ± 0.96	6.3	4.0	89.7				
Malaria	4.33 ± 1.12	11.2	6.0	82.9				
HIV	4.73 ± 0.87	5.3	1.8	93.0				
<i>Cue to action</i> ^b	0.87 ± 0.34	13.2	-	86.9	0.65 ± 0.48	34.7	-	65.3
<i>Past experience</i> ^c of feeding (*)	0.45 ± 0.50	55.3	-	44.7	0.03 ± 0.16	97.3	-	2.7

^a Means ± SDs were measured on a 5-point Likert scale

- Attitudes, subjective norms, self-efficacy, locus of control; 1=strongly disagree to 5=strongly agree
- Perceived susceptibility of diseases: 1=none to 5=very high
- Perceived severity of diseases; 1=not serious at all to 5=very serious
- Cue to action and past experience: 0=no and 1=Yes

^b Cue to action and past experience were measured with a single yes/no question of (1) whether she has received information about exclusive breastfeeding or formula feeding and (2) whether she had experience of feeding only breast milk or formula for their youngest child in the first month.

Table 4. Multiple regressions predicting Ghanaian pregnant women's intention to exclusive breastfeed during the first month from theory constructs ^a (n=402)

	Standardized beta coefficient						
	Combined ^b	TRA	TRA + past ^c	TPB	TPB + past	HBM	HBM + past
Attitudes	0.23 ***	0.67 ***	0.66 ***	0.27 ***	0.27 ***	0.22 ***	0.22 ***
Subjective norms	-0.01	0.07	0.05	0.00	-0.01		0.67
Self-efficacy	0.68 ***			0.66 ***	0.66 ***	0.68 ***	-0.02 ***
Locus of control	-0.06 *			-0.05	-0.05		0.03
Perceived susceptibility ^d	-0.03				0.05	-0.02	0.01
Perceived severity ^d	0.04					0.03	0.05
Cue to action ^e	0.01					0.02	
Past experience	0.05		0.11 **		0.05		
R ²	0.73 ***	0.50 ***	0.51 ***	0.73 ***	0.73 ***	0.72 ***	0.72 ***
Adjust R ²	0.72 ***	0.49 ***	0.50 ***	0.73 ***	0.73 ***	0.72 ***	0.72 ***

^a Constructs from Theory of Reasoned Action (TRA), Theory of Planned Behavior (TPB), and Health Belief Model (HBM) were used.

^b Combined model used unique constructs from TRA, TPB, and HBM as well as past experience

^c Past experience is a dichotomous variable of whether she had breastfeed exclusively at least one month to her youngest child. Primiparous women were considered not having previous exclusive breastfeeding experience.

^d Diseases that perceived susceptibility and severity were measured included diarrhea, cholera, upper respiratory infection, constipation, tuberculosis, malaria, and HIV.

^e Cue to action is a dichotomous variable of whether she had received any information regarding exclusive breastfeeding.

Table 5. Multiple regressions predicting Ghanaian pregnant women's intention to feed formula during the first month from theory constructs ^a (n=401)

	Standardized beta coefficient						
	Combined ^b	TRA	TRA + past ^c	TPB	TPB + past	HBM	HBM + past
Attitudes	0.27 ***	0.36 ***	0.36 ***	0.26 ***	0.27 ***	0.27 ***	0.28 ***
Subjective norms	0.09	0.19 ***	0.19 ***	0.09 *	0.09 *		
Self-efficacy	0.36 ***			0.32 ***	0.32 ***	0.39 ***	0.38 ***
Locus of control	0.00			-0.01	0.00		
Perceived susceptibility ^d	0.01					-0.01	0.00
Perceived severity ^d	-0.02					-0.03	-0.03
Cue to action ^e	0.03					0.04	0.03
Past experience	0.13 **		0.15 **		0.14 ***		0.13 **
R ²	0.34 ***	0.22 ***	0.24 ***	0.29 ***	0.31 ***	0.32 ***	0.33 ***
Adjust R ²	0.33 ***	0.21 ***	0.23 ***	0.29 ***	0.30 ***	0.31 ***	0.32 ***

^a Constructs from Theory of Reasoned Action (TRA), Theory of Planned Behavior (TPB), and Health Belief Model (HBM) were used.

^b Combined model used unique constructs from TRA, TPB, and HBM as well as past experience

^c Past experience is a dichotomous variable of whether she had fed formula before one month of age to her youngest child. Primiparous women were considered not having previous formula feeding experience.

^d Diseases that perceived susceptibility and severity were measured included diarrhea, cholera, upper respiratory infection, constipation, tuberculosis, malaria, and HIV.

^e Cue to action is a dichotomous variable of whether she had received any information regarding formula feeding

CHAPTER 6. CHARACTERISTICS OF PREGNANT WOMEN AT RISK OF SPILLOVER EFFECT

A paper to be submitted to *Journal of Nutrition*

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Abstract

Objectives: The specific aims of this study were 1) to examine pregnant women's willingness to follow prevention procedure of mother-to-child transmission (MTCT), if found to be positive to HIV, 2) to identify the characteristics of pregnant women who were at risk of spillover effects, and 3) to identify acceptable alternative foods to breast milk in Ghana.

Design and Methods: A systematically selected 403 women attending antenatal clinics in Accra, Ghana was interviewed using a structured questionnaire.

Results: Almost all participants were willing to follow health professional's advice on medication and formula feeding, if they were tested positive, but 70% were unable to afford the cheapest formula product on the market. If subsidized formula were available, 96% would like to receive it, if positive to HIV; even without HIV infection, 22% would also like to receive and give it to their infants. The possible spillover group had very strong positive attitudes toward formula feeding and negative attitudes toward exclusive breastfeeding. Factors predicting those at risk of spillover effects included higher perceived risk of getting HIV, awareness of prenatal counseling and testing of HIV, and primipara. The majority of participants preferred commercial formula as an alternative to breast milk in the first month of baby's life, but their preference gradually switched to local foods such as koko as the infants grow.

Conclusions: The spillover effects of formula feeding to children born to HIV-negative mothers or mothers of unknown HIV status is likely to occur if subsidized formula is distributed without proper regulation. Nutrition education as a part of antenatal care should be reinforced to promote exclusive breastfeeding.

Introduction

Breast milk is the best source of nutrients for infants and contributes to infant health by decreasing morbidity and mortality from infectious diseases (1-3). Breast milk, however, is also a source of transmission of the human immunodeficiency virus (HIV). Since 1985, when the first case of mother-to-child transmission (MTCT) of HIV through breastfeeding was reported (4), many epidemiologic studies and a randomized clinical study have shown that between 4 to 29% of infants born to HIV-positive women become infected with the virus through breastfeeding (5-13).

In response to these alarming results, the United Nations Program on HIV/AIDS (UNAIDS), with the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF) has recommended since 1997 that HIV-positive women be empowered to make fully informed decisions about infant feeding by providing unbiased information regarding the benefits and risks of both breastfeeding and alternative feeding. They also proposed that governments provide necessary support to carry out feeding decisions, including access to adequate alternatives to breast milk for those who decide on alternative feeding (14-15).

While the idea of supplying subsidized or free formula for HIV-positive women has been challenged by many health care workers and breastfeeding advocates, several governments, non-governmental organizations (NGOs) and research teams have started to

provide free formula as a way of reducing MTCT of HIV (16-19). There are several concerns with providing formula, including disclosure of the woman's HIV status (by not breastfeeding), increased morbidity and mortality associated with formula feeding, and the 'spillover'¹ effect of formula feeding to infants of mothers without HIV infection (15). Under-regulated distribution of subsidized formula coupled with the misconception of formula feeding being promoted by health authority could also undermine the success of past breastfeeding promotion campaigns (16-17, 20-21).

In Ghana, breastfeeding is the cultural norm, with an almost universal initiation and a mean duration of over 21 months. Breastfeeding is an important protective child caring behavior where there is a high prevalence of childhood malnutrition (22). Infant health is now challenged by a rapid increase in the prevalence of HIV among women of childbearing age (23). While the government is planning to increase voluntary counseling and testing (VCT) of HIV services, NGOs such as Family Health International is planning to provide free formula to HIV-positive women in the region with the highest prevalence of HIV (personal communication, Dr. Phyllis Antwi, Family Health International, Ghana). The effect of providing free formula to HIV-positive women on children of mothers without HIV is largely unanswered. Also, acceptable and feasible local alternatives to breast milk have not been determined. The specific aims of this study were 1) to examine pregnant women's willingness to follow prevention procedure of MTCT, if found positive to HIV, 2) to identify the characteristics of pregnant women who were at risk of spillover effect, and 3) to identify acceptable alternative foods to breast milk in Ghana.

¹ The spread of artificial feeding to infants of mothers who are HIV-negative or who do not know their HIV status, and who would benefit from breastfeeding (15)

Methods

Data collection

The study site, sample selection, survey instrument development, as well as data collection methods were described in detail elsewhere (Chapter 4). Briefly, every third woman attending a prenatal clinic in Mamprobi and Kaneshie polyclinics in Accra, Ghana was invited to participate in an interview of infant feeding and prenatal VCT of HIV twice weekly from each clinic between June and August 2002. If the pregnant woman was 18-49 years old, the study was explained and written informed consent was obtained. Out of 598 selected pregnant women during the study period, 174 women left the clinic before they were approached for an interview and 10 refused to participate. Field staff interviewed the 414 women in the language of their choice (Twi, Ga, or English) using a structured questionnaire. Eleven women did not complete the survey, leaving 403 eligible participants.

Survey instrument

The structured questionnaire was adapted from several existing questionnaires from the Horizons questionnaire library (website) and modified with the salient beliefs about infant feeding and prenatal VCT of HIV of Ghanaian pregnant women, which were identified through focus group discussions. The final survey instrument included questions about sociodemographic and obstetric characteristics of the participants, intentions about infant feeding and prenatal HIV testing, and opinions about and willingness to follow preventive methods of MTCT if infected with HIV. The content-validated questionnaire was pilot tested twice to check its understandability and back-translated before being used. Approval to conduct the study was obtained from the Iowa State University Institutional Review Board for the Protection of Human Subjects and the Ghanaian Ministry of Health.

Statistical analysis

Descriptive statistics (percentage and mean \pm SE unless indicated otherwise) were used to summarize 1) characteristics of the study participants, 2) their willingness to follow prevention methods of MTCT of HIV, 3) culturally acceptable alternative infant foods in Ghana, and 4) reasons not to initiate breastfeeding or to stop breastfeeding before six months. To identify those who would feed formula in the absence of HIV infection and their characteristics, pregnant women were asked to indicate their intention to get infant formula distributed at low or no cost for HIV-positive women. If the woman stated that she would get it and feed her baby even though she was HIV-negative or had an unknown status, she was categorized as breastfeeding (BF) spillover. When mothers reported that they would give formula to the baby before six months, they were classified as exclusive breastfeeding (EBF) spillover. Chi-squared analysis was used to identify socioeconomic status, attitudes toward exclusive breastfeeding and formula feeding as well as perception of HIV and prenatal VCT of HIV of both EBF and BF spillover groups, compared to no spillover. Logistic regression analyses were used to examine relative contribution of each characteristic; those factors with a p-value < 0.2 in the chi-squared analyses were entered into the model. Using forward stepwise logistic regression with a cut off p-value < 0.05 , the odds ratios were estimated controlling for maternal age and the level of education. Income was not a significant predictor of intention and was dropped from the equation. Due to the missing values, the number of participants in each analysis varied depending on the variables included in the analysis. All statistical analyses were performed using SAS 8.2 (1999-2001, SAS Institute Inc., Cary, NC) software and p-value < 0.05 was used, unless indicated, as the standard for statistical significance.

Results

Characteristics of participants

The characteristics of study participants were described elsewhere (VCT study). Briefly, pregnant women in the study had a median age of 27 years. Two-thirds of women had completed at least Junior Secondary School (equivalent to middle school), but 6% had no formal education. About one-half of women were traders or market sellers and another 43% were vocational workers such as hairdresser, seamstress, and caterer. At the time of survey, 42% of women were not working. They lived on a daily income of 13,140 \pm 970 cedis per person (median=7,670 cedis; US\$1=7,900 cedis) and spent about 6,340 \pm 180 cedis per person (median=5,000 cedis) for food.

Willingness to follow preventive methods of mother-to-child transmission

When the participants were asked about willingness to follow a doctor's advice on preventive methods of mother-to-child transmission if they were tested positive, almost all of them stated that they would abide by it: 99% of them would take a medicine and would not breastfeed at all regardless if their family or friends discovered that they were HIV-positive. If recommended, 99% and 97% were willing to feed only infant formula for at least one month and six months, respectively. Less than 4% of the women reported that they would feed both infant formula and breast milk due to lack of money to buy infant formula continuously for six months, fear of stigma, or pressure from spouse and/or family. The maximum amount of money that women reported that they could spend on infant formula each week was 32,700 \pm 1,730 cedis (median= 20,000 cedis).

Willingness to receive infant formula

If the mother tested positive for HIV and the government or NGOs provided infant formula at low or no cost, 96% of the participants said that they would like to receive formula. Twenty- six percent of participants (n=106) also stated that they would like to receive infant formula even though they did not know their HIV status or they tested negative. Out of these 106 pregnant women, 29 women stated that they would feed it to their baby before four months of age, 19 between four to five months of age, and 41 at or after six months of age.

Characteristics of EBF spillover group

A chi-squared analysis showed that the EBF spillover group had very strong positive attitudes toward infant formula and negative attitudes toward exclusive breastfeeding. Pregnant women who did not think formula feeding would cause diarrhea (20% vs. 10%) or malnutrition (22% vs. 8%, $p<0.01$) were significantly more likely to intend to give formula to their baby before six months in the absence of HIV infection if they could get it at low or no cost from the government or NGOs. These women also were considerably more likely to believe that infant formula would make their baby intelligent (22% vs. 8%, $p<0.01$) or satisfied (full) (15% vs. 7%), give the mother more free time (16% vs. 6%, $p<0.01$), and allow them to work outside the home sooner (15% vs. 4%, $p<0.01$). In addition, they believed that exclusive breastfeeding would make their breasts and/or nipples sore (19% vs. 9%), their baby would be hungry (29% vs. 11%), and they were less likely to have received information about EBF (10% vs. 23%). In contrast, those women who thought that exclusive breastfeeding would save money (11% vs. 36%) and protect baby from getting sick (11% vs. 14%) were less likely to be in the EBF spillover group.

After controlling for age and the level of education, favorable attitudes toward formula feeding that were seen in the bivariate analysis continued to predict EBF spillover (Table 1). As perceived risk of getting HIV increased one unit (on a five point Likert scale), the likelihood of being in the EBF spillover group tended to increase 1.75-fold. Those who were aware of prenatal VCT services or had intended to have prenatal HIV testing during the current pregnancy were more likely to be in the EBF spillover group. Tendency of being in the EBF spillover group was also higher among women from Ga ethnic group, compared to those from Akan. Multiparous women, especially who had fed infant formula previously, compared to primiparous women, and pregnant women who had an illness during the current pregnancy were less likely to be EBF spillover group.

Characteristics of BF spillover group

In chi-squared analysis, pregnant women who did not believe that exclusive breastfeeding would save money (50% vs. 21%) or that formula feeding would make child malnourished (31% vs. 18%) were more likely to feed infant formula if they could get it from the government or NGOs at low or no cost even if they did not know their HIV status or were HIV-seronegative. The BF spillover group perceived higher risk of getting HIV (1.38 vs. 1.20 on a 5-point scale), had more misconceptions about HIV (3.96 vs. 3.54 out of 10 points), and had a fewer children (0.80 vs. 1.13) compared to the non-BF spillover group.

Unlike the EBF spillover group that had several distinct characteristics, the logistic regression analysis identified only a few characteristics of BF spillover group and explained only 9.3% of the variance (Table 2). Similar to EBF spillover group, awareness of prenatal VCT as well as higher perceived risk of getting HIV predicted BF spillover group.

Multiparous women also were less likely to be in the BF spillover group compared to primiparous women.

Culturally acceptable alternative infant foods

Table 3 shows culturally acceptable alternative infant foods that could be introduced if a mother could not or decided not to initiate breastfeeding or stopped breastfeeding before six months. More than two-thirds of women preferred infant formula as an alternative to breast milk during the first month of baby's life, but this preference decreased with the infant's age. By four to six months of age, pregnant women believed that a non-breastfeeding mother could feed a fermented maize porridge called '*koko*' or other homemade complementary foods such as '*mpotompoto*¹' and '*mashed banku*²'

The most common reasons for not initiating breastfeeding were concern for saggy breasts, work or school, and breast problems, such as sore nipples, boils, or breast cancers. Other general illnesses among mothers were also frequently cited as reasons not to initiate breastfeeding, but infectious diseases such as HIV or tuberculosis were mentioned by less than 2% of the respondents. Work or school, concern for saggy breasts, and not enough breast milk were reported as the main reasons to stop breastfeeding before six months, followed by baby's refusal of breast milk and mother's illness, absence, or death.

Discussion

This study has clearly demonstrated that the 'spillover' effect of formula feeding to children born to HIV-negative mothers or mothers of unknown HIV status is likely to occur

¹ Mashed yam or cocoyam with tomato and palm oil. Other vegetables like carrot or pepper and fish powder are often added.

² Fermented corn/cassava dough mixed proportionally and cooked in hot water into a smooth whitish paste

if subsidized formula is distributed without appropriate regulation. The magnitude may be more than expected. Out of 26% of participants who expressed the intention of receiving subsidized formula if it is available for HIV-positive women, 84% intended to feed it to their infants even though they were not HIV-positive or did not know their HIV status, resulting in overall 22% possible BF spillover effect. In addition, one-half of BF spillover group indicated their plan of giving it to their infant before six months, which would decrease the already low exclusive breastfeeding rate of 21.8% for four to five months of age (22).

Interestingly, positive attitudes toward formula feeding explained the spillover effect more than negative attitudes toward exclusive breastfeeding. Also, multiparous women who had fed infant formula to their youngest child previously were much less likely to introduce it before six months, perhaps because of unfavorable experiences, such as increased incidence of diarrhea or upper respiratory infections. The fact that the spillover was associated with the perceived risk of becoming infected with HIV suggests that improved VCT may counteract this tendency. As in other studies (24-25), our participants almost universally agreed that they would take medicine and stop breastfeeding if they tested HIV-positive and were recommended to do so by health care professionals.

They also agreed that they would stop breastfeeding completely and give only infant formula for at least six months even though their family and friends found out their status. However, the maximum amount of money available to purchase formula was insufficient among 70% of participants to be able to obtain the recommended amount of the cheapest infant formula product on the market at the time of survey (\cong 30,000 cedis/week). Unlike earlier studies, which have reported financial problems as the main factor not to feed alternatives to breast milk, women in this study did not think the lack of money as a barrier

of replacement feeding in the event of HIV infection, due probably to a desire to protect their baby (26-28). Anecdotal reports from many women suggested that mothers were likely to introduce koko early, over-dilute formula, or mix-feed with breast milk, all of which could result in increased morbidity and mortality from either HIV or other infectious diseases (13, 16, 29-35)

Among the several replacement feeding options that UNAIDS has proposed, only commercially produced infant formula was mentioned frequently as an alternative food for Ghanaian infants (36). Other alternatives that were commonly accepted in other part of the world, such as modified animal milk, were rarely been mentioned (24, 37). Koko, a maize porridge, was mentioned often as a food that could be given to infants before six months of age when breastfeeding was not feasible. However, the use of koko, a low energy- and nutrient-dense food, has been associated with the development of protein-energy malnutrition among young children in Ghana (34). This feeding practice deserves the attention of health care workers working with HIV-positive women.

The findings of this study should be used with caution because mothers were asked about their intentions rather than their actual behavior. All women who intended to receive and feed formula to their baby in the absence of HIV infection might actually decide not to do so. Likewise, those who did not indicate intention of formula feeding might change their mind due to various environmental factors and feed formula in the event of under-regulated distribution of free formula.

In conclusion, the distribution of free infant formula to HIV-positive women in this population without a proper means of regulation could worsen the health status of young infants born to HIV-negative mothers by increasing the their morbidity and mortality from

many infectious diseases. In addition, unless enough formula is provided to HIV-positive women without any interruption, over-dilution of formula, early introduction of koko, and mixed feeding is likely to occur in this population. To prevent the spillover effect, nutrition education as a part of antenatal care is urgently needed to give unbiased information about the risks and benefits of both exclusive breastfeeding and formula feeding to all pregnant women, especially those at the highest risk of spillover effect: primiparous women with a high perceived risk of becoming infected with HIV, and with favorable attitudes toward infant formula coupled with negative attitudes about exclusive breastfeeding. In addition, there should be an effort to examine the possibility of modifying culturally acceptable local foods as a safe and appropriate alternative to breast milk for infants born to HIV-positive mothers.

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Table 1. Characteristics ^a of EBF spillover group ^b (n=379)

	Odds ratio	95% confidence interval	
		Lower CI	Upper CI
<i>SES and obstetric characteristics</i>			
Ethnicity			
Ga/Adangbe	3.35	1.32	8.47
Ewe/Guan	0.52	0.14	1.89
Northerner	1.86	0.40	8.73
Akan			
Number of household goods owned ^c	0.72	0.55	0.93
Had any illnesses during the current pregnancy			
Yes	0.28	0.12	0.64
No			
<i>Experience and opinion about formula feeding</i>			
Previous experience of feeding infant formula			
Multiparous & had fed infant formula	0.16	0.05	0.55
Multiparous & had not fed infant formula	0.23	0.07	0.75
Primiparous			
Attitudes toward formula feeding in terms of benefits to mothers ^d	1.36	1.07	1.75
Mothers' belief about the age at which infant formula could be given			
Before 6 months	20.00	6.64	60.23
After 6 months			
<i>Opinion about HIV</i>			
Had ever heard of prenatal counseling and testing of HIV			
Yes	4.75	2.10	10.73
No			
Intended to have prenatal HIV testing during the current pregnancy			
Yes	2.48	1.07	5.74
No			
Perceived risk of getting HIV ^e	1.75	1.01	3.03

^a Significant determinants were selected by logistic regression with forward stepwise selection ($p < .05$). Odds ratio was then calculated by controlling for age and education level of participants in addition to other factors shown in the table

^b EBF spillover group (n=47) is those mothers who indicated their intention to receive formula, distributed at low or no cost for HIV-positive women, in the absence of HIV infection and to feed it to their infants before six months.

^c Household goods included was radio, TV, VCR, refrigerator, telephone, air conditioner, car (range: 0–7).

^d Attitudes toward formula feeding in terms of mother's benefits were measured by combining 4 formula feeding questions: formula feeding gives her more free time (Yes=+1), wastes money for the family (Yes=-1), helps her work outside sooner (Yes=+1), gives an option not to show your breast in public (Yes=+1). Positive, neutral (including don't know), and negative answers were given +1, 0, and -1 respectively and then summed up (range: -4 – +4) before used for the logistic regression analysis

^e Perceived risk of getting HIV was measured on a five-point Likert scale (1=none to 5=very high)

Table 2. Characteristics ^a of BF spillover group ^b (n=387)

	Odds ratio	95% confidence interval	
		Lower CI	Upper CI
<i>SES characteristic</i>			
Ethnicity of the head of household			
Ga/Adangbe	2.79	1.50	5.19
Ewe/Guan	1.15	0.55	2.41
Northerner	1.27	0.44	3.63
Akan			
<i>Experience of formula feeding</i>			
Previous experience of feeding infant formula			
Multiparous & had fed infant formula	0.50	0.26	0.98
Multiparous & had not fed infant formula	0.45	0.21	0.98
Primiparous			
<i>Opinion about HIV</i>			
Had ever heard of prenatal counseling and testing of HIV			
Yes	2.77	1.64	4.65
No			
Perceived risk of getting HIV ^c	1.43	1.01	2.03

^a Significant determinants were selected by logistic regression with forward stepwise selection ($p < .05$).

Odds ratio was then calculated by controlling for age and education level of participants.

^b BF spillover group (n=85) is those who indicated their intention to receive formula, distributed at low or no cost for HIV-positive women, in the absence of HIV infection and to feed it to their infants.

^c Perceived risk of getting HIV was measured on a five-point Likert scale (1=none to 5=very high)

Table 3. Acceptable alternative infant foods when a Ghanaian mother did not initiate breastfeeding or stopped breastfeeding, by age category (n=403)

Acceptable Alternative Infant Foods	First choice (%) ^a				Combined (%) ^a			
	0- 3d	4-30d	1-3mo	4-6mo	0-3d	4-30d	1-3mo	4-6mo
Infant formula (SMA/Lactogen/Frisolac)	67.7	66.3	44.7	22.1	71.7	71.5	55.1	30.0
Milk (Powdered/evaporated milk)	6.7	3.7	1.7	1.2	8.9	5.7	4.2	2.2
Maize porridge (Koko/tombrown)	4.0	14.4	24.8	25.8	6.9	19.9	38.2	39.2
Other porridge (Weanimix/rice/millet)	0.0	1.0	3.5	3.5	1.0	2.2	6.2	10.2
Commercial complementary foods (Cerelac/Beachnut)	3.0	6.5	15.9	14.9	5.7	12.2	24.1	23.8
Local complementary foods (Mpotopoto/banku, etc)	0.7	1.0	5.7	29.5	2.0	2.7	10.7	44.4
Water	3.7	0.2	0.7	0.2	6.2	2.0	3.2	2.5
Wet nursing	1.0	0.5	0.2	0.2	1.0	0.5	0.5	0.2
Others ^b	4.2	0.7	0.5	0.7	5.2	0.7	0.5	0.7
Missing ^c	8.9	5.7	2.2	1.7	9.4	6.2	2.7	2.0

^a Proportions were calculated in two ways: 'first choice' and 'combined'. 'First choice' was the response mentioned first by the participants to open-end questions. 'Combined' was calculated by including all the responses regardless of the order mentioned.

^b Others include glucose/sugar solution, fruits, and vegetables.

^c Missing includes 'seek advice from health care workers' and 'don't know'.

CHAPTER 7. GENERAL CONCLUSIONS

Summary

With the growing evidence of MTCT of HIV via breastfeeding (Bertolli et al. 1996; Datta et al. 1994; De Martino et al. 1992; Dunn et al. 1992; Ekpini et al. 1997; European Collaborative Study 1992; Leroy et al. 1998; Miotti et al. 1999; Nduati et al. 2000), HIV-positive pregnant women have been encouraged to make a fully informed decision on infant feeding (UNAIDS/WHO/UNICEF 1997; WHO/UNAIDS /UNICEF 1998; WHO Technical Consultation 2001). To do so, pregnant women first must know their HIV status. Then, HIV-positive women must be provided with adequate information on infant feeding options, including risks and benefits of both breastfeeding and alternative feedings. HIV-positive women also need culturally acceptable breast milk alternatives. However, there is little information on these issues in Ghana, where there is a high rate of breastfeeding, a high prevalence of malnutrition and infant morbidity/mortality, as well as an increasing prevalence of HIV.

This project, based on an integrated model of the Theory of Reasoned Action/Planned Behavior and the Health Belief Model, examined culturally sensitive information regarding the factors that permit Ghanaian pregnant women to make an informed decision on infant feeding in the era of an HIV/AIDS pandemic: 1) intention to participate in prenatal voluntary HIV testing and its determinants, 2) knowledge, attitudes, and intentions regarding infant feeding practices and the factors that influence their intentions, and 3) acceptability and affordability of breast milk substitutes.

Data were collected in three phases. During the first phase, seven focus group discussions were conducted, each group with a purposive sample of six pregnant women

aged 18-49 who attended one of two antenatal clinics in Accra. The salient beliefs regarding VCT and infant feeding which were identified through these discussions were used to develop a structured questionnaire. Three additional focus group discussions were conducted with health care workers from the chosen clinics and a Teaching Hospital (4-9 health care workers/group) to understand the socio-cultural environment in which Ghanaian women make decisions regarding VCT and infant-feeding methods. The second phase involved in-person interviews with 403 pregnant women attending antenatal services using a theory-based, pre-tested questionnaire. To better understand the relationship between intentions and actual behaviors, the final phase of this study followed up a purposive sample of 41 pregnant women who indicated a risk of getting HIV or an intention of having prenatal VCT. The women were further surveyed before delivery about prenatal VCT as well as infant feeding. Infant feeding practices and known determinants were recorded within seven days and at one month. In-depth interviews were also used to identify their belief about fully informed infant feeding decision.

The results of this study showed that awareness about HIV/AIDS and MTCT was very high, but knowledge about PMTCT was poor among Ghanaian pregnant women. Misconceptions about transmission routes and consequences of HIV infection were also common. The role of health professionals in promoting prenatal HIV testing, which is a prerequisite for making informed infant-feeding decision, was found to be essential.

Ghanaian pregnant women had a typical pattern of “unrealistic optimism” regarding HIV/AIDS (Van der Pligt et al. 1993); even though they thought HIV was prevalent and serious, they did not believe that they would get infected with HIV. Their intention of

prenatal voluntary testing of HIV was well predicted by self-efficacy, followed by previous experience of being tested for HIV.

Most women preferred exclusive breastfeeding to formula feeding at least during the first month: they had strong positive attitudes, perceived more support, and were more confident about exclusive breastfeeding due mainly to the beneficial health effects of exclusive breastfeeding for infants. But women lacked knowledge about the effects of exclusive breastfeeding for themselves. Less than 4% pregnant women intended to introduce formula within one month because of its negative health consequences, but their intention of not introducing formula was limited to early life. Participants believed that formula such as S.M.A. could be introduced to the infants at the mean age of 4.9 months, contrary to the WHO recommendation of exclusive breastfeeding for 6 months (Butte et al. 2002).

While almost all women were willing to feed formula exclusively regardless of stigma or pressure from their family, if they had been tested HIV-positive, the feasibility of exclusive formula feeding is questionable. As most women were well aware of, preparation of formula safe enough to feed their infants seemed to be challenging. Although our study participants were recruited in urban health facilities, majority used charcoal as the main source of cooking fuel and more than 40% of them did not have access to piped water. Also, the maximum amount of money available to purchase formula was insufficient among 70% of participants to be able to obtain the recommended amount of the cheapest infant formula product on the market at the time of survey.

This study also clearly showed that spillover effect of formula feeding to children born to HIV-negative mothers or mothers of unknown status is likely to occur if subsidized formula is distributed for HIV-positive women without proper regulation and the extent of

spillover effect may be more than expected. More than a quarter of the women were interested in receiving subsidized formula in the event of formula being distributed for HIV-positive women even though they were not infected with HIV or they did not know their HIV status. One half of those who would like to feed formula to their infants indicated their plan of giving it before 6 months, resulting in an overall 12% possible exclusive breastfeeding spillover effects.

Recommendations

Based on the results of the study, the following recommendations are made to help Ghanaian pregnant women make an informed decision about infant feeding with minimal negative effects on maternal and child health. Considering the significant influence of health professionals on pregnant women's intention to take part in prenatal HIV testing, an 'opt-out' approach of VCT, in which all women are tested unless they specifically choose not to be, should be considered as a part of antenatal care. The pretest counseling, which can be offered with other health education to a group of women attending antenatal clinic can be used to inform them not only the advantages and the disadvantages of HIV testing, but also the correct information about HIV/AIDS, MTCT, as well as PMTCT. Women's right to refuse the test should also be clearly delineated.

Taking account of negative views of pregnant women about formula feeding during the first month, together with sub-optimal conditions to prepare safe formula, exclusive breastfeeding in the first few months of life, followed by abrupt weaning using formula and/or local foods may be more feasible for HIV-positive women in Ghana. To this suggestion be valid, the effects of exclusive breastfeeding versus mixed feeding on the rate of HIV MTCT should be further elucidated with more studies. Also, a systematic nutrition

education including the risks and benefits of exclusive breastfeeding and formula feeding should be offered to all pregnant women to minimize the spillover effects. By doing so, HIV-positive women can make an informed choice and HIV-negative women or women of unknown status of HIV can have a better understanding about why exclusive breastfeeding is recommended for them. The maternal benefits of breastfeeding should be routinely discussed also. In addition, nutrition education should use methods to reinforce women's self-efficacy, which was found to be the best predictor of both exclusive breastfeeding and formula feeding intention in this study. One possibility is hands-on training of breastfeeding techniques for pregnant women in general or that of hygienic and proper preparation of formula and cup feeding for HIV-positive women who decide to feed formula.

Limitations

Although this study elucidated culturally sensitive information that can help Ghanaian pregnant women make an informed infant feeding decision, the interpretation of these results is limited due to several reasons. The two polyclinics where we collected the data were located in western Accra. Thus, our sample might not truly represent pregnant women in Accra. Also, a cross-sectional survey of sensitive issues like HIV/AIDS and MTCT of HIV using in-person interview might have influenced participants' responses. Since the interviews were conducted in the clinic, the response to infant feeding questions may have been influenced by a social desirability bias as well. In addition, we measured pregnant women's intention, which were hypothetical and could be changed by many other factors. Finally, the actual feeding behavior was evaluated in only 10% of the purposive sample of clinic survey participants. Therefore, the results cannot be generalized to all pregnant women.

Future research

The findings of this study should be validated by conducting further research on a large scale with diverse samples including pregnant women from rural areas before being used for an intervention program. For a successful implementation of prenatal VCT services in Ghana, women's preference for universal testing to minimize the stigma attached to having the test over 'opt-out' approach, recommended by this study results, should be further examined. Pregnant women's perceptions, intentions and actual behaviors of exclusive breastfeeding and formula feeding beyond the first month should also be examined.

In any case, the infant-feeding decision by HIV-positive women should be tailored based on the individual risk/benefit ratio evaluation. To ease the confusion and burden of women as well as health care workers, evaluation guidelines that describe the risks and benefits of both exclusive breastfeeding and formula feeding in various circumstances should be developed with further studies. Finally, to increase the accessibility of alternative feeding for HIV-positive women who switch to breast milk substitutes from breast milk, further research of modifying nutritional contents of local complementary foods is needed so that they can be safely introduced to an infant prematurely weaned from exclusive breastfeeding.

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APPENDICES

Appendix 1.

Focus group discussion questionnaire

Appendix 1-a. Informed consent for pregnant women

DETERMINANTS OF FULLY INFORMED DECISION ON INFANT-FEEDING METHODS Informed Consent

We ask that you read this document and ask any questions you may have before agreeing to be in the study.

With the growing number of people affected by the human immunodeficiency virus (HIV) and the possibility that mothers may pass the virus to their babies through breast milk, women have to make difficult decisions about how to feed their babies. We are interested in pregnant women's knowledge, attitudes, and intentions regarding infant-feeding methods and participation of a HIV counseling and testing program. This is a research study conducted by Department of Food Science and Human Nutrition at Iowa State University, in collaboration with faculty at the Department of Nutrition and Food Science, at University of Ghana.

You will be asked to answer a pre-discussion questionnaire, which includes questions regarding 1) yourself, 2) infant-feeding methods, and 3) voluntary counseling and testing of HIV programs. You will also be asked to participate in a discussion with several other pregnant women regarding the same topics. The focus group discussion will take about one and a half hours and will be audiotaped.

Risks and Benefits of Being in the Study

Some of the questions to come may be uncomfortable to answer, because they have to do with HIV. Some people feel uncomfortable discussing these things, but we would really like to know what you think about these issues. There is no direct benefit to you. However, the study results might be used to improve a prevention program of mother-to-child-transmission of HIV for pregnant women as well as a nutrition intervention program for children born to HIV-positive mothers in Ghana. For your time, you will receive a small thank you gift for participating in the study.

Confidentiality

Once the focus group discussion is completed, personal information will be separated from other research data and kept locked by the investigator. The information will be only identified by a sequence number, when it is shared with others. When the study is completed, the personal information will be destroyed to make sure the confidentiality of study participants.

Voluntary Nature of the Study

You do not have to answer any questions that you do not want to answer, and you are free to withdraw at any time for any reason with no negative consequences or effects on the treatment you receive at the clinic.

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Statement of Consent:

I have read the above information. I have asked questions and have received answers. I consent to participate in the study. I have been offered a copy of this form to keep for my records.

Signature of participant	_____	Date	_____
Signature of witness	_____	Date	_____
Signature of interviewer	_____	Date	_____

Appendix 1-b. Pre-focus group discussion questionnaire for pregnant women

Participants no _____ Location _____ Date _____

PRE-FOCUS GROUP DISCUSSION QUESTIONNAIRE FOR PREGNANT WOMEN

(Q1-Q4: Record Verbatim: Multiple Answers. When the respondent stop listing, ask, “Is there anything else?”)

- Q1.** What foods do you intend to introduce to your baby within a month?
- Q2.** In addition to those foods, what foods do you intend to introduce to your baby within 6 months?
- Q3.** If a mother cannot or decides not to initiate breastfeeding, what can she feed her baby within a month?
- Q4.** If a mother cannot or decides not to initiate breastfeeding, what can she feed her baby within 6 months?
- Q5.** How likely it is for you to participate in an HIV counseling/education program at least once during the current pregnancy on a scale of 0-5? (0=none - 5=very likely)
- Q6.** How likely it is for you to take an HIV testing at least once during the current pregnancy on a scale of 0-5? (0=none - 5=very likely)
- Q7.** On a scale of 0-5, what do you think would be your risk of being infected with HIV in the next 12 months? (0=none - 5=very high risk)
- Q8.** What is the main reason for the risk category you have indicated above?

Appendix 1-c. Focus group discussion questions for pregnant women

<Part 1. Breastfeeding and Alternatives to breast milk>

Breastfeeding

1. What does the word 'breastfeeding' mean to you?
2. When I say 'exclusive breastfeeding, what comes to mind? What does 'exclusive breastfeeding' mean to you?
3. **(Attitudes + Perceived behavioral control + Cues to action)** How do you feel about feeding breast milk only for 6 months?
 - a. What do you see as the advantage or good things that would happen if you feed your child only breast milk during the first 6 months?
 - b. What do you see as the disadvantages or bad things that would happen if you feed your child only breast milk during the first 6 months?
 - c. What would make it difficult or impossible for you to feed your child only breast milk during the first 6 months?
 - d. What would make it easier for you to feed your child only breast milk during the first 6 months?
4. **(Subjective norms)**
 - a. Who (INDIVIDUALS OR GROUPS) do you think would approve or support if you feed your child only breast milk during the first 6 months?
 - Why do you think they support/approve if you feed only breast milk during the first 6 months?
 - Would their opinion be likely to influence what you do?
 - b. Who (INDIVIDUALS OR GROUPS) do you think would object or disapprove if you feed your child only breast milk during the first 6 months?
 - Why do you think they object/disapprove if you feed only breast milk during the first 6 months?
 - Would their opinion be likely to influence what you do? (E.G., PARTNER, FAMILY/ RELATIVES, FRIENDS, COWORKERS, COMMUNITY/ GOVERNMENT, CULTURE, ETC)
5. What would be the characteristics, qualities, or attributes of a woman who feeds her child only breast milk during the first 6 months?

Alternatives to breast milk

1. There might be a situation when a mother cannot give breast milk to her child. What might these situations be?
2. In those situations, what alternatives can she feed to her child?
 - a. Could you explain to me how to make it?
 - b. How easily can you make it? (PREPARATION)
 - c. How easily can you get it? (ACCESSIBILITY)
 - d. How affordable is it? (AFFORDABILITY)
3. **(Attitudes + Perceived behavioral control + Cues to action)** When you see a women feeding (____; A GIVEN CHOICE OF BREAST MILK ALTERNATIVE) to their child, what comes to mind? How do you feel about (____)?
 - a. What do you think would be the advantages or good things about feeding (____)?
 - b. What do you think would be the disadvantages or bad things about feeding (____)?
 - c. If you decide to feed (____) to your baby, what would it make difficult or impossible for you to feed it?
 - d. If you decided to feed (____) to your baby, what would it make easier for you to feed it?
4. **(Subjective norms)**
 - a. Who (individuals or groups) do you think would support or approve if you feed (____)?
 - Why do you think they support/approve if you feed (____)?
 - Would their opinion be likely to influence what you do?
 - b. Who (individuals or groups) do you think would object or disapprove if you feed (____)?
 - Why do you think they object/disapprove if you feed (____)?
 - Would their opinion be likely to influence what you do?
5. **(Perceived susceptibility)** What kinds of diseases could your baby get from feeding (____)?
 - a. What would increase the chance of your baby's getting (DIARRHEA, RESPIRATORY INFECTION, ETC) when you feed (____)?
 - b. What would decrease the chance of your baby's getting (DIARRHEA, RESPIRATORY INFECTION, ETC) when you feed (____)?
6. **(Perceived severity)** How serious would (DIARRHEA, RESPIRATORY INFECTION, ETC) be?
 - a. In what way? (HEALTH, SOCIAL, FINANCIAL, ETC)
 - b. What would be the consequence of having (DIARRHEA, RESPIRATORY INFECTION, ETC)?
7. What would be the characteristics, qualities, or attributes of a woman who feeds her child (____) during the first 6 months?
8. What would be the characteristics, qualities, or attributes of a child who is given (____) during the first 6 months?

<Part 2. HIV/AIDS>

1. When you see the term 'HIV', what comes to mind?
2. When you see the term 'AIDS', what comes to mind?
 - GENERAL DEFINITION
 - CULTURAL DEFINITION
3. **(Knowledge: Transmission)** How is HIV transmitted? What causes AIDS?
 - BIOLOGICAL FACTORS
 - BEHAVIORAL FACTORS (INTRA-PERSONAL/ INTER-PERSONAL)
 - SOCIOECONOMIC FACTORS
 - ENVIRONMENTAL FACTORS
 - CULTURAL FACTORS
 - SPIRITUAL/RELIGIOUS FACTORS
4. **(Knowledge: Prevention)** What could you do to prevent transmission of HIV?
5. **(Attitudes)** How do you feel about people with HIV?
 - a. If the person with HIV/AIDS is a male?
 - b. If the person with HIV/AIDS is a female?
 - c. If the person with HIV/AIDS is one of your friends?
 - d. If the person with HIV/AIDS is one of your families/relatives?
 - e. If the person with HIV/AIDS is your spouse/partner?
 - What do you see as the disadvantage or bad things that could happen to someone with HIV?
6. **(Subjective norms)**
 - a. Who (INDIVIDUALS OR GROUPS) do you think would be favorable toward people with HIV/AIDS?
 - Why do you think they are favorable toward people with HIV/AIDS?
 - Would their opinion be likely to influence what you think/do?
 - b. Who (INDIVIDUALS OR GROUPS) do you think would be unfavorable toward people with HIV/AIDS?
 - Why do you think they are unfavorable toward people with HIV/AIDS?
 - Would their opinion be likely to influence what you think/do? (E.G., PARTNER, FAMILY/RELATIVES, FRIENDS, COWORKERS, COMMUNITY/GOVERNMENT, CULTURE, ETC)
7. **(Perceived susceptibility)** How likely one can get HIV/AIDS?
 - a. What would increase the chance of one's getting HIV/AIDS?
 - b. What would decrease the chance of one's getting HIV/AIDS?
8. **(Perceived severity)** How serious would having HIV/AIDS be?
 - a. In what way? (HEALTH, SOCIAL, FINANCIAL, ETC)
 - b. What would be the consequence of having HIV/AIDS?

<Part 3. Prenatal voluntary counseling and testing of HIV>

1. When you see the term 'prenatal voluntary counseling and testing of HIV', what comes to mind?
2. **(Attitudes + Perceived behavioral control + Cues to action)** How do you feel about taking a prenatal HIV test accompanied by pre- and post- counseling?
 - a. What do you see as the advantage or good things that would happen if you take a prenatal HIV test?
 - b. What do you see as the disadvantage or bad things that would happen if you take a prenatal HIV test?
 - How serious would that be?
 - c. What makes it difficult or impossible for you to take it?
 - d. What make it easier for you to take it?
3. **(Subjective norms)**
 - a. Who (INDIVIDUALS OR GROUPS) do you think would support or approve if you take a prenatal HIV test accompanied by pre- and post- counseling?
 - Why do you think they support/approve if you take a prenatal HIV test?
 - Would their opinion be likely to influence what you do?
 - b. Who (INDIVIDUALS OR GROUPS) do you think would object or disapprove if you take a prenatal HIV test accompanied by pre- and post- counseling?
 - Why do you think they object/disapprove if you take a prenatal HIV test?
 - Would their opinion be likely to influence what you do? (E.G., PARTNER, FAMILY/RELATIVES, FRIENDS, COWORKERS, COMMUNITY/GOVERNMENT, CULTURE, ETC)
4. What would be the characteristics, qualities, or attributes of a woman who take a confidential HIV test accompanied by pre- and post- counseling?

Appendix 1-d. Informed consent for health care workers

DETERMINANTS OF FULLY INFORMED DECISION ON INFANT-FEEDING METHODS Informed Consent

We ask that you read this document and ask any questions you may have before agreeing to be in the study.

With the growing number of people affected by the human immunodeficiency virus (HIV) and the possibility that mothers may pass the virus to their babies through breast milk, women have to make difficult decisions about how to feed their babies. Health professionals encourage mothers to be informed about the risks and benefits of different infant-feeding methods. We are interested in health professionals' view on current decision-making recommendations for HIV-positive mothers. This is a research study conducted by Department of Food Science and Human Nutrition at Iowa State University, in collaboration with faculty at the Department of Nutrition and Food Science, at University of Ghana.

You will be asked to answer a pre-discussion questionnaire, which includes questions regarding 1) mother-to-child transmission of HIV, 2) prenatal voluntary counseling and testing of HIV, and 3) current recommendation of informed infant-feeding decisions. You will also be asked to participate in a discussion with several other health professionals regarding the same topics. The focus group discussion will take about one and a half hours and will be audiotaped.

Risks and Benefits of Being in the Study:

There is no foreseen risk or direct benefit to you. However, the study results might be used to improve a prevention program of mother-to-child-transmission of HIV for pregnant women as well as a nutrition intervention program for children born to HIV-positive mothers in Ghana. For your time, you will receive a small thank you gift for participating in the study.

Confidentiality:

Once the focus group discussion is completed, personal information will be separated from other research data and kept locked by the investigator. The information will be only identified by a sequence number, when it is shared with others. When the study is completed, the personal information will be destroyed to make sure the confidentiality of study participants.

Voluntary Nature of the Study:

You do not have to answer any questions that you do not want to answer, and you are free to withdraw at any time for any reason with no negative consequences.

Contacts and Questions:

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Statement of Consent:

I have read the above information. I have asked questions and have received answers. I consent to participate in the study. I have been offered a copy of this form to keep for my records.

Signature of participant	_____	Date	_____
Signature of witness	_____	Date	_____
Signature of interviewer	_____	Date	_____

Appendix 1-e. Pre-focus group discussion questionnaire for health care workers

- Q1.** There might be a situation when a mother cannot give breast milk to her child. What might these situations be?
- Q2.** In those situations, what alternatives can she feed to her child?
A. Of those, what do you think is the most feasible alternative in Ghana?
B. Why do you think so?
- Q3.**
A. In every 100 **pregnant women** you see in the clinic, how many of them do you refer for HIV counseling/ prevention program?
a. Where do you refer them?
B. In every 100 **pregnant women** you see in the clinic, how many of them do you refer for HIV testing?
a. Where do you refer them?
C. In every 100 **pregnant women** you see in the clinic, how many of them do you believe are HIV-positive?
- Q4.**
A. In every 100 **HIV-positive pregnant women**, how many of them do you think transmit the virus to their baby in utero?
B. In every 100 **HIV-positive pregnant women**, how many of them do you think transmit the virus to their baby during labor and delivery?
C. In every 100 **HIV-positive pregnant women**, how many of them do you think transmit the virus to their baby through breastfeeding?
- Q5.**
A. What do you think is the current infant-feeding recommendation (policy) of WHO for **HIV-positive women**?
B. What do you think is the current infant-feeding recommendation (policy) of Ghanaian MOH for **HIV-positive women**?
- Q6.**
A. If you see a **HIV-positive woman** in your clinic, what would you recommend to feed her child?
B. What is the main reason that you recommend that?

Appendix 1-f. Focus group discussion questions for health care workers**<Part 1. HIV/AIDS, MTCT>**

1. **(Attitudes)** How do you feel about people with HIV? How do you feel about mother-to-child transmission of HIV? How do you feel about mother-to-child transmission of HIV through breastfeeding?
 - a. What do you see as the disadvantage or bad things that could happen to someone with HIV?
 - b. What do you see as the disadvantage or bad things that could happen to a mother with HIV?
2. **(Subjective norms)** What would you say is the view of other health professionals in general about
 - a. People with HIV/AIDS?
 - b. Mother-to-child transmission of HIV/AIDS?
 - c. Mother-to-child transmission of HIV/AIDS through breastfeeding?

<Part 2. Prenatal voluntary counseling and testing of HIV>

1. **(Attitudes + Perceived behavioral control + Cues to action)** How do you feel about prenatal counseling and testing of HIV?
 - e. What do you see as the advantage or good things that would happen if a pregnant woman takes it?
 - f. What do you see as the disadvantage or bad things that would happen if a pregnant woman takes it?
2. **(Subjective norms)** What would you say is the view of other health professionals in general about prenatal counseling and testing of HIV?
3. What would be the characteristics, qualities, or attributes of a woman who take a counseling and testing of HIV?

<Part 3. Alternatives to breast milk>

1. There might be a situation when a mother cannot give breast milk to her child. In those situations, what alternatives can she feed to her child?
 - a. Could you explain to me how to make it?
2. **(Attitudes + Perceived behavioral control + Cues to action)** When you see a women feeding (____: a given choice of breast milk alternative) to their child, what comes to mind? How do you feel about (____)?
 - a. What do you think would be the advantages or good things about feeding (____)?
 - b. What do you think would be the disadvantages or bad things about feeding (____)?
3. **(Subjective norms)** What would you say is the view of other health professionals in general about women feeding (____)?
 - a. Who (INDIVIDUALS OR GROUPS) do you think would support or approve if a mother feeds (____)?
 - Why do you think they support/approve if a mother feeds (____)?
 - Would their opinion be likely to influence what you think?
 - b. Who (INDIVIDUALS OR GROUPS) do you think would object or disapprove if a mother feeds (____)?
 - Why do you think they object/disapprove if a mother feeds (____)?
 - Would their opinion be likely to influence what you think?
4. **(Perceived susceptibility)** What kinds of diseases could a baby get from feeding (____)? How likely is it that a baby gets (DIARRHEA, RESPIRATORY INFECTION) from feeding (____)?
 - a. What would increase the chance of a baby's getting (DIARRHEA, RESPIRATORY INFECTION, ETC) when a mother feeds (____)?
 - b. What would decrease the chance of a baby's getting (DIARRHEA, RESPIRATORY INFECTION, ETC) when a mother feeds (____)?
5. **(Perceived severity)** How serious would (DIARRHEA, RESPIRATORY INFECTION, ETC) be?
 - c. In what way? (HEALTH, SOCIAL, FINANCIAL, ETC)
 - d. What would be the consequence of having (DIARRHEA, RESPIRATORY INFECTION, ETC)?
6. What would be the characteristics, qualities, or attributes of a mother who feeds her child (____) during the first six months?
7. What would be the characteristics, qualities, or attributes of a child who is given (____) during the first six months?

Appendix 2.

Content analysis results of focus group discussion with pregnant women

*The number indicate the focus group discussion number

⌘ BENEFITS OF EXCLUSIVE BREASTFEEDING

EBF MAKES THE CHILD STRONG

- 0. When you feed BM, it gives strength to the child.
- 0. When you give them BM, they become strong and also they become it
- 6. The food and the water in it give them strength. Just as it has been said we shouldn't give them water. It is the water in the BM, which will favor them before we start giving them water when they are 6 months old.

EBF MAKES THE CHILD HEALTHY (=↓ ILLNESS)

- 0. I feel it is good because it will let the child become healthy but there are some people who buy Lactogen for the baby.
- 1. It broadens the mind of the child and protect the child from getting diseases.
- 1. It also prevent the child from getting sick.
- 2. It prevents the child from having diseases.
- 5. There are some women who will not boil the water before they give it to their babies, but BM has been cooked naturally by God. So I think this new recommendation (EBF for 6mo) is good and the children don't normally get sick.
- 6. It makes them healthy because there is water in the BM that will sustain them till they are 6 months. So I think it is good.

EBF MAKES THE CHILD INTELLIGENT

- 0. Also it broadens the mind of the child.
- 0. When you give them BM, they become strong and also they become intelligent
- 1. It broadens the mind of the child and protect the child from getting diseases.

EBF INCREASES BONDING OF THE MOTHER AND THE CHILD

- 0. Breastfeeding binds the mother and the child together in love.
- 0. It also brings love between the mother and the child.

EBF HELPS THE CHILD GROW WELL (=FINE)

- 1. It makes the child grows well. You should not give the child any foods that will let the child becomes malnourished.
- 1. It is good because the BM makes the children look fine. You don't have to give other foods that will let the child get kwashiorkor or get sick. The BM is important.
- 3. It is good thing because when I gave birth to my first child, I fed only BM to the child, which made him grow nicely. Everybody was happy about the child's health.
- 6. It is good because the BM is food and water. So it is necessary for you to breastfeed the child. It makes the child fine.

EBF IS CONVENIENT & HYGIENIC

- 2. Because some people don't wash it well when they use feeding bottle, the baby gets sick.
- 4. I feel it is good because there are some women they don't wash the feeding bottle well and they will not handle the child water well. So I feel it is good to give BM up to 6 months before you introduce water to the baby.
- 5. It is good because there are some people who are dirty. When they are using feeding bottle, they don't handle it well. They feed with the dirty bottles and utensils.
- 5. There are some women who will not boil the water before they give it to their babies, but BM has been boiled naturally by God. So I Think this new law is good and the children don't normally get sick.

BM HAS ALL THE NUTRIENTS THE CHILD NEEDS

- 5. But the BM has naturally been prepared so that the child can be satisfied with the right content.
- 6. It is good because the BM is food and water. So it is necessary for you to breastfeed the child. It makes the child fine.

⌘ POSSIBLE SITUATIONS A MOTHER CAN NOT BREASTFEED

MOTHER HAS NO/LITTLE BM

0. When the mother is not having enough BM.
0. Some mothers also don't have BM
1. Too much thinking prevents the mother from having enough milk.
2. Some may not have enough BM.
3. I know of a lady who doesn't have enough BM.
4. There are some who has no milk in their breasts
5. There are some who don't have HIV, but she just doesn't have BM in her breasts. So she can feed S.M.A. to her baby till she gets BM. Before she gets BM, she has to eat certain food like roasted corn and mashed kenkey.
6. There are women who will have big breasts without pains when they give birth. But there will be no BM at all to feed the child

MOTHER HAS BREAST/NIPPLE PROBLEM

1. If the mother has a disease in her breasts.
3. Maybe the mother had problem in her breasts and she had been told not to feed her child.
3. I know a lot of sicknesses such as boils and burst. This can prevent you from feeding the child. And it is the baby that stops sucking the breast.
3. Breast cancer.
4. If there is disease in the breast
4. When some people give birth, the breast becomes swollen. When they give it to the child, he doesn't suck it. So when they take him to the doctor, he will tell you not to breastfeed and will recommend a food for the baby.
6. Maybe the mother is having problems in the breast
6. It can be breast cancer

MOTHER HAS OTHER ILLNESS

0. Maybe the mother is sick and has been hospitalized. The condition of the mother might make the health workers ask the mother to feed her child with other foods such as Cerelac or Lactogen.
1. Maybe the mother is sick.

MOTHER HAD CESAREAN SECTION

2. Maybe the mother had cesarean operation when she was giving birth. The mother will not be too well to breastfeed the child
5. During the birth, if the mother was operated, it means the mother cannot breastfeed. So in this case, she can give other foods
6. If the mother had been operated upon, she cannot breastfeed the child immediately

MOTHER IS DEAD

0. If the mother died through the child's birth, it can also let that happen.
1. When the mother dies
4. Sometimes, the mother died during delivery

MOTHER IS WORKING

2. The nature of someone's work also affect them in the child's breastfeeding

MOTHER IS HIV-POSITIVE

5. If the mother is sick and she has HIV. The virus is in the blood and since BM is a kind of blood, the child will be also infected when he takes BM. Usually, the child has already gotten the virus, before he comes out. Sometimes, doctor can detect the virus in the mother's blood, but not in the baby's. So in this case, the mother will be advice not to breastfeed the child.

MOTHER WANTS TO STOP

0. Some mothers might want to stop giving the child BM

THE CHILD DOESN'T TAKE/LIKE BM

6. There are children who don't like BM. The mother will force them, but they will not take it. But when you give them S.M.A., they will take it.

⌘ ALTERNATIVES TO BM

(NO ONE KNEW ABOUT THE MODIFICATION OF POWDERED MILK OR FRESH/RAW MILK AS AN ALTERNATIVE TO BM. MOST WOMEN CONSIDERED EVAPORATED/POWDERED MILK AS SOMETHING THAT CAN BE ADDED TO PORRIDGE SO THAT IT CAN BE MORE NUTRITIOUS)

INFANT FORMULA (S.M.A., LACTOGEN)

1. She can give the child S.M.A.
1. Lactogen
3. She can give S.M.A.
3. Lactogen
3. You can give light koko and add S.M.A. to it.
3. If there is no BM, I think the mother can give S.M.A. first and then followed it with light koko.
3. I think from the first day, you can give S.M.A. Then when the baby is 3 months old, you feed the child with Lactogen. When the child is 6 months, you can give the child Lactogen and koko, and soya bean
3. If a doctor advises you not to breastfeed and you have money, then you can buy S.M.A. and feed it to the child
4. You can give S.M.A., koko with Ideal milk or you can put S.M.A. in the koko for the child
4. You can give Lactogen and Cerelac
4. The first day, you can give S.M.A. or Lactogen
4. Let's assume you've delivered today and the child does not like being breastfed. So you try feeding some food. If the baby can eat koko, you give koko. If it is S.M.A., you can give that one too.
4. The S.M.A. is just like BM so when you give it to the baby, it will help her. Then give koko
5. You can give only S.M.A
6. Some said S.M.A. must be fed, but you can also give Lactogen.
6. Others prepare light koko and add S.M.A. to it

COMMERCIAL COMPLEMENTARY FOODS (CERELAC, COMPLAN, ETC)

1. Cerelac
3. (You can start feeding child with Cerelac) First month until 6 months
3. I think from the first day, you can give S.M.A. Then when the baby is 3 months, you feed the child with Lactogen. When the child is 6 months, you can give the child Cerelac and koko, and soya bean
4. You can give Lactogen and Cerelac
4. It's just a matter of making sure child eats what you feed him. If you should feed the child with porridge and she eats, you can then go on with it or give Cerelac providing the child likes it as well
4. From 4 months you can give Cerelac
5. From 6th month, you can feed Cerelac
5. You can feed Cerelac from 3 months onward
6. There are child who gets hungry easily. So you can prepare light Cerelac
6. From 4 months, you can feed Cerelac
6. A lot of people also give Cerelac (before 6 months)

MILK (IDEAL, NIDDO, PEAK, COW BELL)

2. You can give koko. You can also add milk (i.e. Ideal) or egg right before you give it to the child
4. You can give S.M.A., koko with Ideal milk or you can put S.M.A. in the koko for the child
5. S.M.A., Lactogen, Cerelac, koko and Niddo
5. You can give Lactogen or Niddo

PORRIDGE (KOKO, TOM BROWN, WEANIMIX)

0. In 2 months time, she can prepare koko for the child.
2. You can give koko. You can also add milk or egg right before you give it to the child
3. You can give light koko and add S.M.A. to it
3. If there is no BM, I think the mother can give S.M.A. first and then followed it with light koko.
3. I think from the first day, you can give S.M.A. Then when the baby is 3 months, you feed the child with Lactogen. When the child is 6 months, you can give the child Cerelac and koko, and soya bean
3. You can give koko from 6 months
3. Okay. Since there is no BM for the child during the first week when you prepare light koko for the child and the child eat it, I think you continue with it.
3. If there is a problem with the BM, you can prepare light koko, just like BM. Then you give it to the baby to drink.
3. Some children may eat. For instance, my oldest child started taking porridge when she was three weeks and it made her look fine. I fed her only porridge and she was fine.
3. Some also add soya bean and Lactogen to koko
4. You can give S.M.A., koko with Ideal milk or you can put S.M.A. in the koko for the child
4. There are some children who can also take koko, so I will give koko.
4. It's just a matter of making sure the child eats what you feed him. If you should feed the child with porridge and she eats, you can then go on with it or give Cerelac providing the child likes it as well
4. Let's assume you've delivered today and the child does not like being breastfed. So you try feeding some food. If the baby can eat koko, you give koko. If it is S.M.A., you can give that one too.
4. I will give koko between the 3rd or 4th month. I will make sure I strain it well for it to be light. Then, I will mix some 'whintia (clove)' to give it a nice flavor
4. The S.M.A. is just like BM so when you give it to the baby, it will help her. Then give koko
5. You can feed koko from the 3rd month.
6. Some people give koko from 3 months onward, because maybe the mother has to go to work. She will leave some BM, but one looking after the baby may decide to give koko.
6. A lot of people give koko early (before 6 months)
6. Others prepare light koko and add S.M.A. to it

⌘ PREPARATION OF ALTERNATIVES TO BM**PREPARATION OF INFANT FORMULA**

0. What I know is that you will fetch water into the baby's cup then you scoop 2 or 3 spoons of Lactogen into the child cup, then you stir it up. That is what I know. You can use hot water. Sometimes you can use cold water
0. What I want is what I pour in (Q: What will determine how many spoons of Lactogen you use?)
0. Okay. I was with a sister. When she gave birth, she took 3 spoons of water & she took 3 spoons of Lactogen so that the water or Lactogen will not be more than the other. You use hot water.

1. You will put water into the feeding bottle. Then you put in the S.M.A. depending on how you want.
1. There are instructions on the label of the Lactogen tin.
1. You can give Lactogen to the child according to the months of the child. You can start with 3-4 tables spoons.
1. Oh, I use my own mind (to mix S.M.A.)
1. When you read the label of S.M.A., there are instructions provided on it. You can read it.
1. You will use your mind or sometimes the instructions are on the containers
1. You will boil the water together with the sugar to mix well because you're preparing it for a baby

PREPARATION OF COMMERCIAL COMPLEMENTARY FOODS

0. I mixed Cerelac with warm water. Sometimes I add Ideal milk
0. Because she doesn't eat Cerelac well sometimes, I take four or five teaspoons
1. Take warm water, then you put in the Cerelac, stir until it is OK

PREPARATION OF KOKO

0. To make koko you use corn dough. My grandmother taught me to put water on fire first. When it boils then you strain the dough into boiling water. My grandmother had a spice called 'whintia (clove)' so that the koko will smell good. When it is five to ten minutes time, then you lift it off the fire and pour it into a flask. Sometimes can add the sugar into the koko while it is still on fire. Sometimes, we don't put sugar. My grandmother told me that it would let the child like sweets too much from the beginning. So we don't add sugar.
1. You will boil water first, then mix the dough with water, and strain it into the boiling water. We strain so that if there are ants or other things, it will not get into the boiling water. Then you stir till it is ready

§ AFFORDABILITY (AVAILABILITY) OF ALTERNATIVES TO BM

S.M.A.: VERY EXPENSIVE

1. The Cerelac is not expensive like the S.M.A. The S.M.A. is very expensive so if you don't have money you will struggle to get it.
3. If you don't have money. S.M.A. is expensive; it costs 50,000 cedis.
4. Someone may not have BM after 1 month, but cannot afford S.M.A.
4. Money problems will make it difficult to get S.M.A., Lactogen, and Cerelac.
5. It is very expensive (to get S.M.A. and Lactogen).
5. There are some people who don't have money to buy. So it will be difficult for such a person (to get S.M.A.).
6. Yes, the cost can stop you from feeding S.M.A., or Lactogen.
6. A lot of people can't afford. It (S.M.A) is very expensive.

LACTOGEN: EXPENSIVE

0. Lactogen is expensive. Koko is not expensive and Cerelac is next to Lactogen.
0. Lactogen is expensive. It is 22000 cedis.
1. Lactogen is very expensive to get.
5. It is very expensive for them (to get S.M.A. and Lactogen).
6. Yes, the cost can stop you from feeding S.M.A., or Lactogen.

CERELAC: SOMEWHAT EXPENSIVE

1. Cerelac is not expensive, compared to S.M.A. or Lactogen.
1. The Cerelac is not expensive like the S.M.A. S.M.A. is very expensive so if you don't have money you will struggle to get it.
5. It will be difficult for some people to get Cerelac in terms of money.

6. Cerelac is also expensive.
6. Every mother can give Cerelac if she can afford it.
6. We have two types of package on the market; one in a sachet and the other in a tin. So it depends on which one you can afford.
6. When you have the money, it is not difficult to get some. There are a lot of Cerelac on the market.

PORRIDGE: AFFORDABLE

0. As for koko, it is easy to get when you have 500 cedis. You can buy the corn dough and also what I have to say is it depends on what the child likes.
0. Koko is easy to afford.
1. Koko is not expensive at all.
4. Yes, getting the maize is no problem.
4. When you have one or half 'American tin of maize' you can prepare your koko in more hygienic way for the child and it is also cheaper.
4. Corn dough for koko is not scarce at all.
5. It is not difficult to get at all, if you have 500 cedis, you can buy enough corn dough for koko.
6. You need only 500 cedis worth of corn dough for koko.
6. The easiest type of food (in terms of affordability) is koko.
6. You can easily get corn dough. You have to prepare it in more hygienic way. If you have sugar, you can add a little to it. You can't just give sugar to the child. You can only add one cube of sugar to the koko.

⚡ ATTRIBUTES OF MOTHER GIVING ALTERNATIVES TO BM

MOTHER HAS LITTLE/NO BM (=THE CHILD IS NOT SATISFIED WITH ONLY BM)

0. May be the BM is not sufficient enough for the child.
0. What I want to say is that some don't have BM so they need to give the baby Lactogen to drink before she gives the koko.
0. Maybe the BM doesn't satisfy the child. Lactogen is just like BM unlike koko. So the mother can give it to the child.
1. I feel it is not money alone because when you give S.M.A. to your child, the baby becomes fine. Some give it because they don't have BM.
3. I think the mother doesn't have BM. Some mothers have big breast, but there is nothing in it. The other day I argued with a mom. They said if a child cries often, it is because the child is not satisfied with the BM. But I think sometimes, it is something else which is worrying the child. If the child is not satisfied with the BM, she can buy S.M.A. for the baby.
3. A mother who doesn't have BM.
6. A mother who feels that her BM is not enough to satisfy the child can feed S.M.A.

MOTHER IS RICH (IF SHE CAN FEED INFANT FORMULA SUCH AS S.M.A., LACTOGEN)

1. I feel the person is financially okay.
1. I think the mother is rich.
1. Someone with money (can feed S.M.A).
2. I think when you are rich,
3. I will say the mother has done well (financially).
3. Some feel they have money. So they will waste it on infant formula. The rich can also buy.
3. Some mothers think they have money for S.M.A. A person who is rich can also buy.
4. (If I see a mother feeding her child with only Lactogen and S.M.A.), I will think she has money
6. The person has money (if she can buy S.M.A.)

MOTHER IS POOR (IF SHE FEEDS ONLY PORRIDGE)

0. The poor (can feed porridge)
2. Poor women give koko
3. A poor mother feeds koko
4. I will think she doesn't have money (if a mother feeds only koko to the child)
6. I feel she doesn't have money to buy S.M.A. That is why she is feeding koko

ANYBODY CAN FEED PORRIDGE (NOT A PARTICULAR MOM)

0. I also think the koko is very good for the children. So everybody can give koko to the child, either you have or don't have money.
1. Anyone can feed koko. It is not for the rich or the poor. Everybody can feed koko
3. Everybody can feed koko
4. Every mother can give koko. Sometimes, the child will not take in koko. The child wants heavy food
6. Everybody gives the child koko

MOTHER IS WORKING/STUDYING (=DOESN'T HAVE ENOUGH TIME TO BF)

0. Sometimes, the mother is an office worker, so she has to supplement BM with infant formula.
0. What comes to mind is that the mother doesn't have time. Maybe she works at the bank. So when she goes to work she leaves it (formula) for the child to be fed with it
0. A woman who works at the bank or a trader can also prepare to be given to the child. As for Lactogen, a rich women or a poor women can buy (as long as they want).
1. Also some are government workers so they are not in the house to feed the child. That is why they feed S.M.A. So it is not because she wants to show off or she has money in excess but it's because she doesn't have time.
5. Some don't want to breastfeed because they are students.
6. Mothers who work 3 months after birth are those who normally feed S.M.A.
6. I think the mother is working (if she feeds S.M.A.)

MOTHER DECIDES WHAT TO FEED (UP TO MOM)

4. It is up to you, the mother. It depends on what you want to give your infant. Even if you're poor, if you want your child to eat S.M.A. in order to grow well, you would have to buy the S.M.A for the child.
5. There are some women who sell something at the market. They will feed koko so that the baby can be satisfied and sleep.

MOTHER IS WORRIED ABOUT THE SHAPE OF THEIR BREAST (SAGGY BREAST)

3. Some mothers believe that when they feed BM continuously, their breast will be flattened. That is why they feed S.M.A.
5. There are some women who have decided not to breastfeed even though they don't have any problem because they believe the breast will be flattened
6. Some also don't want their breast to be saggy. So they buy tin food for their babies

MOTHER IS SHY OF SHOWING HER BREAST IN PUBLIC

6. Others don't want to breastfeed their babies a lot. They think people will look at their breasts when they are breastfeeding the child

MOTHER DIDN'T RECEIVE SUPPORT/COUNSELING FOR BF

5. Some mothers don't know how to hold a baby to breastfeed. So the baby becomes tired as she sucks and then decided not to take BM again
5. What I ask myself is how old the baby who will be fed koko is. When the child is 6 months old, it's okay, but if the child is not, I will ask myself whether it is because she has not attended antenatal clinic or what

MOTHER HAS PROBLEM IN HER BREASTS

5. I feel there is a problem in the breast

⌘ ATTRIBUTES OF BABY RECEIVING ALTERNATIVES TO BM

INFANT FORMULA

CHILD GROWS NICELY/WELL

1. I feel it is not money alone because when you give S.M.A. to your child, the baby becomes fine.
Some give it because they don't have BM.
3. The S.M.A.-fed child grows well.
5. The child grows fine (S.M.A.).
5. Grows well and bouncy (S.M.A.).
6. They grow nicely (S.M.A.).

CHILD BECOMES HEALTH/STRONG

1. The child becomes healthy (infant formula).
6. Because we do not have sufficient BM, they have added some medicine (vitamin & mineral) to the S.M.A. to give them strength and energy.

CHILD BECOMES BIG

2. The S.M.A.-fed child grows quickly, but not strong enough
6. The child will grow fat (S.M.A.).
6. The child will be big and bouncy (S.M.A.)

CHILD LIKES IT

5. Some children don't like BM, but they like tin food. There is a woman in my house whose child doesn't drink BM, but when she gives the child tin food, the child eat it.

ALL DEPENDS ON HOW MOTHER PREPARES IT

5. I think all this depends on the person feeding it and how well she prepares it. A child can be fed S.M.A. and she wouldn't be bouncy, but some will be bouncy. All will depend on the neatness of the one who is preparing it.

PORRIDGE/COMMERCIAL COMPLEMENTARY FOODS

CHILD GROWS NICELY/WELL

3. My child, for instance, I gave her koko at week 3 and she was fine.
3. It will all depend on the preparation. When you add S.M.A. and Lactogen (to koko), the child grows well.
3. The child will become fine because there is milk in Cerelac.
5. The baby becomes bouncy as well (koko).

CHILD BECOMES HEALTHY/STRONG

0. Koko makes the child strong and healthy.
1. The child grows nicely and healthy. Also when you say koko, it is not raw koko. We add Lactogen, soya bean, ground nut to enrich it.
1. I think when you add groundnut paste to the koko, it strengthens the child.
6. The child can grow fat no matter what. They will get strength (koko).
6. When you add soya bean and weanimix to koko, the child will be healthy.

CHILD BECOMES BIG

2. The koko-fed baby gains weight more than the one who is fed S.M.A..
2. The Cerelac-fed child gains weight.
6. The child will grow big (Cerelac).
6. There is maize-based Cerelac. So the Cerelac-fed baby will gain more weight than the S.M.A.-fed child.
6. The child also grows big (koko).
6. The child can grow fat no matter what. They will get strength (koko).
6. When you take a child who feeds on koko, for instance, the child will grow big because koko is our local food.

6. The one who eats koko will gain more weight than the child who eats S.M.A. S.M.A.-fed child will also be heavier than Cerelac-fed baby.

CHILD BECOMES INTELLIGENT

6. Cerelac will also broaden their mind.
6. It broadens their mind because koko feeding started from the old days.

CHILD LIKES IT

3. There are some children who don't like tin foods, but like koko.
4. Some have money, but they feed koko because maybe the child doesn't like tin food.
4. Some parents have money, so they don't want to give their children koko. But with my children, when you give them S.M.A., they will not eat it, but they enjoy taking koko.
4. Some children may not like to eat certain foods. Some wealthy mothers might not like to feed porridge to their baby. But with my child, she'll eat the porridge and refuse the S.M.A.
4. Every mother can give koko. Sometimes, the child will not take in koko. The child wants heavier food.
4. I think the child likes Cerelac. That's why the mother has bought it for the child.
5. There are some children who don't get satisfied with the BM unless you add koko. So I feel the baby is not satisfied with BM.
5. I feel she doesn't like BM (but likes koko).
6. There are children who get hungry easily. So you need to prepare light Cerelac.
6. There are some women who don't go to work at all, but feed other foods. The child is not satisfied with BM. So the baby will cry until you give another food.

⌘ ADVANTAGES/DISADVANTAGES OF FEEDING INFANT FORMULA (S.M.A., LACTOGEN, ETC)

ADVANTAGES

CHILD GROWS NICELY/WELL

1. A lot of mothers give S.M.A. to their baby not because the mothers have money, but because it helps the child to grow.
1. I feel it is not money alone because when you give S.M.A. to your child, the baby becomes fine. Some give it because they don't have BM.
1. It helps the child become nice.
2. The child is always fine.
3. The S.M.A.-fed child grows well
3. When you add S.M.A. and Lactogen, the child grows well. But it will all depend on the preparation.
6. They grow nicely (when you feed S.M.A.).

CHILD BECOMES HEALTHY/STRONG

2. When you don't have enough BM, you can feed your child with S.M.A. The child will be healthy until you have enough BM to feed the child.
3. When you give S.M.A., the child doesn't normally get diarrhea.
4. S.M.A. makes the baby strong.
4. It also makes the infant grow strong. As human being, when we eat, we're always strong. But S.M.A. contains certain things that makes the child strong whereas porridge lacks those things
6. S.M.A. gives strength to the child because they've added medicine to it to make the children strong, especially when you cannot breastfeed the child.

CHILD BECOMES BIG/FAT/BOUNCY

0. What I also know is that the Lactogen makes the child grows fat.
4. Sometimes, S.M.A. makes the children grow fat.

6. The child will grow fat (S.M.A.).
6. The child will be big and bouncy (S.M.A.).

INFANT FORMULA HAS NUTRIENTS CHILD NEEDS (=LIKE BF)

1. S.M.A. contains a lot of nutrients like calcium which makes child's bones strong
4. It also makes the infant grow strong. As human being, when we eat, we're always strong. But S.M.A. contains certain things that makes the child strong whereas porridge lacks those things
5. There are some vitamins in S.M.A.
5. All the nutrients in the BM are also in the S.M.A.
5. S.M.A. is just like the BM. It has all the nutrients the baby needs.
6. S.M.A. gives strength to the child because they've added medicine to it to make the children strong, especially when you cannot breastfeed the child.
6. S.M.A. is just like the BM.
6. Because we do not have sufficient BM they have added some medicine to the S.M.A. to give them strength and energy.

MOTHER HAS MORE FREE TIME/DOESN'T NEED TO SHOW HER BREAST IN PUBLIC

2. Yes, you are free.
6. Others don't want to breastfeed their babies a lot. They think people will look at their breast when they are breastfeeding the child

DISADVANTAGES

CHILD BECOMES SICK BECAUSE IT DOESN'T SUIT WELL FOR THE CHILD

1. Feeding only Lactogen can cause the child constipation.
4. All is good, but it depends on the child. There are some children who go to toilet (diarrhea) when you give S.M.A.
4. Some infants may have watery stool continuously (after eating S.M.A.).
6. Some mothers think that when you feed a lot of S.M.A., the child will get diarrhea. So when you add other nutrients to the koko, it is good.
6. The child will have stomach problem (sore stomach) after feeding S.M.A.
6. When you give S.M.A. to your child, you must make sure that you get amoxycyline (antibiotic) because the child gets sore in the stomach.
6. S.M.A. is good for some children, but not for others. They have different stomachs.
6. The child can get diarrhea after feeding S.M.A. So when it happens, you have to stop feeding.

CHILD BECOMES SICK DUE TO INADEQUATE USE OF INFANT FORMULA

3. If it has been expired, S.M.A. can give the baby diarrhea.
3. Because S.M.A. is expensive, they don't throw away what is left after feeding, but keep it in a refrigerator and feed the child with it. This can also let the child have diarrhea.
5. Even though they have written how to prepare it on the label, it is not everybody who can read. So such a person prepares it with her own mind. So she can overfeed or underfeed the baby by not taking the right amount of food. But the BM has naturally been prepared so that the child can be satisfied with the right content. There are pictures on the tin about how to scoop the formula. There are some people who haven't been to school, but they are smart, so they can learn from those pictures on the label.
5. If the child is not yet 6 months old, you have to know how to prepare it. If you make it too thick, the child can get constipation.

CHILD BECOMES SICK DUE TO POOR HYGIENE DURING PREPARATION & FEEDING

0. When the mother didn't cook it well or she didn't wash the child's utensils well, formula feeding can also bring diarrhea.
0. When we go for weighting, we can see some mothers don't keep the feeding bottle clean, especially the teat. Some of them are green. So if you don't boil it, germs can come inside.

So you have to put it on fire to boil it and then wash it. After that, you give it to your child and I believe if you do it that way it will help for not letting disease getting inside.

1. All is good, but it depends on the preparation. If you don't prepare it well, the problem occurs. If you use dirty water or if you don't boil the water well, that will make the child become sick.
2. Because some people don't wash it well when they use feeding bottle, child gets sick.
2. Some mothers don't clean the teat of the feeding bottle after use. Also, they don't throw away what is left, but give it to the child. The child will get sick with cholera.
5. When some finish feeding their babies, they leave the feeding bottle outside. The wind will blow over it and flies will play around it. When she comes, she will not wash the bottle, but will use it to feed the child. When it happens, the child can get constipation, diarrhea, and even worms.
6. If the utensils that you use to prepare S.M.A. are dirty and you feed the child with them, she will get diarrhea because the child is not mature enough.

⌘ ADVANTAGES/DISADVANTAGES OF FEEDING COMMERCIAL COMPLEMENTARY FOODS (CERELAC, COMPLAN, ETC) AND/OR MILK (IDEAL, PEAK, NIDDO, COW BELL)

ADVANTAGES

CHILD BECOMES FULL/SATISFIED

0. There are some children who become fine when you give them the Cerelac. Some, however, do not eat and only cry, when you give it.
3. The child will become fine because there is milk in Cerelac.
6. When the child eats Cerelac and you top it up with BM, the child will be satisfied. So it is good.

CHILD BECOMES HEALTHY/STRONG

0. Cerelac lets the child grow and become strong.
2. I think the Cerelac is just like the koko. The child gets healthy when given Cerelac.
6. There is energy in Cerelac.

CHILD BECOMES BIG/FAT/BOUNCY

0. Cerelac lets the child grow and become strong.
6. The child will grow big (when fed Cerelac).
6. There is maize-based Cerelac. So the Cerelac-fed baby will gain more weight than the S.M.A.-fed child.

CHILD BECOMES INTELLIGENT

6. Cerelac will also broaden their mind

MOTHER HAS MORE FREE TIME

5. If you feed Niddo to your baby, you can leave your baby to someone else and then you go to town.

COMPLEMENTARY FOOD HAS NUTRIENTS THE CHILD NEEDS (=LIKE BF)

5. Cerelac is good because they have mixed everything together already: there are maize and Niddo already in it. (All the essential things that you have to feed the child with is already in it, so it makes the child healthy.). All you need is warm water to prepare it. So Cerelac is very good
6. The cereal is good because there is wheat in Cerelac.

DISADVANTAGES**CHILD BECOMES SICK BECAUSE IT DOESN'T SUIT WELL FOR THE CHILD**

6. Now we have two types of Cerelac on the market; maize and wheat Cerelac. A lot of people usually feed the maize Cerelac. When you give the wheat-based Cerelac to the child, it makes difficult for the child to go to toilet.
6. When the child eats either the wheat or maize, he goes to toilet (have diarrhea).

CHILD BECOMES SICK DUE TO POOR HYGIENE DURING PREPARATION & FEEDING

1. It also depends on the way you prepare it and how you handle the utensil.
2. The child can be sick but not because of Cerelac. The child become sick only if you don't clean up well and not boil the water.
6. When you prepare Cerelac with cold ordinary water instead of warm water, the child can get diarrhea or stomachache. The temperature of the food should be that of BM.

CHILD BECOMES SICK DUE TO INADEQUATE USE OF COMPLEMENTARY FOOD/MILK

1. Some people don't have much money, so when they prepare the Cerelac, they make it very watery. When it happens, child will get diarrhea.
3. When the baby eats Cerelac and if there is leftover, it becomes hard and cold. If Cerelac is too hard, it causes constipation.
3. Sometimes, Cerelac becomes very watery and it causes diarrhea.
5. You have to follow the instruction on the tin, when you feed tin foods like Niddo, Cerelac, and Lactogen. There are some mothers who will take 2 of the food instead of 1 because they want their children to be satisfied. When this happens, the child becomes constipated.

CHILD BECOMES SICK WHEN COMPLEMENTARY FOOD/MILK IS INTRODUCED TOO EARLY

4. Some children pass watery stool with blood when being fed Cerelac too early.
5. The milk (Ideal and Carnation) that is given to the baby at the early stage is not good because it is written on the tin.

⌘ ADVANTAGES/DISADVANTAGES OF FEEDING PORRIDGE (KOKO, TOM BROWN, WEANIMIX, ETC)**ADVANTAGES****CHILD BECOMES FULL/SATISFIED**

0. The child will be satisfied and will not worry you much.
0. She becomes full and becomes fine.
2. The good thing about feeding koko is that the child will be satisfied. The mother will then be free.
6. When they take koko, they become fully satisfied.
6. Koko gives them strength and satisfaction for them. If you don't take care, they will sleep from morning to evening.

CHILD BECOMES HEALTHY/STRONG

2. Koko strengthens the child.
4. Koko will give strength because when you eat and become satisfied, you are always strong. But there are nutrients in the rest (S.M.A., Lactogen, Cerelac), compared to koko.
6. Koko gives strength and satisfaction for them. If you don't take care, they will sleep from morning to evening.
6. The child can grow fat no matter what. They will get strength as well (koko).
6. Because it is corn dough, there is energy in koko. So when they eat they become healthy.

CHILD BECOMES BIG/FAT/BOUNCY

6. The child also grow big (koko).
6. The child can grow fat no matter what. They will get strength as well (koko).

6. The koko-fed baby will gain more weight than the S.M.A.-fed baby. S.M.A.-fed child will also be heavier than the Cerelac-fed baby.
6. When you take a child who feeds on koko, for instance, the child will grow big because koko is our local food.

CHILD BECOMES INTELLIGENT

6. It broadens their mind because koko feeding started from the old days.

MOTHER HAS MORE FREE TIME

2. The good thing about feeding koko is that the child will be satisfied. The mother will then be free.

PORRIDGE HAS NUTRIENTS CHILD NEEDS (=LIKE BF)

1. After feeding Lactogen for sometimes, you introduce koko because there are a lot of nutrients in the maize.

PORRIDGE IS GOOD ONLY WHEN MOTHER ADDS OTHER FOODS IN IT

4. If you add milk, soya bean and groundnut to koko, the child becomes fine. It gives enough strength to the child
5. If you feed well-cooked koko, it is good. If you don't add anything to it, it will not help the child because it is full of carbohydrate
6. Some people think that the child will get diarrhea when fed a lot of S.M.A. When you add other foods such as soya bean and weanimix to the koko, it is good. The child will be healthy.

DISADVANTAGES

CHILD BECOMES SICK WHEN KOKO IS NOT COOKED WELL

1. If the corn dough is over fermented, it can create health problem to the child
2. It depends on how you prepare the koko. When it is overcooked, the child will get phlegm.
5. The child will get sick if the mother doesn't cook koko well.
6. Some people don't strain corn dough well. Maybe the machine didn't mill the corn well. If you prepare koko with this dough, it will affect her.
6. Koko has to be light. Otherwise, child will have problem

CHILD BECOMES SICK WHEN KOKO IS INTRODUCED TOO EARLY

2. When the child is not old enough to take koko, he can become sick.
4. Koko is too heavy at 1 wk.
6. Some people give koko when the child is only 2 months old. So the child has mucus in the stool.
6. I know some people give koko when the child is 4 months old. But if you give it to the child before that time, the child will have upset stomach.

CHILD BECOMES SICK DUE TO POOR HYGIENE DURING PREPARATION & FEEDING

1. If you keep the corn dough too long, insect comes into it. But because you know you will strain it, you might use it to make koko and it is not hygienic. It will introduce sickness to the child.
3. When the mother doesn't use washed utensils and wash her hands before she prepares the koko, or she strains the dough on the floor and flies come and settle on it, the child will get diarrhea and cholera.

CHILD BECOMES SICK BECAUSE IT DOESN'T SUIT WELL FOR THE CHILD

3. I feel that the koko cause phlegm.
4. Some children's tummy may not find porridge suitable, hence it may cause watery stool
4. Some infant may have a lot of phlegm in their chest as a result of taking porridge which does not suit the tummy.

⌘ BARRIERS OF ALTERNATIVE FEEDING

INFANT FORMULA

MONEY PROBLEM

0. Money problems. So if the child doesn't like koko, you have to discuss with the father. But koko is easy to afford.
0. A woman in my compound has given birth. She was giving her child Lactogen, but she has to stop because it is expensive. It is now over 23,000 cedis and she will not get that much money to buy Lactogen everyday, even though her husband is working.
1. It is money.
2. Not having money.
3. If you don't have money. S.M.A. is expensive. It costs 50,000 cedis.
3. Nothing may prevent you from feeding formula if you can afford it. You may decide to feed your child with S.M.A. just because you want her to look fine as we're taught here. So it depends on your financial status.
4. Maybe you have given birth and you are not working. The housekeeping money from your husband will not be enough to take care of the family and to buy S.M.A. The child's father wouldn't buy it.
5. The same money problem. If I don't have money, I can't feed S.M.A. or Cerelac.

CHILD'S CONDITION (DOESN'T LIKE)

3. There are children, who don't like suckling from the feeding bottle. If the child is that type, it can stop you from feeding S.M.A.

PORRIDGE/COMMERCIAL COMPLEMENTARY FOODS

MONEY PROBLEM

3. It is all money problem because Cerelac is now 12,000 cedis. Some children eat a lot when they reach 6 months. I know of a mother who said the child finishes 1 tin of Cerelac within three days.
3. Money can also prevent you from feeding Cerelac... if you have no money.
5. The same money problem. If I don't have money, I can't feed S.M.A. or Cerelac

CHILD'S CONDITION (GETS SICK, TOO EARLY, DOESN'T LIKE)

1. In my case, when I give koko to the child, the child gets phlegm and this prevents me to give koko.
3. There are children who doesn't like koko.
3. The Cerelac is heavy like the koko.
3. The Cerelac is too thick for a baby who is not yet 6 months old.

THERE'S NO BARRIER IF I DECIDED TO FEED AF

2. I believe nothing can prevent you from feeding koko.
3. As for koko, nothing will prevent you. You just have to prepare it well, then you add in your soya bean and a little sugar.
3. Some children do not like eating, but if the child would eat koko, there's nothing to prevent you.
5. As for koko, nothing will prevent you.

PREPARATION

1. The preparation takes time.
5. If you don't have fire to work on, that will prevent you.

⌘ FACILITATORS OF ALTERNATIVE FEEDING

MONEY (HAVE MONEY, WORK, GIVEN MONEY)

1. When you are a working mother.

2. If I have money.
3. I feel if you have money, you can buy S.M.A. that will also help.
4. If you have money.
4. Some father may buy whiles others may not
5. If you have money

OTHERS (FIRE TO COOK)

5. If you have fire to cook it

⌘ SUPPORTERS OF ALTERNATIVE FEEDING

MYSELF/PARTNER/SPOUSE

2. Myself. Sometimes, your husband can tell you to give the baby koko because the baby is crying.
4. Your husband will tell you to give koko.
4. Your husband with whom you live might tell you that since you started feeding the child with porridge, it has made the child fine, so continue with it.
6. Maybe the child's father wants you to feed S.M.A.

SIBLING/FAMILY/RELATIVE

0. Friends, sister or mother can support (formula feeding).
0. Your family can also say that the BM doesn't satisfy the child and that is why she cries. So they might ask you to give her other foods.
1. Tenants, grandmother, mothers, and friends (formula).
1. Our siblings and friends (formula).
2. My mother and sister (formula).
2. My sister and even strangers can tell you to give koko.
3. Normally the adults like our mothers and those who manufacture the formula

FRIENDS/CO-TENANT/NEIGHBOR

1. Tenants, grandmother, mothers, and friends (formula)
1. Our siblings and friends (formula)
3. The old ladies (will encourage me to give koko). Some will even give them mashed yam.
4. When a co-tenant notices that your child is underweight, she can also recommend S.M.A. to you.
4. If the baby doesn't like the koko, neighbors can tell you to give S.M.A.
4. A neighbor will encourage you to give S.M.A.
4. A co-tenant can tell you that the porridge has made her child fine. So continue with it. The co-tenant gives this advice because she has been seeing you feeding the child with porridge, which is believed to be heavy (enough) for the child.
6. Neighbors and other mothers will support you if you introduce koko.
6. Friends that stay with us in the same house

HEALTH PROFESSIONALS

0. My sister who is a nurse told me to give koko to the child, because the child is not satisfied enough with the BM
1. Midwives and nurses can also advise you to feed S.M.A.
4. When you take the baby to weighing, nurses will ask you what you feed your child with. When they notice what you feed your child with is good, they will encourage you to continue with it (koko)
4. The nurse can encourage you (to give S.M.A.)

OTHERS (OTHER MOTHERS, MANUFACTURER)

0. Someone who has given Lactogen to their child before and knows can support you
1. A mother who have used Lactogen or S.M.A. before

2. Everybody will tell you to give koko
2. My sister and even strangers can tell you to give koko
3. Normally the adults like our mothers and those who manufacture the formula
6. Mothers who have given birth before can also tell you to feed koko
6. Our mothers will tell us that the child is not satisfying with the BM. So you can add koko to the child feeding. Gradually she will change her mind
6. A mother who has fed S.M.A. to her child before and saw that the child was bouncy and strong can tell you to use it

⌘ OPPONENTS OF ALTERNATIVE FEEDING

MYSELF/PARTNER/SPOUSE

0. My mother or husband or mother in law or a group that gives teachings on such issue (exclusive breastfeeding for 6 mo) will also tell you not to.
4. Your husband can tell you that BM is enough.

SIBLING/FAMILY/RELATIVE

0. My mother or husband or mother in law or a group that gives teachings on such issue (exclusive breastfeeding for 6 mo) will also tell you not to.
3. Our grandparents (formula)

FRIENDS/CO-TENANT/NEIGHBOR

2. Neighbors can tell you that it is not good to give koko to the child who is not 6 months old yet. Nurses can also advise you on that (to early to feed koko).
3. If you were my friend, I will advise to use the money that you are planning to buy S.M.A. for palm-nut soup so that you get enough BM

HEALTH PROFESSIONALS

0. The nurses have talked about it. They said we should not give them foods if they are not 6 months old yet. If we give anyway, a nurse or a doctor will not be happy with you.
2. The nurses will tell you that it is not good to give S.M.A. unless you are sick.
2. Neighbors can tell you that it is not good to give koko to the child who is not 6 months old yet. Nurses can also advise you on that (to early to feed koko).
2. The nurses (will say it is not good to give Cerelac).
3. The nurses, because they have told you not to give any foods before 6 months. So when they see S.M.A. or Lactogen, they will be very unhappy unless you hide it. Also, if you use feeding bottle and they see it they will be very unhappy.
3. Nurses can tell you not to feed koko.
3. Nurses can tell you not to feed Cerelac.
6. The doctors and the nurses (will tell me not to introduce koko)
6. It is the nurses who teach us those things. So they can tell us not to give S.M.A.

OTHERS (NO ONE, BF ACTIVISTS, OTHER MOTHERS)

0. My mother or husband or mother in law or a group that gives teachings on such issue (exclusive breastfeeding for 6 mo) will also tell you not to.
2. No one will say S.M.A. is not good.
2. People will not let you give S.M.A. because the baby's stomach cannot digest it
3. If you prepare koko well, no one can discourage you from feeding it.
4. No one will discourage you about feeding S.M.A.
6. Some mothers can tell you not to give koko because the child is old enough to take koko.
6. A mother who has been to clinic before and has been taught about infant feeding will tell you that it is not good (to feed S.M.A.)

**8 PERCEIVED SEVERITY OF DISEASE CAUSED BY ALTERNATIVE FEEDING (E.G.,
DIARRHEA, CHOLERA, CONSTIPATION, UPSET STOMACH)**

SERIOUSNESS OF DIARRHEA ON A SCALE OF 1-10

1. Seriousness of diarrhea is 8 out of 10.
1. We agree with her (8 out of 10).

SERIOUSNESS OF CHOLERA (DIARRHEA/VOMITING) ON A SCALE OF 1-10

2. I think the seriousness of vomiting caused by S.M.A. is 10
2. I will place it at 9
2. I will also place it at 10
2. I will place it at 5
5. I will rate diarrhea and vomiting at 4
5. I will rate diarrhea and vomiting at 9
5. I will rate diarrhea and vomiting at 5

SERIOUSNESS OF CONSTIPATION ON A SCALE OF 1-10

1. I will say the seriousness of constipation caused by feeding Lactogen is 5
5. I will place seriousness of constipation at 8

CAN BE COMPARED TO

0. All (measles, diarrhea, TB) is serious. When a child gets diarrhea and if you don't take the child to a clinic, the child will dehydrate.
3. The seriousness of diarrhea can be compared to cholera, malaria, or fever.
4. I will compare it to worms in the stomach
4. (Diarrhea can be compared to) convulsion.
4. When the child gets infested with germ, the way the child may look, go lean or weak, is just like having diarrhea.
4. When a child have convulsion or teething, it also results in diarrhea.
5. No, measles is more serious because if you don't detect it early, it can kill the child.
6. Measles is more serious when you compare stomach sore to it

BABY'S PROBLEM (DEHYDRATION, MALNUTRITION, DEATH)

0. When a child has both diarrhea and vomiting (=cholera), it is serious. So you have to take her to the hospital.
0. All (measles, diarrhea, TB) is serious. If a child gets diarrhea, and you don't take the child to a clinic, the child will dehydrate.
0. A church friend had a set of twins. One of them had diarrhea, but instead of taking the child to the clinic, the mother took the child to church to be prayed for, because she didn't have money. Unfortunately, the child become weak as the child was being sent to the hospital. The child died on the way. Diarrhea lets the child lose more water from its system.
0. Yes, it affects the child. He becomes light.
1. Diarrhea is very serious even though I have not given birth before. But I have seen children with it before. They become dehydrated and it even kills them.
1. The child can die of diarrhea.
1. The child will not grow healthy.
2. The vomiting (=cholera) is serious because when you don't take the child to the clinic early, the child will become weak and die.
3. It is very serious because diarrhea kills the child faster.
3. The child also becomes dehydrated due to diarrhea.
4. It is serious. When the child goes to toilet, she becomes dehydrated. Even when we, as an adult, get diarrhea for sometimes, you begin to feel dizzy.
5. It is serious because the baby cries often and the temperature goes high.

5. Every child disease is serious because the child cannot say which part is paining her. So as a mother, you become miserable.
6. It is very serious for child to have stomach sore.
6. You will see the baby in pain, turning himself from one point to the other.
6. The baby will get the stomach sore before he will get diarrhea.

OTHER PROBLEMS (INFECTIOUS, WASTE OF MONEY, STRESS)

1. The rest of the family can be infected with diarrhea.
1. You also waste money.
1. The mother becomes disturbed.
3. You will not be happy and can even lose your child. But a healthy child always makes the mother happy.
3. If the baby is admitted to the hospital, everyday you have to go to the hospital and visit the child. You will waste money and time.

§ PERCEIVED SUSCEPTIBILITY OF DISEASE CAUSED BY ALTERNATIVE FEEDING DEPENDS ON HOW YOU PREPARE

0. It depends on how you keep the child feeding bottles and utensils. When a lady in my house gave birth at seven month, the child was tiny. But, shhe gave the child Lactogen and because she boils her utensils everyday and handled the utensils well, the child is about to walk and had not experienced diarrhea before.
0. If you don't prepare it well, she will get diseases. So it will also depend on how you prepare it. If it is not well cooked, the child can get diarrhea.
1. Some don't use hot water so the child does not grow up well.
1. It also depends on the way you prepare it and how you handle the utensil. Some people don't have much money. So when they prepare the Cerelac, they make it very watery and when it happens, child will get diarrhea.
2. If you don't boil the feeding bottle before using it, the baby will easily get cholera.
3. It is not difficult to get diarrhea when you feed S.M.A. It all depends on the way you handle the utensils
3. It is not difficult at all to get diarrhea from feeding Cerelac. It all depends on how you handle your utensils.
3. Porridge is worse. Someone may not be hygienic. It shows on whatever she does. A housefly might hover over the food.
4. If the koko is not well cooked, it can cause diarrhea.
4. When you don't clean the feeding bottle and the ladle well and expose them to houseflies, it can cause diarrhea to the child.
4. Some children are already sick. I don't think it is difficult to get diarrhea.
4. If you are careful with the preparation and take your time to prepare it neat, flies will not settle on it. Also you have to allow koko to be cooked well.
4. There are some people who don't cook well, when they prepare the koko. That will let the child get diarrhea and also if you don't wash the feeding bottle and the spoons well.
5. It is not difficult to get diarrhea when you feed S.M.A. or koko.
5. Getting constipation will be a little bit difficult.
6. You have to be neat (not to get diarrhea and stomach sore).
6. If you use feeding bottle, you have to boil the feeding bottle. If the teat is dirty, that makes the child get sick easily

6. You have to put the feeding bottle in a boiling water and cover it so that the boiling water can kill any germs that come into contact with the bottle. Otherwise, your child will get stomach sore and diarrhea
6. When I gave birth, someone who came from abroad gave me some medicine. When I finish washing the child's feeding bottle and spoon, I will put it in a clean container with water because I don't have the actual container for keeping feeding bottle. So I will add a tablet of medicine to the bottle, which will make the water bubble. If the child is hungry, I will use a ladle to take out the feeding bottle and rinse it before feeding the baby.

SUSCEPTIBILITY OF DIARRHEA ON A SCALE OF 1-10

1. The susceptibility of having diarrhea when feeding koko is 8
1. The susceptibility of having diarrhea is 7 when feeding S.M.A.
1. It's 5 for Cerelac

⌘ HIV/AIDS

HIV IS VIRUS, WHICH CAUSES AIDS

0. HIV is a virus. If it gets into your blood, it brings AIDS.
1. HIV is the virus so you will get the virus before you get the AIDS. If someone has the virus and is walking around, you wouldn't know. But if the person gets AIDS, that is when the person grows lean.
1. HIV is the virus and when it develops, then it becomes AIDS.
2. They said the HIV is the virus, but the AIDS is a disease.
3. HIV is the virus, which develops into AIDS, the disease itself.
4. They said the first stage of the disease is HIV and when it stays in your blood for a long time, it becomes AIDS.
5. HIV is a virus, which brings AIDS.
5. AIDS is a disease, which attacks your immune system. When it attacks your system, you can be attacked by any diseases because your resistances becomes weak.
5. When you get the virus and you can't cure it. Then it develops into AIDS.
6. They are virus in the blood. So if I have the virus and cut my nails with blade, you can get it if you also cut your nail with it and you have a cut.
6. It is virus in some people, but not everybody.
6. When the virus stays longer in you, it will give you AIDS.

HIV/AIDS IS A DEADLY DISEASE IN THE BLOOD WITHOUT CURE

0. It is a disease without cure.
0. HIV is a disease, which brings about AIDS. It has no medicine and when you get, you are getting closer to death.
0. I know it (HIV) is a virus. When it comes in to your blood, it makes you sick and you become lean.
0. AIDS is a disease, a deadly disease. When you get, you will die.
1. It (HIV) is a bloody disease.
1. HIV is a disease that will kill you when you have.
2. It (HIV) is a deadly disease.
2. AIDS kills you.
3. It is a disease in the blood caused by tiny germs with no cure.
4. HIV is a disease, which will kill you when you get it.
4. HIV is a disease, which makes you have diarrhea and become lean until you die.

HIV IS A DISEASE OF CHOICE (DUE TO CARELESS LIFE)

0. What comes to my mind is that in this world, you have to lead a holy life. If you don't and you lead a careless life, AIDS is there waiting for you.
0. People said that you can get the disease if you are with your husband today, and then with another man the next day, but I don't believe it.
1. This is a disease that you can get through various means such as injection and casual sex.
6. It is a disease that infect you, especially when you have an affair with someone with AIDS.

OTHERS (LEAN DISEASE, CAN CURE INITIALLY, HIV & AIDS ARE SAME, NOT REAL)

2. They (HIV and AIDS) are same.
4. When you get infected with it, you will grow lean. Some may not grow lean initially, but rather have the appearance of rashes on the body. She may itch and have a pointing belly.
5. At the initial stage, you can cure it.
5. AIDS is not real. They don't want us to have more children and that's why they are saying AIDS is real.

§ MODES OF TRANSMISSION**SEXUAL INTERCOURSE (PROSTITUTION, FLIRTING AROUND, HAVING >1 PARTNERS)**

0. I know it can be transmitted through sexual intercourse. I am not sure, but my sister said I could get it through cuts on the skin. Say, if you have a cut and another person who has the disease also has a cut, you can get it when it gets into contact directly or via water.
0. What I know is that if your husband has an affair with another woman and have a sexual relationship with you, then you will have it.
0. Okay. One thing, which brings AIDS, is through prostitution. If you take this man today, and another man the next day, that will bring you AIDS.
1. HIV is a disease which you can get through sexual intercourse and also through sharp edge.
1. This is a disease that you can get through various means such as injection and casual sex.
1. It is through sex. When the sperms enters into the vagina. That is the way of having it.
2. If you don't stay with one partner... If you flirt with this man today and with another man the next day, you will get it.
2. If you flirt with a lot of men, you will get it
3. Through sex.
3. These days, it is the men who cause trouble. They don't stay at one place. They keep chasing women after women.
4. If you flirt with a lot of men, you will get it
4. When the man did not use condom during sexual intercourse...
4. If the person you are having sex with is infected, you will also get it.
5. If you have sex with an infected person, you will also get it.
6. You can get it through sex.

CUTS BY SHARP INSTRUMENTS (RAZORS, BLADES, NEEDLES)

0. I know it can be transmitted through sexual intercourse. I am not sure, but my sister said I could get it through cuts on the skin. Say, if you have a cut and another person who has the disease also has a cut, you can get it when it gets into contact directly or via water.
0. If using the same razor with AIDS patients at the barbering salon.
0. When they use the machine at a barber salon and it cuts the person with AIDS and they use it on another person and it cuts that person, he can also get it.
0. In our villages, some pose as doctors but they are not and they go about injecting about 20 people with one needle. So if he uses it on someone who has AIDS and they use it on you too, you will have it.

1. HIV is a disease which you can get through sexual intercourse and also through sharp edge.
1. This is a disease that you can get through various means such as injection and casual sex.
2. You can get it if you use a needle to inject someone with HIV and they use it on you too. Also, those who cut nails in town with blade and nail cutters can also get HIV if you are not fortunate and they use it on HIV person and it cuts the person and they use the same instruments on you and it cuts you.
2. Through the sharing of razors.
3. It is a blood disease so if an infected person uses a razor and it cuts him and if you use that razor and it cuts you, you can also get the virus.
3. When they use an injection on infected person and they use the same needle on you, you will get the virus.
4. When they use needles and syringes on someone with AIDS at the hospital and they do not change it and use it on you, you can also have the virus.
5. If infected person uses a razor and it cuts him and you also use it and it cuts you, you will get the virus.
5. If a needle pricks an infected person and you also use it and it pricks you, you will also get it.
6. You can also get it through injection. Maybe they don't change the needle they have used on an infected person.
6. At the hair dressing salon, if the person with has cut and they use the same instrument on you and had cut from it, you can be infected.

BLOOD TRANSFUSION

3. Through blood transfusion.
4. You can get it through blood transfusion. When the person is having the virus, you can get it through the blood.
5. Through blood transfusion.

MOTHER-TO-CHILD TRANSMISSION

3. As we are pregnant and if we have the virus, we can pass it on to the baby in the womb.
4. When you had the virus before you became pregnant, the child will get it. But when you became pregnant before getting the virus, the child won't get it.

SPIRITUAL

0. Some of the pastors say it is a spiritual disease. It can be bought for you spiritually. I know of a sister through a prayer meeting. When I saw her, she was fine, but those who knew her before said she was very lean. Every clinic she went diagnosed her as AIDS. So people thought she would definitely die. But she attended prayer meetings and she is fine now.
0. As long as there are evil spirits in the world, they can bring that disease to you.
1. People say that you can get HIV spiritually, but I don't believe it. They said if they have not cursed you to that disease, you will never get it.
2. She was afraid of getting an HIV and one day dreamed of someone giving her injection. So the next day, she went for the HIV test and found to be positive. She has it physically, but was not aware of it. Since God wants her to know, it was revealed in her dream.
3. When I went to church, there was this sister who had been tested HIV-positive. When she went to church for prayers and the pastor prayed for her. When she went back again for another test, she was negative. Then the pastor told her that she got it spiritually.
4. Witches may also transmit the disease. You may cross-examine yourself and then go to a hospital only to be told you've been infected which you know is not possible. You wouldn't know where exactly you had the transmission. Then you realize it is work of witches.
4. Half of the AIDS disease is spiritual.
5. I have not heard anything like that (HIV can be transmitted spiritually).
6. The witches can suck an infected person's blood and give it to you (spiritually).

OTHERS (SHARING TOOTH BRUSH, MOSQUITO, TEARS, COUGHING, SHARING FOODS, ETC)

1. Also when you share toothbrush with someone who has HIV and has sore mouth and if you have sore mouth, too, you can get it.
0. You can also get it through accident. Health professionals are also at risk. I know of a case that a lab technician dropped an instrument which has been used on an AIDS patient. It cut his leg and he got AIDS.
5. These days, some say that if infected person cries and it drops into cuts on your body, you will also get it.
5. Then mosquito can give you the virus.
5. Mosquitoes only suck your blood, not inject you with the blood of someone else. So there is no way mosquitoes can give you HIV or AIDS.
6. You can get it through sharing of toothbrush. When the person gets sore in the mouth and you also uses it to brush your teeth, you will get it through the blood on the bristles.
6. When the person is coughing and you always sit close the person, you can also get it. Also if the person has got diarrhea and you wash it with bear hand, you can also get it.
6. When people get the virus, they don't want to die alone. They will use every means to get you infected. For example when the person has cuts from the hand and you eats with him, you can get it.

⚔ PREVENTION**FAITHFUL (STAYING WITH ONLY 1 PARTNER, NOT FLIRTING, TAKING GOOD CARE OF YOURSELF, ETC)**

0. What you can do is to take good care of yourself; if you stay with one partner, you can prevent yourself from getting the disease.
0. You need to be faithful to your partner. There is a need to lead a decent life and stay faithfully with your partner. It is a must that you protect yourself from your husband who is a womanizer, so that you will not get the virus.
0. I feel it is not the use of condom only but when you take good care of yourself together with your husband, you will not have AIDS.
1. If you don't flirt around and if you and your husband are faithful to each other and advice the children on the disease, you can prevent yourself from getting.
2. You have to stay with one partner.
3. You have to take good care of yourself. You have to be faithful to your partner.
4. Sticking to one partner without flirting.
5. We have to advise our husbands to be faithful to us. If your husband is not faithful, then you have to let him use condom.
6. When you are faithful to each other.
6. You have to be faithful to your partner. Or if you know of a flirt, you have to advise her to change for the better.

USE OF CONDOM (MALE, FEMALE)

0. It is difficult. I have heard of female condom. So when you notice that your husband is unfaithful and dislike the use of condom, you can discuss it with him and put on your female condom.
0. By the use of condom.
1. Condom.
1. If I know I flirt, I will take condom to protect ourselves.
1. I will advise the person to use condom.
2. You can use condom.

3. You have to use condom.
3. You can also use female condom to protect yourself.
3. I believe if you use condom, you can protect yourself.
4. You can use female condom.
5. You can use condom. Women can use female condom and men can use male condom. The one thing is that the two of you can't use condom at the same time. If the man wears it, the woman doesn't have to wear it and if the woman wears it, the man doesn't have to wear it.
5. We have to advise our husbands to be faithful to us. If your husband is not faithful, then you have to let him use condom.
6. They need to protect themselves. I talked to such a person and what she told me was that since she moves from one person to another, she needs to protect herself with condom.
6. When you use condom.

NOT SHARING SHARP INSTRUMENTS (NEEDLES, RAZORS, BLADES)

1. They have said on the radio that if you share razors you can get the disease. So I make sure I don't use already used razors.
1. You have to make sure that you use shaving stick alone.
1. I told my younger siblings that they should not use a razor on the floor. One day one of my sisters told me that the other sister has used a blade on the floor. I immediately told her that she has the virus and she cried of fear. I intentionally put some fear in them so that they don't use used razors any longer.
3. When you go to the barbering salon, make sure the barber uses a new razor on you.
3. When you go to the hospital, make sure the nurse uses a new needle on you.
3. You also should not cut your nails in town.
4. Not picking blade from the floor and any sharp piercing objects. Maybe the person who used it and had a cut might be a HIV patient. When you have a cut, then you might also get HIV. Who knows? An HIV-positive person might intentionally cut himself with a blade and throw it away. When you use the same blade, you will also have AIDS.
5. You shouldn't share razors.
6. When you don't share razors with others. Also, you have to dispose the used razors well so that children will not pick it up from the floor and play with it.
6. If we stop cutting our nails in the market and do it ourselves, it will also help.

COUNSELING (ADVICE, EDUCATION)

0. It also depends on prayer and advice. Even though you are faithful to your husband, your husband can bring the disease. Unless he has infected you with the disease, you will not know about it.
1. You can advise your husband and children and tell them about AIDS.
5. If you get a good education about the disease, it can help you not to get the disease.
6. You have to be faithful to your partner. If you know of a flirt, you have to advise her to change her life for the better.

OTHERS (MISCONCEPTION)

2. If you are faithful and your husband is unfaithful, the word of God says that God will deliver us from evil. So even though my husband has gotten the virus through his unfaithfulness, God won't let me get it because I am faithful.
4. I think you need to pray well and surrender yourself to God because it is a spiritual disease.
5. You shouldn't share tooth brush.

⌘ ATTITUDES TOWARD PEOPLE WITH HIV/AIDS

SAD

1. I feel sad because I know it is not her alone who has it, but a lot of people have it too.
1. I feel sad because they suffer before they die.
3. I feel sad for the person and I pray that God will take care of her. Maybe she is not a flirt. It might be her husband who flirts and has given her this disease. Sometimes, it may be through injection. So I feel very sad.
3. I feel sad because the person grows lean and the bone begins to show.
4. I feel sad for the person. No reasons.

HURT (WORRIED)

0. I will be very hurt and will think about it. I heard a lady who has it on the radio. I was sad and cried because no matter what she does, she has the disease and she will die.
2. I get hurt and even become afraid of me being HIV-positive.
4. I got worried for the person.

SORRY (PITY, SYMPATHIZED)

0. Not too long ago, a friend drew my attention to an AIDS patient who was passing by. She said this man had lived in the State before. I felt pity for him. His wife and children were having the virus as well. You can see that he had grown lean. Everybody was looking at him when he was passing. I felt sorry and sad for him.
2. I will pity the person.
3. I may only feel pity because I would not know the person. But I will still pray that God heals him. Someone may grow lean, but you may not know whether it's AIDS or not.
5. We have to really feel for them. We should sympathize with them because they are on the edge of life and death.

AFRAID (SCARED)

0. As for such a person, I will be afraid of her.
0. I will not get close to the person because if you do, you can also get it.
3. When such a person approaches you, you may run away in spite of the fact that you feel pity for the person.
3. I can eat with the person, but because of my perception, I will be scared.
4. I am afraid of the person.
6. I think I will ask myself question about how this person got the virus. But I will not get closer to the person.
6. You will be afraid of the person.

ANNOYED (SHUN)

5. If someone has gotten AIDS, I don't feel for that person. I will shun that person.
5. I think the woman has several partners with whom she flirts around. So when such a person gets the virus, I don't sympathize with her at all.

ENCOURAGE (MAKE THEM HAPPY)

5. Some show sympathy toward that person, and others don't. I feel when someone gets AIDS, you have to be close to the person and encourage her.
5. There might be certain things that will make HIV-positive person happy. I should provide those things.
6. You don't have to hurt the person.

LEARN A LESSON FROM IT

5. Maybe it wasn't the fault of the person, but it happened through accident. So I will learn something from that and lead a good moral life so that I will not get it.
6. When you see how lean the person has grown, that alone make you take good care of yourself.

⌘ ATTITUDES TOWARD FRIENDS WITH HIV/AIDS

SAD

6. I will feel sad, but there is nothing I can do for the person.

HURT (WORRIED)

0. I will be hurt. I will advise her not to take poison to kill herself. Instead, I will advise her to see a doctor for a medicine and foods, which she can eat to prolong her life span because no matter what, it has already come.

1. If the person is your friend, you will be very hurt because maybe when she was flirting around, you talked to her and she didn't listened to you.

2. I get hurt and even become afraid of me being HIV-positive.

5. I will be hurt because people will think that I have also gotten the virus. I had a friend who died of AIDS. I was worried about what other people would think about me because not everybody has knowledge on AIDS. She used to work in a store. If her family don't take care customers, they will stop buying from their shop since they know one of them died of AIDS. So I will be very hurt.

SORRY (PITY, SYMPATHIZED)

3. You'll feel pity for the person because of the way she will look: the bones that will be left and how lean she may be.

4. I will have sympathy for the person.

5. If the person is my friend and she got the virus through injection or blood transfusion, I will sympathize with her a little.

5. You can't tell if the person got it through injection or transfusion. So no matter how the person get it, you have to sympathize with her.

6. You will get pity for the person.

AFRAID (SCARED)

2. I get hurt and even become afraid of me being HIV-positive.

2. I don't get closer to the person.

3. If the person is my friend, I will not shun her, but advise her not to worry much about it. Other diseases can also kill her before she dies of AIDS. I will not let her know that I am afraid of her.

3. I will treat her nicely. I will serve her foods and drinks, but make sure I pack the plates and stuff somewhere.

3. I had a friend whose boyfriend was a thick and tall man who died recently of AIDS. I later got to know my friend also got the virus. When she sent a message through a friend that she would be visiting me, I immediately told the lady to go and tell my friend that I have traveled.

ANNOYED (SHUN, MAKE THE PERSON SACK)

3. If you are my friend, and you have the disease through flirting, I will kick you out from my house because I advised you when you were flirting around and you didn't listen.

3. If I know that you flirt a lot and you get the virus, all I will say is "it serves you right." I will not have any sympathy for you.

5. If my friend flirts around and get the virus, I don't care and I will not sympathize with her

ENCOURAGE (ADVICE)

0. I will be hurt. I will advise her not to take poison to kill herself. Instead, I will advise her to see a doctor for a medicine and foods, which she can eat to prolong her life span because no matter what, it has already come.

4. I will advise the person that she should be faithful so that she will not infect others with it since she already has the disease, she should be faithful so that she will not infect others with it.

⌘ ATTITUDES TOWARD FAMILY/RELATIVES WITH HIV/AIDS

SAD

1. I will also be sad, because I think that the rest of the family has been infected.
1. I will be very sad and ask the person to take AIDS test.
2. I will become sad.
4. I'll be sad and anytime I will see her, I will cry. Having known somebody and realizing later that such a person has changed due to a disease and has grown lean, we'll definitely make you sad. Out of this, you advise yourself.

HURT (WORRIED)

0. When you hear of it, you will be hurt, but all you can do is to advise her.
1. It will greatly affect me. Even though the person is someone else, it hurts. It will hurt much more if the person is a relative.
3. I will be very hurt.
5. I will be hurt because people will think that I have also gotten the virus. I had a friend who died of AIDS. I was worried about what other people would think about me because not everybody has knowledge on AIDS. She used to work in a store. If her family don't take care customers, they will stop buying from their shop since they know one of them died of AIDS. So I will be very hurt.

SORRY (PITY, SYMPATHIZED)

0. For me, I will feel sorry because everyone will say this is the family that one of them has AIDS.
0. I will feel sorry because I know it is a shameful disease. So when one has it, it affects the whole family. If someone is coming to your house, he is afraid because of the disease, but it has already come. You have to advise the person so that she will not go back to it, if it is out of her careless past.

AFRAID (SCARED)

3. You will chat with the person, but deep down in your heart, you wouldn't be happy.
6. Yes, it was out of fear, because we didn't know and he never told us too. So when we got to know I felt he is wicked man. So I didn't go near him till he died.
6. I will be nice to you, but there are certain things I will withdraw from doing it together with that person.

ANNOYED (SHUN, DON'T CARE)

3. Say you are a relative. When you were leading a careless life, I advised you not to and you didn't mind me, or even insulted me. If you get the virus, I will greet you all right, but you shouldn't expect any help from me.
5. If you are my relative and didn't lead a good moral life, I don't care when you die of AIDS.
6. If my relative gets the virus, I will ask him a question of how he got it. I don't think he can come to the house again, due to the way other family member treat him.

ENCOURAGE (MAKE THEM HAPPY)

0. When you hear of it, you will be hurt, but all you can do is to advise her.
0. I will feel sorry because I know it is a shameful disease so when one has it, it affects the whole family. If someone is coming to your house, he is afraid because of the disease, but it has already come. If it is out of the person's careless past, you should advise so that she will not go back to the same life.
0. Some people with HIV feel that someone gave it to them intentionally. Hence, they will also intend to spread it. I heard of a lady on radio who said she had given AIDS and has infected 27 men with it. You have to advise such people so that they don't spread the disease. Also you should pray God to heal her.
2. When you see a relative with such disease, you should pretend to be happy and encourages the person to be happy and pray for the person.

LEARN A LESS FROM IT

2. I will advise myself and take good care, so that I will not get it.
4. I'll be sad and anytime I will see her, I will cry. Having known somebody and realizing later that such a person has changed due to a disease and has grown lean, it'll definitely make you sad. Out of this, you advise yourself.
6. I will look at him and also be careful with myself.

⌘ ATTITUDES TOWARD HUSBAND WITH HIV/AIDS**SAD**

0. I will be sad and disappointed simply because he is my wedded husband.
0. There will be no happiness in the home.
2. I will cry.
4. I will feel sad for him.
4. You won't feel happy because you know that you will die one day, if you can't get medicine for AIDS.
5. I will not stay with him at all if I check and I don't have the virus. If I also have the virus, I will stay with him. I will also be hurt and feel sad for him.

HURT (WORRIED)

1. I will be very hurt (if my husband got AIDS through unfaithfulness).
1. I will be hurt, but when you compare it to the unfaithful one, I think it is better if my husband got AIDS through the use of blade.
2. I will be hurt, because I don't flirt around.
5. I will be hurt and pray that I will not get HIV. I will also feel embarrassed.
6. It is very difficult, hurting and sympathetic. When you look at your small children, who will cater for them. He will stay in the house and not work. In fact, it will be very very difficult
6. I will also be very hurt.
6. You will be hurt, but you have to keep quite so that no one will hear of it. I will also advise him not to think of having sex because that will make him weak faster.

EMBARRASSED (WANT TO DIE)

1. If my husband is HIV positive, I will die.
2. You will wish you die that moment.
5. I will be hurt and pray that I will not get HIV. I will also feel embarrassed.

ANNOYED (SHUN, DON'T CARE)

0. It depends on the way he had the virus. Some men are very ungrateful in a sense... When he doesn't have money, you as a wife, take care of his financial problems. When he becomes financially sound he is flirting with women. If my husband gets the virus, I wouldn't be hurt.
2. I will be annoyed.
2. I will be impatient.
4. Well, I will really beat him. Okay, I will go and do the test to see if I have it. If I don't have it, I will beat him again, because if I wasn't lucky enough, he could have infected me with it.

WORRIED ABOUT CHILDREN

0. If my husband did not get it through flirting with other women, I will take him to a hospital for an advice on what to do to live longer. I will protect myself during my sexual intercourse, so that I will also not have the disease. If I don't protect myself and have the virus, two of us will die. Then, who will take care of the children?
1. You will be thinking of dying and leaving your children behind.

6. I will be said because I will think about my children when I die. Even I am alive, it is very difficult to cater for them. How about when I am not around? Who can take good care of them? In fact, it is painful.

ENCOURAGE (ADVISE, PRAY)

2. You will pray that I won't get AIDS.
 4. I will not beat him, but I will advise him that this is the situation. So he should let us give it to God and pray about it.

TAKE CARE

3. If you are my husband, then it means I have also gotten it. So I will not treat you differently because I know I also have it.
 4. I will comfort him.
 6. If you get the virus, there is nothing you can do about it. But if you eat well and get medicine, you will live long. So you have to make sure he eats well and sees the doctor for medicine.

WILL LEAVE HIM RIGHT AWAY (IF I AM NEGATIVE)

3. Say you were flirting and I talked to you and you didn't take my words. I will immediately go and do the test. When I am negative, I will pack my things and leave (divorce) you.
 3. If I should contract it, then I know it's bad. But if by God's grace should I test negative, then I think that would be the end of our relationship.
 3. Should I stay for him to infect me with it? No way!
 5. I will go to the clinic and check if I have some of the virus. If I don't have, I will pack my things and leave.
 5. I will not stay with him at all if I check and I don't have the virus. If I also have, I will stay with him. I will also be hurt and feel sad for him.

WILL STAY WITH HIM (W/O SEX OR W/ PROTECTED SEX)

3. I will stay with him, but I will not allow him to have sex with me.
 3. As I said, I will not divorce him because he has helped me in life before. So I won't leave him. I will be with him till he dies.
 4. I will stay with him. I will not divorce him, but I will make sure that he uses condom when we are having sex.
 4. I will stay with him, but we won't have sex because when you have AIDS in your blood, it shortens your lifespan.
 5. I will not leave him. I will stay with him, but I will make sure he uses condom whenever he wants to sleep with me. I will be very sad too.
 5. I will not stay with him at all if I check and I don't have the virus. If I also have, I will stay with him. I will also be hurt and feel sad for him.
 5. I will stay with him, but I will tell him that we will not have sex. People with AIDS can shorten their life span when they have sex.
 6. I will go and do the test. If we both have, we will stay without having sex. If I don't have, I protect myself. I will not let him sleep with me because I have to be alive to look after our children.

⚠ DISADVANTAGES OF HAVING HIV/AIDS

SICKNESS (DIARRHEA, VOMITING, FEVER, RASH, LOSS OF APPETITE)

0. It brings different types of sicknesses to the body, such diseases as measles, headache, fever, vomiting, diarrhea.
 1. What is not good is that you will suffer before you die. You will cough, have rashes, and some little sickness.
 1. Always you will go to the hospitals.

1. A lot of diseases.
2. You lose appetite.
2. It can let you get rashes.
3. There are so many disease you'll suffer from.
3. It let you get a lot of sickness like headache, fever, rashes, and it also stops your menses.
4. You are no longer healthy.
4. You fall sick often.
4. You get diarrhea.
4. It is very serious. They show on the television. They suffer before they die. If you have HIV, you become too sick to move. So if you want to eat, they have to bring food to you. If you want to urinate, they have to take you to the restroom. So if there is no one around to take care you, you have to ease on yourself.
6. When you get it, you get diarrhea. It can kill you quickly.
6. It makes you cough.
6. It makes you lose hair.

UNPLEASANT APPEARANCE (LEAN, TINY)

0. You will grow lean and look very unpleasant. So if anyone sees you, even though he/she has not heard that you have the disease, he/she will right away think you have the virus. That is the bad thing about it.
1. They grow lean.
2. It will let you grow lean.
2. The person grows slim.
4. You grow lean.
4. You grow lean and tiny.
6. When you get it, it make you think a long time and that can let you grow lean or kill you.

EMOTIONAL DISTRESS (FEAR, PANIC, UNHAPPINESS, LONELINESS)

0. Bible teaches that our bodies are the temple of God. So getting AIDS means that you have defiled your body and you did not lead a holy life. So when you die, you will go to hell.
0. You can't even go out. If you are not emotionally strong enough, you will take poison and die because you know what may come (death): When you see you friends, they shun your company because it is a disgraceful disease.
1. They are always reserved.
3. If it is your husband, it quenches the love between you.
3. You become unhappy about your life.
3. The fear alone can kill you untimely. The fact that you have the disease will make you panic and you might think that it's better to die than live with AIDS. Then will poison yourself.
6. You can't mingle with people, but you have to be confident and talk with them. No matter what you do, you will definitely die.

STIGMA

0. You can't even go out. If you are not emotionally strong enough, you will take poison and die because you know what may come (death): When you see you friends, they shun your company because it is a disgraceful disease.
0. If you don't take care, your family members can neglect you.
1. People will shun your company because it is a disgrace to have it.
4. It is a disgrace.
5. Your relative and friends will shun you and your partner. They will not come close to you. You will feel shy to go out because people will be pointing at you. So you will stay in your room and think about committing suicide.

WILL DIE NO MATTER WHAT

1. Death.
3. It also leads to premature death. There's a long way to go in life, but because of AIDS, your life span is cut short.
3. You feel like dying.
4. It is not a good thing. When you get it, then you know you are done with your life.
4. You have even disgraced yourself before dying.
4. You know you and your husband are about to die.
5. Everything is not good, because the moment you get it, you are about to die
6. You can't mingle with people, but you have to be confident and talk with them. No matter what you do, you will definitely die.

WASTE MONEY

3. It will drain off your money.
4. You waste a lot of money.
4. You can't work because you are sick.
4. Your wife can't leave you in the house alone, because she is the one looking after you. So she can't go out to make money.
5. It makes you waste money. You have to go to a hospital and buy medicine.
6. If you don't have money to buy medicine and eat well, you will die early.

CHILDREN WILL SUFFER

3. If you have children, you will become sad, because as they come to you, you can't really talk to them. So you always become sad.
4. If he has children, he will die and leave the children behind for them to suffer. Sometimes, children are also infected.
4. Sometimes, children are not old enough. If the father is sick and the mother doesn't have a good job, who then will look after your children. It means you have spoilt the future of the children.

⌘ SUPPORTERS OF PEOPLE WITH HIV/AIDS (PEOPLE HAVING FAVORABLE ATTITUDES TOWARD PWHA)**RELIGIOUS GROUP & LEADERS**

0. We have so many of them. Example is PPAG.
0. Pastors.
1. I also heard that there is a group at Tema. They are catholic AIDS group. When you have the virus, you can go and stay there. They will feed people with HIV and give them a vocational training. There are some AIDS patients who are bored & lonely in the house so they can also go there and make themselves happy.
2. Church, people with HIV, and school children.
3. Church members also help financially sometimes.
5. I know of a group that teaches AIDS patients how to make handicraft for sale, but don't remember their name.
5. Okay. I know of "CARE". I saw them on television. They talked with a lady with the virus and sent her for hospital.
6. I've heard of a group on the television. There was this woman who died out of AIDS. She was being catered for by this group. They gave her money and stuff she needed. This group even took care of her children, who were not even attending school.

STUDENTS

2. Church, people with HIV, and school children.
3. Yes, students. There was this woman called Janet on television, who has the virus. These students visited her, gave money for medicine and food until she died.

HEALTH PROFESSIONAL & GOVERNMENT

0. Doctors.
1. The government by importing medicines at a lower rate.

⌘ OPPONENTS OF PEOPLE WITH HIV/AIDS (PEOPLE HAVING UNFAVORABLE ATTITUDES TOWARD PWHA)**INDIVIDUALS (WHO ARE SCARE OF DISEASE, WHO DON'T HAVE ANYONE WITH HIV/AIDS IN THEIR FAMILY)**

0. Every human being will not be happy to be with people with AIDS. When someone gets to know that you have the disease, he/she will not come close to you at all. There are some people who are sympathetic so when they know you have the disease, they will come and comfort you, but some will not come close to you at all.
1. If you don't have AIDS patients in your family, then you won't like people with HIV.
1. I know some individuals would do that (reject/have unfavorable attitude toward AIDS patients).
1. I don't think there will be such organization. I believe it's an individual who normally dislikes them.
6. Yes, a lot of people, because they are afraid of the disease.

FAMILY/FRIENDS (IF SOMEBODY WHOM YOU KNOW HAVE HIV/AIDS)

1. If the person leads a careless life by always flirting around and don't even listen when you advise her to stop, then you become annoyed when you see the person having AIDS.
4. You become annoyed when you find out that your husband has contracted it. That means he has already transmitted it to you and there's no cure for it. If your siblings have contracted it, then you are not going to be that upset since they are not going to give it to you.
4. If the person is a sister or a friend and she was flirting around and gets the disease, you will be annoyed with her because you talked to her and she never minded.
5. Individuals like your mother and father. When they get to know you have the virus, they can sack you from the house.
5. In the companies, when the director gets to know you have the virus, he can fire you from the work place.

⌘ ADVANTAGE OF PRENATAL VCT**KNOW YOUR HEALTH STATUS (CAN HAVE A PIECE OF MIND, CAN TAKE CARE OF YOURSELF IF (+), CAN PREVENT IF (-))**

0. I think it is good for you to go for AIDS test because it will let you know whether you are carrying the virus or not. Because the testing is expensive, people don't do it.
0. It helps you know how to take care of yourself, if you have. If you don't have, it helps you take care yourself not to have it in the future.
0. When you are not having the virus, you will be happy simply because your child will also not have the virus.
1. I will do it and that will help me know how to protect myself and they can protect the baby so that he doesn't always get it.
2. It will help you take good care of yourself.
2. That will let you know your health status.

3. In spite of the fact that it frightens you, you still must go for the test in order to know whether you have it or not. I'd put aside fear and do it.
3. It lets you know you are healthy, if you have done the test and you are negative. It lets you become happy if you don't have it.
4. When you do the test and you are negative, you will become happy because you are AIDS free.
4. Some also just do the test to know their health status.
5. If you do the test and you don't have the virus, you will be happy with yourself.
6. It helps you know that you don't have the virus. That will let you be careful and take good care of yourself.
6. If you have the virus, you can start treatment for yourself.

PROTECT YOUR BABY (CAN START PREVENTION)

0. It will be good to know whether you have it or now. If you have the virus, doctors can give you medicine to prevent the vertical transmission when the child is in the womb.
1. It helps to protect the child in the womb so that he will not get it and even if he gets it, it will not be serious.
1. That will help you know how to protect yourself. When you do have the virus, doctors can protect the baby so that he doesn't always get it.
2. So that you will know if the child is healthy or not.
3. If you don't have the virus, you know that you also have a healthy baby.
4. You will be happy because you will have a healthy baby.
0. It will help the nurses when examining you. If you don't have the virus, then they will not be infected with the virus.
5. When you do the test and you have the virus, they will let you deliver the baby, but they will operate (CS) you so that the baby doesn't get infected.
6. They said not every child gets the virus, even though the mother has it. So it would help me to take care of my child.
6. If you are pregnant and you do the test, it helps you know how to take care of your baby.

KNOW WHETHER YOUR HUSBAND/PARTNER IS FAITHFUL

3. We will do it while we are pregnant so that you will know what kinds of life your husband is leading.
3. That will also let you know if your husband is faithful or not.
4. When you do it, it is good for you because you can't trust men of today.

⌘ DISADVANTAGE OF PRENATAL VCT

EMOTIONAL DISTRESS (AWARENESS OF YOUR (+) STATUS CAN KILL YOU SOONER, HIGH STRESS BEFORE YOU RECEIVE YOUR RESULT)

0. When she wasn't aware of the fact that she has it, she was not worried. But the moment she knows she has it, she thinks of it and that makes them become lean.
1. When I realize that I have AIDS virus, I will rather kill myself. When you compare the one who knows that he has the virus and the one who doesn't know that he has the virus, the one who doesn't know it stays longer.
1. Yes, I've heard of counseling, but I will be afraid if you ask me to go and do the test. The awareness that I have can kill me.
3. Yes, it is frightening.
3. When you do it and get to know you have it, you feel like dying.
3. They say if the baby has HIV, the baby will not live long. It is very hurting to lose a baby, especially after going through pregnancy and labour.
4. It is not a good thing. When you get it, then you know you are done with your life.

4. There are some people who do not want to know and don't want to think about it when they have it.
5. When you get to know you have the virus, panic alone can let you miscarry and lose your baby.
6. When someone goes to the Korle-bu hospital to do the test and she finds out she is HIV-positive, the she is not going to come back to hospital again because she is so upset.

STIGMA (LEAK OF CONFIDENTIALITY)

1. Family member will also shun your company.
6. When they test you and you have the virus, they will not tell you. They will rather tell your relatives. I have also heard that they don't write 'HIV' on your card, but they write something different.

FALSE POSITIVE (CAN BRING NEGATIVE EFFECT ON HER)

5. Someone might test positive, but in reality she is negative. So if such a woman is not courageous, she can miscarry, but meanwhile she is negative.

FORCED ABORTION/FAMILY PLANNING

6. If a mother has the virus, they (health care workers) will inject something to the mother so that the baby will die.

⌘ BARRIERS OF PRENATAL VCT

TEST FEE

0. The fee for testing can prevent you (from taking HIV test).
1. Money.
2. Money problem.
3. Yes, money problem can also prevent you.
4. If they charge for the test
5. Money can prevent me.
6. When you don't have money.

FEAR

1. Panic and fear.
3. You will be afraid. That is all, because the pregnant woman is at risk.
5. Fear can prevent you.
6. Someone might not want to take the test due to the fear factor. If she tested negative, she would be fine, but if she has the virus, she will be afraid of dying.
6. Those who are afraid of the test would not go for a test. If the person is afraid, you don't have to tell her she is going in for the HIV test. You just tell her it is a lab test. After the test, you can tell her.

OTHER (UNFAITHFUL HUSBAND)

0. Maybe if your husband is a womanizer, he can prevent you from having the test.

⌘ FACILITATORS OF PRENATAL VCT

FREE TESTING

0. AIDS test should be free of charge so that many people can have it.
0. If it is free or it is not expensive.
1. If they don't charge anything for the test.
2. If I have money.
2. If my husband gives me money for it.
3. If the test is free, we would be anxious to go for the test. I'd be the first person.

3. If it is free. You look at the amount they charge for our laboratory. If it were not to be that we are pregnant, we wouldn't have done it.
4. If you have money.
5. If I have money.
5. What I would also love you to do is let them cut down the test fee because people are willing to do it, but the fee is too high.
6. If they do HIV test for free.

COUNSELING

5. If everything has been explained to me about the disease more in detail.

⌘ SUPPORTERS OF PRENATAL VCT

HUSBAND (SOMEONE WHO LOVES YOU)

1. Husbands.
4. Your husband.
5. Your husband can encourage you to go and do it, but only if he tested negative.
6. If the person loves you.

RELIGIOUS GROUP/LEADER

0. Church members can also advice people to take the test.
1. Pastors. But they encouraged us to do it before marriage.

HEALTH PROFESSIONAL

1. The doctors.
3. Doctors will tell you to do the test if they are not sure of your sickness.
3. It is the nurses who ask us questions and examine us here: look at your eyes, neck, etc. So if they see any problems on you, they will tell you to see the doctor. So it's the nurses and doctors.
4. The nurse can tell you to do it.
6. The doctors. They (nurses) have to tell the doctor that you are afraid of the test so they should not disclose to you that they would have HIV test on you. After the test, they can tell you.

⌘ OPPONENTS OF PRENATAL VCT

HUSBAND (UNFAITHFUL HUSBAND)

0. Your womanizer husband can prevent you from having AIDS test.
1. If your husband is unfaithful
3. It is your husband who will tell you not to do it. If you are infected with HIV, then you know he is unfaithful.
4. Your husband will tell you not to do it because he knows he is not faithful.
5. My partner.
6. If your husband knows that he has the virus, he will tell you not to have it.

FAMILY/FRIENDS

1. Friends can also prevent from taking AIDS test.
5. My mother and friends.
5. My grandmother.
5. My parents.

HEALTH PROFESSIONAL

1. Some doctors can prevent you from taking the test (because they know that you already have it).

NONE

6. No one can stop you.

§ CHARACTERISTICS OF PREGNANT WOMEN TAKING VCT

UNFAITHFUL HERSELF

0. If the pregnant woman is also not faithful and doesn't even know who's the baby's father, she would have AIDS test.
1. If she is not faithful.
3. As I said earlier, someone may have AIDS by flirting around. Another person may have the disease, but she may not be a flirt. We don't know how she got it. One must not think negative of the person.
4. I feel she is a flirt. Maybe she is not even sure of who the father of baby is.
5. I also feel she is a flirt.
6. There are some people they don't have husbands and they know they are not living right.

UNFAITHFUL HUSBAND

0. Those who do not trust their husband would do the test.
1. If she doesn't trust her husband.
2. Their husband gave it to them.
4. I feel her husband is womanizer. That is why she wants to do the test.
5. I am sure that her husband is a womanizer.
6. A person who doesn't trust her husband can do the test.

SICK (SICK OFTEN, SICK OF UNKNOWN ILLNESS)

0. I think a pregnant woman who is always complaining of sickness will be advised by doctors to have an AIDS test.
0. If you don't usually fall sick easily, but realize that you are vomiting and having boils, it will encourage you to take the test to make sure whether you have AIDS or not.
1. Pregnant women who fall sick easily.
3. When she is sick and the doctor cannot diagnose what is wrong with her, then the doctor will ask her to do the test.

PROTECT HER BABY

5. I also feel that she wants to protect her baby. In case she is HIV positive, she can be operated (CS) to deliver the baby so that the baby can have a less chance of getting the virus.

OTHERS

3. As I said earlier, someone may have AIDS by flirting around. Another person may have the disease, but she may not be a flirt. We don't know how she got it. One must not think negative of the person.
6. You can also get through blade and stuff. So I don't see her as a bad person.

Appendix 3.

Main survey questionnaire

**DETERMINANTS OF FULLY INFORMED INFANT FEEDING DECISIONS
AMONG GHANAIAN PREGNANT WOMEN**

INTRODUCTION

"My name is (____). We're interviewing pregnant women here in (____) polyclinic to learn more about their health and how they feed their babies, and what they know about the HIV"

PARTICIPANTS SCREENING

<p>P1. How old were you at your last birthday?</p> <p>_____ YEARS → IF SHE IS <18 OR >49, THANKS HER AND STOP</p> <p>99 DON'T KNOW/ NOT SURE → THANK HER AND STOP</p> <p>P2. Are you currently pregnant?</p> <p>1 YES</p> <p>2 NO/ NOT SURE → THANK HER AND STOP</p>
--

INFORMED CONSENT

We are interested in pregnant women's knowledge, attitudes, and intentions regarding infant feeding methods and participation in a HIV counseling and testing program. You will be asked to answer questions regarding 1) yourself and your household, 2) infant feeding methods, and 3) voluntary counseling and testing of HIV programs. The interview will take about an hour.

Risks and Benefits of Being in the Study

Some of the questions to come may be uncomfortable to answer, because they have to do with HIV. Some people feel uncomfortable discussing these things, but we would really like to know what you think about these issues. There is no direct benefit to you. However, the study results might be used to improve a voluntary counseling and testing of HIV program for pregnant women as well as a nutrition intervention program for children in Ghana. For your time, you will receive a small thank you gift for participating in the study.

Confidentiality

Once the interview is completed, personal information will be separated from other research data and kept locked by the investigator. The information will be only identified by a sequence number, when it is shared with others. When the study is completed, the personal information will be destroyed to ensure the confidentiality of study participants.

Voluntary Nature of the Study

You do not have to answer any questions that you do not want to answer, and you are free to withdraw at any time for any reason with no negative consequences or effects on the treatment you receive at the clinic.

Contacts

If you have an additional question, you can contact the study coordinator, Yi-Kyoung Lee, in the department of Nutrition and Food Science, University of Ghana, Legon (Tel: 310972) or the study advisor, Dr. Anna Lartey, in the department of Nutrition and Food Science, University of Ghana, Legon (Tel: 513293)

Statement of Consent

I have been explained the above information. I have asked questions and have received answers. I consent to participate in the study.

Signature of participant _____ Date ____ / ____ /2002

Signature of witness _____ Date ____ / ____ /2002

Signature of interviewer _____ Date ____ / ____ /2002

Participants ID	_ _ _ _		
Interviewer	Code _ _	Name _____	
Site	1=KPC, 2=MPC		
Language	1= Twi, 2 = Ga, 3 = English		
Time start	_____ : AM/PM	Time end	_____ : AM/PM
Checked by	_____		
Editing	Code _ _	Name _____	
Follow-up	→ Qualified	1=Yes	2=No
	→ Recruited	1=Yes	2=No

SES BACKGROUND CHARACTERISTICS

Characteristics of SP

S1. To which ethnic group do you belong?

- 1 AKAN (ASHANTI, AKWAPIM, FANTI, ETC)
- 2 GA/ ADANGBE
- 3 EWE
- 4 NORTHERN ETHNIC GROUPS
- 88 OTHER (SPECIFY: _____)

S2. Which region have you spent most of your life?

- 1 GREATER ACCRA
- 88 OTHER (SPECIFY: _____)

S3. What is your marital status? **(PROBE)**

- 1 CURRENTLY MARRIED (MONOGAMY/POLYGAMY)
→ Do you currently stay with your spouse- Yes/No
- 2 LIVING WITH A MAN (COMMON LAW)
- 3 DIVORCED/ SEPARATED/ WIDOWED
- 4 NEVER MARRIED/ NOT LIVING WITH A MAN
- 88 OTHER (SPECIFY: _____)

S4. What is the highest grade of school you have completed? **(PROBE)**

RECORD VERBATIM:

- _____ YEARS
- 99 DON'T KNOW/ NOT SURE

S5. What is your usual profession? **(PROBE)**

- 0 NONE/ HOUSEWIFE
- 1 TRADER/ MARKETER
- 2 HAIR DRESSER
- 3 SEAMSTRESS
- 4 CATERER
- 5 CLERICAL (SECRETARY, COMPANY AGENTS)
- 88 OTHER (SPECIFY: _____)

S6. What is your current employment status? Are you currently...

READ OUT

- 1 WORKING ON A PAID JOB
- 2 WORKING ON AN UNPAID JOB
- 3 SELF EMPLOYED
- 4 HOUSEWIFE, UNEMPLOYED, OR LOOKING FOR WORK
- 88 OTHER (SPECIFY: _____)

S7. How soon are you planning to go back to work after delivery?

- _____ YEARS _____ MONTHS _____ WEEKS
- 99 DON'T KNOW/ NOT SURE

S8. What is your religion?

- 0 NO RELIGION
- 1 PROTESTANT (SPECIFY: _____)
- 2 CATHOLIC
- 3 MUSLIM
- 88 OTHER (SPECIFY: _____)

S9. Which inheritance system do you belong to? Is it...

- 1 MATRILINEAL SYSTEM
- 2 PATRILINEAL SYSTEM
- 99 DON'T KNOW/ NOT SURE

S10. Do you belong to any mutual help societies or other affiliations such as associations, co-operatives, clubs, and churches? **(PROBE)**

- 1 YES (SPECIFY: _____)
- 2 NO → S12
- 99 DON'T KNOW/ NOT SURE → S12

S11. What kind of support do you get from mutual help societies?

DO YOU GET... (REPEAT)	Yes	NO	DK
A. EMOTIONAL SUPPORT (EMPATHY, LOVE, TRUST, CARING)	1	2	99
B. INFORMATIONAL SUPPORT (ADVICE, COUNSELING)	1	2	99
C. MATERIAL SUPPORT (MONEY, FOOD, CLOTHES)	1	2	99

Characteristics of RP

S12. Are you the head of the household?

(IF NOT) what is the relationship of the head of household to you?

- 1 YES → S21
- 2 SPOUSE TO THE HEAD OF HOUSEHOLD
- 3 PARENT (SPECIFY: _____)
- 4 SIBLING (SPECIFY: _____)
- 5 RELATIVE (SPECIFY: _____)
- 88 OTHER (SPECIFY: _____)

S13. To which ethnic group does the head of household belong?

- 1 AKAN (ASHANTI, AKWAPIM, FANTI, ETC)
- 2 GA/ ADANGBE
- 3 EWE
- 4 NORTHERN ETHNIC GROUPS
- 88 OTHER (SPECIFY: _____)

S14. Which region has the head of household spent most of his/her life?

- 1 GREATER ACCRA
- 88 OTHER (SPECIFY: _____)

S15. What is the marital status of the head of household?

- 1 CURRENTLY MARRIED
- 2 LIVING WITH A MAN/WOMAN (COMMON LAW)
- 3 DIVORCED/ SEPARATED/ WIDOWED
- 4 NEVER MARRIED/ NOT LIVING WITH A MAN/WOMAN
- 88 OTHER (SPECIFY: _____)

S16. What is the highest grade of school the head of household has completed?

RECORD VERBATIM:

- _____ YEARS
- 99 DON'T KNOW/ NOT SURE

S17. What is the usual profession of the head of household? (Probe: What kind of job does the head of household do most of the time?)

- 0 NONE
- 1 STREET TRADER/MARKETER
- 2 GENERAL TRADER/ SALES PERSON
- 3 GUARD, SOLDIER, POLICEMAN
- 4 MANUAL WORK (DRIVER, MECHANIC, CARPENTER, ETC)
- 5 CLERICAL (COMPANY AGENT, ETC)
- 6 MANAGERIAL/ADMINISTRATIVE/PROFESSIONAL
- 88 OTHER (SPECIFY: _____)

S18. What is the current employment status of the head of household? Is he/she currently...

READ OUT

- 1 WORKING ON A PAID JOB
- 2 WORKING ON AN UNPAID JOB
- 3 SELF EMPLOYED
- 4 UNEMPLOYED OR LOOKING FOR WORK
- 88 OTHER (SPECIFY: _____)

S19. What is the religion of the head of household?

- 0 NO RELIGION
- 1 PROTESTANT (SPECIFY: _____)
- 2 CATHOLIC
- 3 MUSLIM
- 88 OTHER (SPECIFY: _____)

S20. Which inheritance system does the head of household belong to? Is it...

- 1 MATRILINEAL SYSTEM
- 2 PATRILINEAL SYSTEM
- 99 DON'T KNOW/ NOT SURE

Characteristics of household

S21. Where are you staying in now?

RECORD VERBATIM:

S22. How many years have you been living continuously in (S21)?

- _____ YEARS
88 OTHER (SPECIFY: _____)
99 DON'T KNOW/ NOT SURE

S23. Do you own the house you are staying in or do you rent it? (PROBE)

- 1 OWNED (SPECIFY: BELONG TO _____)
2 RENTED (SPECIFY: BELONG TO _____)
88 OTHER (SPECIFY: _____)

S24. How many households including yours stay in your compound?

_____ HOUSEHOLDS

S25. How many rooms are used for sleeping for your family?

_____ ROOMS

S26. What kind of toilet do most members of your family use? Is it...

- 1 WATER FLUSH TOILET (W.C.)
2 LATRINE TOILET (BUCKET LATRINE)
3 VENTILATED IMPROVED PIT (VIP)
4 TRADITIONAL PIT TOILET
5 COMMERCIAL/PUBLIC TOILET → S28
6 NO FACILITY (BUSH/FIELD/BEACH) → S28
88 OTHER (SPECIFY: _____)

S27. Do you share this toilet facility with other household (s)?

- 1 YES
2 NO
99 DON'T KNOW / NO RESPONSE

S28. What is the main source of drinking water for most members of your family? Is it...

- 1 PIPED WATER IN YOUR HOME (RESIDENCE/COMPOUND)
2 PIPED WATER IN PUBLIC TAB/NEIGHBORS
3 COMMERCIAL TAB
4 WATER FROM COVERED WELL OR BOREHOLE
5 WATER FROM OPEN WELL
6 BOTTLE WATER
88 OTHER (SPECIFY: _____)

S29. What type of fuel does your family mainly use for cooking?

- 1 ELECTRICITY
2 LPG/NATURAL GAS
3 KEROSENE
4 COAL/LIGNITE
5 CHARCOAL
88 OTHER (SPECIFY: _____)

S30. What is the main material of the floor? Is it...

- 1 NATURAL FLOOR (EARTH/SAND/MUD)
2 RUDIMENTARY FLOOR (WOOD PLANKS/PALM)
3 FINISHED FLOOR (LINOLEUM/TILES/CEMENT/TERRAZZO/CARPET)
88 OTHER (SPECIFY: _____)

S31. Does your family own...

	YES	NO
A. A RADIO	1	2
B. A TELEVISION	1	2
C. A VCR	1	2
D. A TELEPHONE	1	2
E. A REFRIGERATOR	1	2
F. AN AIR-CONDITIONER	1	2
G. A CAR	1	2

S32. What is the total number of your family? (PROBE)

_____ PEOPLE

S33. What is the average family income per day? (PROBE)

_____ CEDIS/DAY

99 DON'T KNOW/ NOT SURE/ NO RESPONSE

S34. How much money, on average, do you spend for foods per day? (PROBE)

_____ CEDIS/DAY FOR _____ PEOPLE

99 DON'T KNOW/ NOT SURE/ NO RESPONSE

PREGNANCY CHARACTERISTICS

P1. When were you born? (DD/MM/YYYY)

____/____/19____
99 DON'T KNOW

P2. How many weeks pregnant are you?

____ WEEKS (____ MONTHS)
99 DON'T KNOW/ NOT SURE

P3. How many weeks pregnant were you when you first visited the antenatal clinic?

____ WEEKS (____ MONTHS)
66 THIS IS THE FIRST VISIT → P5
99 DON'T KNOW/ NOT SURE

P4. How many times, including today, have you visited the antenatal clinic with this pregnancy?

____ TIMES
99 DON'T KNOW/ NOT SURE

P5. When is due date of this pregnancy?

____/____/200____
99 DON'T KNOW/ NOT SURE

P6. Where do you plan to deliver your baby?

- 1 KANESHIE POLYCLINIC
- 2 MAMPROBI POLYCLINIC
- 3 KORLE-BU HOSPITAL
- 4 PRIVATE MIDWIFE
- 5 TRADITIONAL BIRTH ATTENDANT
- 88 OTHER (SPECIFY: _____)
- 99 DON'T KNOW/ NOT SURE

P7. Was this pregnancy planned?

- 1 YES
- 2 NO
- 99 DON'T KNOW/ NOT SURE

P8. Have you had any minor illnesses such as fever, diarrhea, cholera or malaria related vomiting during this pregnancy? (PROBE)

- 1 YES (SPECIFY: _____)
- 2 NO
- 99 DON'T KNOW/ NOT SURE

P9. Have you had any serious illnesses such as diabetes or hypertension? (PROBE)

- 1 YES (SPECIFY: _____)
- 2 NO
- 99 DON'T KNOW/ NOT SURE

P10. How many births have you given so far?

____ BIRTHS → IF "0", F13

P11. How many children of your own do you have now (not counting this pregnancy)?

____ CHILDREN → IF "0", F13

INFANT FEEDING

Previous infant feeding practices

What is your youngest child name?
 For the following questions, let's talk about (child name).

- F1.** How old is (child name)?
 _____ YEARS _____ MONTHS
 99 DON'T KNOW/ NOT SURE
- F2.** Have you ever breastfed to (child name)? **(PROBE)**
 (IF NO) What did you feed (child name) instead of breast milk?
 1 YES
 2 NO, I FED (SPECIFY: _____) → F7
- F3.** (IF YES) how many months was (child name) breastfed?
 _____ YEARS _____ MONTHS → F5
 66 STILL BREASTFEEDING
 99 DON'T KNOW/ NOT SURE → F5
- F4.** How long do you plan to continue breastfeeding (child name)?
 _____ YEARS _____ MONTHS
 99 DON'T KNOW/ NOT SURE
- F5.** Did you feed colostrum (yellow milk) to (child name)?
 1 YES
 2 NO
 99 DON'T KNOW/ NOT SURE
- F6.** What is the main reason you (fed/didn't feed) colostrum?
 RECORD VERBATIM:
- F7.** What was the first liquid or food given to (child name) other than breast milk? Is it plain water, liquid or food? **(PROBE)**
 RECORD VERBATIM:

- F8.** At what age did you first feed that?
 _____ MONTHS _____ WEEKS _____ DAYS
 99 DON'T KNOW/ NOT SURE
- F9.** Have you ever fed (child name) infant formula such as S.M.A., Lactogen, Frisolac, etc (not Cerelac)?
 1 YES
 2 NO → F13
 99 DON'T KNOW/ NOT SURE → F13
- F10.** At what month did you start giving infant formula and stop giving it? **(PROBE)**
 BEGAN AT _____ MONTH
 ENDED AT _____ MONTH (_____ YEARS)
 66 STILL FEEDING INFANT FORMULA
 88 OTHER (SPECIFY: _____)
 99 DON'T KNOW/ NOT SURE
- F11.** How did you feed infant formula? Did you feed it...
 1 WITH A FEEDING BOTTLE
 2 WITH A SPOON
 3 WITH A CUP
 88 OTHER (SPECIFY: _____)
- F12.** What was the main reason you fed (child name) infant formula?
 RECORD VERBATIM:
- F13.** Have you ever received any information regarding ... **(REPEAT)**
- | | YES | NO | DK |
|----------------------------|-----|----|----|
| A. EXCLUSIVE BREASTFEEDING | 1 | 2 | 99 |
| B. BREAST PROBLEM/CARE | 1 | 2 | 99 |
| C. INFANT FORMULA | 1 | 2 | 99 |
| D. FOOD SANITATION/HYGIENE | 1 | 2 | 99 |

Infant feeding intentions

Now I would like us to change our conversation and to talk about the baby that is coming in.

F14. What liquids and foods including plain water do you intend to feed your baby within the first 3 days after delivery?

MULTIPLE ANSWERS
RECORD VERBATIM:

F15. What liquids and foods including plain water do you intend to feed your baby during the 1st month (after the first 3days)?

MULTIPLE ANSWERS
RECORD VERBATIM:

F16. What liquids and foods including plain water do you intend to feed your baby between 1-3 months?

MULTIPLE ANSWERS
RECORD VERBATIM:

F17. What liquids and foods including plain water do you intend to feed your baby between 4-6 months?

MULTIPLE ANSWERS
RECORD VERBATIM:

F18. (IF SHE INTENDS TO FEED OTHER THAN BREAST MILK IN F14-17)
What is the main reason that you intend to introduce other foods apart from breast milk within 6 months?

RECORD VERBATIM:

I am going to read you some statements about your intentions regarding infant feeding. Please tell me whether you strongly agree, agree, not sure (neutral), disagree, or strongly disagree with the following statements.

F19. Within the first month, you plan to feed your baby...
(REPEAT)

	A				D
A. ONLY BREAST MILK	1	2	3	4	5
B. PLAIN WATER	1	2	3	4	5
C. INFANT FORMULA	1	2	3	4	5
D. PORRIDGE	1	2	3	4	5

F20. How long do you intend to feed your baby only breast milk?
_____ MONTHS _____ WEEKS
99 DON'T KNOW/ NOT SURE

F21. How long do you intend to feed your baby breast milk (WITH OTHER FOODS)?
_____ YEARS _____ MONTHS _____ WEEKS
99 DON'T KNOW/ NOT SURE

Attitudes, Subjective norms, & Perceived behavioral control

I am going to read you some statements about infant feeding during the 1st month. Please tell me whether you strongly agree, agree, not sure (neutral), disagree, or strongly disagree with the following statements.

Exclusive breastfeeding

F22. FEEDING ONLY BREAST MILK DURING THE 1ST MONTH IS...
(REPEAT)

	A				D
A. ENJOYABLE/PLEASANT	1	2	3	4	5
B. BENEFICIAL	1	2	3	4	5
C. VALUABLE	1	2	3	4	5
D. GOOD	1	2	3	4	5
E. CONVENIENT	1	2	3	4	5

F23.		A	D
A.	MOST PEOPLE WHO ARE IMPORTANT TO YOU THINK YOU <u>SHOULD</u> FEED YOUR BABY <u>ONLY BREAST MILK DURING THE 1ST MONTH</u>	1	2 3 4 5
B.	THE PEOPLE WHOSE OPINIONS YOU VALUE WOULD <u>APPROVE</u> YOUR FEEDING <u>ONLY BREAST MILK DURING THE 1ST MONTH</u>	1	2 3 4 5
C.	IT IS <u>POSSIBLE</u> FOR YOU TO FEED YOUR BABY <u>ONLY BREAST MILK DURING THE 1ST MONTH</u>	1	2 3 4 5
D.	YOU <u>COULD</u> FEED YOUR BABY <u>ONLY BREAST MILK DURING THE 1ST MO.</u>	1	2 3 4 5
E.	IT IS MOSTLY <u>UP TO YOU</u> WHETHER OR NOT YOU FEED YOUR BABY <u>ONLY BREAST MILK DURING THE 1ST MONTH</u>	1	2 3 4 5
F.	YOU BELIEVE YOU <u>DO HAVE CONTROL</u> OVER FEEDING YOUR BABY <u>ONLY BREAST MILK DURING THE 1ST MONTH</u>	1	2 3 4 5

Formula feeding

F24.		A	D
FEEDING <u>INFANT FORMULA WITHIN 1 MONTH</u> IS (REPEAT)			
A.	ENJOYABLE/PLEASANT	1	2 3 4 5
B.	BENEFICIAL	1	2 3 4 5
C.	VALUABLE	1	2 3 4 5
D.	GOOD	1	2 3 4 5
E.	CONVENIENT	1	2 3 4 5

F25.		A	D
A.	MOST PEOPLE WHO ARE IMPORTANT TO YOU THINK YOU <u>SHOULD</u> FEED BABY <u>INFANT FORMULA WITHIN 1 MONTH</u>	1	2 3 4 5
B.	THE PEOPLE WHOSE OPINIONS YOU VALUE WOULD <u>APPROVE</u> YOUR FEEDING <u>INFANT FORMULA WITHIN 1 MONTH</u>	1	2 3 4 5
C.	IT IS <u>POSSIBLE</u> FOR YOU TO FEED YOUR BABY <u>INFANT FORMULA WITHIN 1 MONTH</u>	1	2 3 4 5

		A	D
D.	YOU <u>COULD</u> FEED YOUR BABY <u>INFANT FORMULA WITHIN 1 MONTH</u>	1	2 3 4 5
E.	IT IS MOSTLY <u>UP TO YOU</u> WHETHER OR NOT YOU FEED YOUR BABY <u>INFANT FORMULA WITHIN 1 MONTH</u>	1	2 3 4 5
F.	YOU BELIEVE YOU <u>DO HAVE CONTROL</u> OVER FEEDING YOUR BABY <u>INFANT FORMULA WITHIN 1 MONTH</u>	1	2 3 4 5

I am going to read you some statements about infant feeding during the 1st month. Please tell me whether you agree or not

Exclusive breastfeeding

F26.		Y	N	DK
DO YOU THINK FEEDING <u>ONLY BREAST MILK DURING THE 1ST MO...</u> (REPEAT)				
A.	PROTECTS BABY FROM GETTING SICK	1	2	99
B.	MAKES BABY THIRSTY	1	2	99
C.	MAKES BABY STRONGER	1	2	99
D.	MAKES BABY HUNGRY	1	2	99
E.	PROVIDES ALL THE NUTRIENTS BABY NEEDS	1	2	99
F.	INCREASES BONDING OF MOM AND BABY	1	2	99
G.	MAKES BABY INTELLIGENT	1	2	99
H.	MAKES BABY GROW WELL	1	2	99
I.	TAKES TOO MUCH OF YOUR TIME	1	2	99
J.	REDUCES YOUR CHANCES OF GETTING CANCER	1	2	99
K.	MAKES YOUR BREAST SAGGY	1	2	99
L.	HELPS YOU WITH CHILD SPACING	1	2	99
M.	SAVES MONEY FOR THE FAMILY	1	2	99
N.	MAKES YOUR BREAST/NIPPLE SORE	1	2	99
O.	PREVENTS YOU FROM WORKING OUTSIDE	1	2	99
P.	HELPS YOUR POSTNATAL RECOVERY	1	2	99

Formula feeding

F27. DO YOU THINK FEEDING INFANT FORMULA WITHIN 1 MONTH
(REPEAT)

	Y	N	DK
A. ENSURES THAT BABY GETS ALL THE NUTRIENTS	1	2	99
B. MAKES BABY HAVE DIARRHEA	1	2	99
C. MAKES BABY GROW NICELY	1	2	99
D. MAKES BABY SATISFIED (FULL)	1	2	99
E. MAKES BABY MAL/UNDER-NOURISHED	1	2	99
F. MAKES BABY VOMIT	1	2	99
G. MAKES BABY INTELLIGENT	1	2	99
H. MAKES BABY BIG (BOUNCY)	1	2	99
I. GIVES YOU MORE FREE TIME	1	2	99
J. WASTES MONEY FOR THE FAMILY	1	2	99
K. HELPS YOU WORK OUTSIDE SOONER	1	2	99
L. GIVES AN OPTION NOT TO SHOW YOUR BREAST IN PUBLIC	1	2	99

(F28-31)

0	NOBODY	7	RELATIVES
1	MYSELF	8	FRIENDS
2	SPOUSE/PARTNER	9	NEIGHBORS
3	MOTHER OF SP	10	NURSES
4	MOTHER IN LAWS OF SP	11	DOCTORS
5	SIBLINGS	88	OTHERS (SPECIFY)
6	FAMILY (SPECIFY)	99	DON'T KNOW/ NOT SURE

F28. Who do you believe would approve your feeding only breast milk during the 1st month?

MULTIPLE ANSWERS

F29. Who do you believe would disapprove your feeding only breast milk during the 1st month?

MULTIPLE ANSWERS

F30. Who do you believe would approve your feeding infant formula within 1 month?

MULTIPLE ANSWERS

F31. Who do you believe would disapprove your feeding infant formula within 1 month?

MULTIPLE ANSWERS

Perceived susceptibility & severity of disease

I am going to give some examples of diseases your baby might get. Please tell me whether it is very likely, likely, not sure (neutral), unlikely, or very unlikely for your baby to get the following diseases

F32. When you feed (→), how likely is it for your baby to get (disease)
(REPEAT)

	BREAST MILK ONLY DURING THE 1 ST MO					INFANT FORMULA WITHIN 1 MONTH				
	L				U	L				U
A. DIARRHEA	1	2	3	4	5	1	2	3	4	5
B. CHOLERA	1	2	3	4	5	1	2	3	4	5
C. URI	1	2	3	4	5	1	2	3	4	5
D. CONSTIPATION	1	2	3	4	5	1	2	3	4	5
E. TB	1	2	3	4	5	1	2	3	4	5
F. MALARIA	1	2	3	4	5	1	2	3	4	5
G. HIV	1	2	3	4	5	1	2	3	4	5

F33. How serious do you think it is if your baby gets the following diseases? Is it very serious, serious, somewhat serious, not very serious, or not serious at all? (REPEAT)

	SERIOUS					NOT				
A. DIARRHEA	1	2	3	4	5	1	2	3	4	5
B. CHOLERA	1	2	3	4	5	1	2	3	4	5
C. URI	1	2	3	4	5	1	2	3	4	5
D. CONSTIPATION	1	2	3	4	5	1	2	3	4	5
E. TB	1	2	3	4	5	1	2	3	4	5
F. MALARIA	1	2	3	4	5	1	2	3	4	5
G. HIV	1	2	3	4	5	1	2	3	4	5

Beliefs and Knowledge about infant feeding

F34. In your family who mainly decides what to feed your baby?

- 1 MOTHER OF BABY
- 2 FATHER OF BABY
- 3 MOTHER OF SP
- 4 MOTHER IN LAW OF SP
- 88 OTHER (SPECIFY: _____)
- 99 DON'T KNOW/ NOT SURE

F35. If you want to introduce other liquids or foods for your baby, other than breast milk, who is mainly going to pay for that?

- 1 MOTHER OF BABY
- 2 FATHER OF BABY
- 88 OTHER (SPECIFY: _____)
- 99 DON'T KNOW/ NOT SURE

F36. Up to what age (month) should a baby be exclusively breastfed?

- _____ MONTHS
- 99 DON'T KNOW/ NOT SURE

F37. Up to what age (month) should a baby be breastfed with other foods?

- _____ YEARS _____ MONTHS
- 99 DON'T KNOW/ NOT SURE

F38. How often should a baby less than 1 month old be breastfed? (PROBE)

- _____ TIMES PER 24 HOURS
- 77 DAY TIME ONLY
- 78 ON DEMAND (SPECIFY: _____)
→ Do you feed on demand 24 hrs or only during the day?
- 88 OTHER (SPECIFY: _____)
- 99 DON'T KNOW/ NOT SURE

F39. At what age should a baby be first given... (REPEAT)

	MO	Wk	DAY	DK
A. KOOKO	_____	_____	_____	99
B. CERELAC	_____	_____	_____	99
C. LACTOGEN	_____	_____	_____	99
D. MILK (IDEAL, NIDDO, COW BELL)	_____	_____	_____	99
E. APAPRANSA	_____	_____	_____	99
F. PLAIN WATER	_____	_____	_____	99
G. S.M.A.	_____	_____	_____	99
H. MPOTO _h MPOTO	_____	_____	_____	99

F40. If a mother cannot or decides not to initiate breastfeeding, or stops breastfeeding within the first 3 days after delivery, what can she feed her baby within the first 3 days after delivery? (PROBE)

MULTIPLE ANSWERS
RECORD VERBATIM:

F41. If a mother cannot or decides not to initiate breastfeeding, or stops breastfeeding before 1 month of age, what can she feed her baby during the 1st month (after the first 3 days)? (PROBE)

MULTIPLE ANSWERS
RECORD VERBATIM:

F42. If a mother cannot or decides not to initiate breastfeeding or stops breastfeeding before 3 months of age, what can she feed her baby between 1-3 months? (PROBE)

MULTIPLE ANSWERS
RECORD VERBATIM:

F43. If a mother cannot or decides not to initiate breastfeeding or stops breastfeeding before 6 months of age, what can she feed her baby between 4-6 months? (PROBE)

MULTIPLE ANSWERS
RECORD VERBATIM:

F44. In your neighborhood, what are the reasons mothers do not initiate breastfeeding their babies? (PROBE)

MULTIPLE ANSWERS
RECORD VERBATIM:

F45. In your neighborhood, what are the reasons mothers stop breastfeeding before 6 months? (PROBE)

MULTIPLE ANSWERS
RECORD VERBATIM:

HIV/AIDS

Knowledge/perceptions about HIV/AIDS

H1. Have you ever heard of HIV/AIDS?

- 1 YES
- 2 NO → THANKS HER AND STOP
- 99 DON'T KNOW/ NOT SURE → THANKS HER AND STOP

H2. How can one get infected with HIV/AIDS?

RECORD CODE FROM H3:

H3. I am going to give you examples of possible transmission route of HIV/AIDS. Please tell me whether it is true or not. Please do not guess the answer. Tell me you do not know if you are not sure.

Is it possible one can get infected through (ONLY THE OPTIONS SHE HAS NOT MENTIONED IN H2)

	T	F	DK
A. SEXUAL INTERCOURSE W/ HIV (+) PERSON	1	2	99
B. SHARING BLADE, RAZOR, NEEDLE	1	2	99
C. BLOOD TRANSFUSIONS	1	2	99
D. MTCT DURING PREGNANCY	1	2	99
E. MTCT DURING BIRTH	1	2	99
F. MTCT THROUGH BREASTFEEDING	1	2	99
G. SPIRITUAL (WITCH, WIZARD)	1	2	99
H. MOSQUITO/INSECT BITES	1	2	99
I. SHARING A MEAL OR FOODS WITH HIV (+)	1	2	99
J. SHARING CUP/GLASS WITH HIV (+)	1	2	99
K. KISSING WITH HIV (+)	1	2	99
L. USING THE SAME BATHROOM WITH HIV (+)	1	2	99

H4. How can people protect themselves from getting infected with HIV/AIDS? (PROBE)

MULTIPLE ANSWERS

- 0 NO WAY TO AVOID HIV/AIDS
- 1 ABSTAIN FROM SEX
- 2 ALWAYS USE CONDOMS
- 3 USE CONDOM MORE OFTEN
- 4 STAY FAITHFUL TO ONE PARTNER
- 5 LIMIT NUMBER OF SEX PARTNERS
- 6 AVOID SHARING SHARP INSTRUMENTS
- 7 SEEK PROTECTION FROM GOD (PRAYING)
- 8 SEEK PROTECTION FROM A TRADITIONAL HEALER
- 88 OTHER (SPECIFY: _____)
- 99 DON'T KNOW/ NOT SURE

H5. Do you personally know anyone who has HIV/AIDS?

- 1 YES
- 2 NO → H7
- 99 DON'T KNOW/ NOT SURE → H7

H6. How did you know that person has HIV/AIDS?

- 1 BY LOOKING AT THE PERSON (LEAN, RASH, COUGHING)
- 2 SOMEBODY TOLD ME
- 3 THE SPOUSE OR CHILD DIED FROM AIDS
- 4 THE PERSON HAS BEEN ABROAD (_____)
- 5 I AM JUST GUESSING
- 88 OTHER (SPECIFY: _____)

H7. In every 100 people in your neighborhood, how many do you think are HIV-positive?

- _____ PEOPLE
- 99 DON'T KNOW/ NOT SURE

H8. In every 100 pregnant women, how many do you think are HIV-positive?

- _____ PEOPLE
- 99 DON'T KNOW/ NOT SURE

H9. In every 100 HIV-positive people in your neighborhood, how many do you think are female?

- _____ PEOPLE
- 99 DON'T KNOW/ NOT SURE

H10. I am going to read you some statements about HIV/AIDS. Please tell me whether it is true or not

	T	F	DK
A. <u>AS SOON AS YOU GET HIV, YOU BEGIN TO GROW LEAN.</u>	1	2	99
B. AIDS IS A <u>SPIRITUAL DISEASE</u> , SO GOD /TRADITIONAL HEALER CAN CURE IT.	1	2	99
C. YOU CAN TELL <u>BY LOOKING AT THE PERSON</u> WHETHER HE/SHE HAS HIV.	1	2	99
D. AT THE <u>INITIAL STAGE</u> OF INFECTION, YOU CAN <u>CURE AIDS</u> BY TAKING MEDICINE AND NUTRITIOUS FOODS.	1	2	99
E. IF PREGNANT WOMEN ARE HIV-POSITIVE, THE <u>BABY IN THE WOMB IS AUTOMATICALLY HIV-POSITIVE.</u>	1	2	99
F. IF YOU TESTED HIV-NEGATIVE, YOU ARE <u>FREE FROM HIV FOR 6 MONTHS.</u>	1	2	99
G. IF YOU HAVE MONEY, YOU CAN GET <u>VACCINATION AGAINST HIV/AIDS.</u>	1	2	99
H. IF YOU HAVE <u>SEX WITH AN HIV-POSITIVE PERSON AT LEAST ONCE</u> , YOU WILL GET THE VIRUS <u>BY ALL MEANS.</u>	1	2	99
I. IF YOU GET INFECTED WITH HIV, YOU WILL <u>KNOW (FEEL) RIGHT AWAY.</u>	1	2	99
J. IF YOU ARE GOD FEARING, GOD WILL PROTECT YOU FROM GETTING HIV <u>NO MATTER WHAT.</u>	1	2	99

H11. Have you ever discussed your personal risk or concerns about HIV/AIDS with anyone?

- 1 YES
- 2 NO
- 99 DON'T KNOW/ NOT SURE

H12. What do you think would be your risk of getting HIV in the next 12 months? Is it none, low, moderate, high, or very high?

- 1 NONE
- 2 LOW
- 3 MODERATE
- 4 HIGH
- 5 VERY HIGH
- 99 DON'T KNOW/ NOT SURE → H14

H13. What are the reasons you choose (H12) as your risk of getting HIV in the next 12 months?

MULTIPLE ANSWERS

- 1 I AM FAITHFUL
- 2 I AM NOT FAITHFUL (MULTIPLE SEXUAL PARTNER)
- 3 HUSBAND/PARTNER IS FAITHFUL
- 4 HUSBAND/PARTNER IS NOT FAITHFUL
- 5 PROTECTED SEX (USE CONDOM ALWAYS/ MORE OFTEN)
- 6 UNPROTECTED SEX
- 7 SEXUALLY INACTIVE (NO SPOUSE/PARTNER)
- 8 DON'T SHARE SHARP INSTRUMENTS
- 9 SHARE SHARP INSTRUMENTS
- 10 ACCIDENTS/VARIOUS TRANSMISSION ROUTE
- 88 OTHER (SPECIFY: _____)
- 99 DON'T KNOW/ NOT SURE

H14. What do you think would be your husband's risk of getting HIV in the next 12 months? Is it none, low, moderate, high, or very high?

- 1 NONE
- 2 LOW
- 3 MODERATE
- 4 HIGH
- 5 VERY HIGH
- 99 DON'T KNOW/ NOT SURE → H16

H15. What are the reasons you choose (H14) as your husband's risk of getting HIV in the next 12 months?

MULTIPLE ANSWERS

- 1 I AM FAITHFUL
- 2 I AM NOT FAITHFUL (MULTIPLE SEXUAL PARTNER)
- 3 HUSBAND/PARTNER IS FAITHFUL
- 4 HUSBAND/PARTNER IS NOT FAITHFUL
- 5 PROTECTED SEX (USE CONDOM ALWAYS/ MORE OFTEN)
- 6 UNPROTECTED SEX
- 7 DON'T SHARE SHARP INSTRUMENTS
- 8 SHARE SHARP INSTRUMENTS
- 9 ACCIDENTS/VARIOUS TRANSMISSION ROUTE
- 88 OTHER (SPECIFY: _____)
- 99 DON'T KNOW/ NOT SURE

H16. From which source of information have you learned most about HIV/AIDS?

- 1 RADIO
- 2 TELEVISION
- 3 NEWSPAPER/MAGAZINES (OR OTHER WRITTEN MATERIALS)
- 4 HEALTH CARE WORKERS
- 5 RELIGIOUS GROUP (CHURCHES/MOSQUES)
- 6 SPOUSE
- 7 FAMILY/RELATIVES
- 8 FRIENDS/NEIGHBORS
- 88 OTHER (SPECIFY: _____)

H17. If a person learns that h/she is infected with the virus that causes AIDS, should the person be allowed to keep this fact private or should this information be available to spouse, family or neighbors?

MULTIPLE ANSWERS

- 1 CAN BE KEPT PRIVATE
- 2 AVAILABLE TO SPOUSE/PARTNER
- 3 AVAILABLE TO FAMILY (CHILDREN, PARENTS, SIBLING)
- 4 AVAILABLE TO NEIGHBORS
- 88 OTHER (SPECIFY: _____)
- 99 DON'T KNOW/ NOT SURE

H18. What kind of care and support does an AIDS patient need?

MULTIPLE ANSWERS

- 0 NONE → H20
- 1 EMOTIONAL SUPPORT (EMPATHY, LOVE, TRUST, CARING)
- 2 INFORMATIONAL SUPPORT (ADVICE, COUNSELING)
- 3 MATERIAL SUPPORT (MONEY, FOOD, MEDICINE)
- 4 PRAYERS (RELIGIOUS LEADER, FRIENDS, FAMILY)
- 88 OTHER (SPECIFY: _____)
- 99 DON'T KNOW/ NOT SURE

H19. Who do you think should mainly provide such care and support?

- 1 FAMILY
- 2 RELATIVES
- 3 FRIENDS
- 4 NEIGHBORS/COMMUNITY
- 5 RELIGIOUS ORGANIZATION
- 6 GOVERNMENT ORGANIZATION
- 88 OTHER (SPECIFY: _____)
- 99 DON'T KNOW/ NOT SURE

H20. What do you think is the most important thing the government should do to prevent people from getting HIV?

- 1 NONE
- 2 PROVIDES MORE EDUCATION/COUNSELING/CAMPAIGN
- 3 PROVIDES MORE CONDOMS
- 4 PROVIDES FREE/LOW COST HIV TESTING
- 5 PROVIDES FREE TREATMENT FOR STD PATIENTS
- 88 OTHER (SPECIFY: _____)
- 99 DON'T KNOW/ NOT SURE

H21. What do you think is the most important thing the government should do for people with HIV/AIDS?

- 1 NONE/ SHOULD NOT BE INVOLVED
- 2 PROVIDE MEDICAL CARE AT NO/REDUCED COST
- 3 HELP FAMILY/RELATIVES PROVIDE CARE
- 4 ISOLATE/ QUARANTINE
- 88 OTHER (SPECIFY: _____)
- 99 DON'T KNOW/ NOT SURE

I am going to read statements about perception regarding HIV/AIDS. Please tell me whether you agree or not with the following statements

H22.

	A	D	DK
A. YOU ARE AFRAID THAT YOU MIGHT GET HIV	1	2	99
B. YOU ARE AFRAID THAT YOUR HUSBAND MIGHT GET HIV	1	2	99
C. YOU ARE AFRAID THAT YOUR BABY MIGHT GET HIV	1	2	99
D. YOU ARE AFRAID THAT YOUR BABY MIGHT GET HIV FROM YOU	1	2	99

H23.

	A	D	DK
A. THOSE WHO GET HIV FROM SEX ARE TO BLAME	1	2	99
B. NO ONE SHOULD BE BLAMED FOR GETTING HIV	1	2	99
C. GOVERNMENT SHOULD NOT WASTE MONEY ON PEOPLE WITH HIV	1	2	99
D. THOSE WHO USE CONDOMS ARE PROMISCUOUS	1	2	99
E. NOBODY SHOULD BE TESTED FOR HIV UNLESS THAT PERSON REQUESTS	1	2	99
F. ALL PROSTITUTES SHOULD BE TESTED AS A MUST	1	2	99
G. ALL PREGNANT WOMEN SHOULD BE TESTED AS A MUST	1	2	99
H. ALL PEOPLE SHOULD BE TESTED AS A MUST	1	2	99
I. PEOPLE WITH HIV CAN ALSO HAVE SEX	1	2	99
J. PEOPLE WITH HIV CAN ALSO HAVE A BABY	1	2	99

VOLUNTARY COUNSELING AND TESTING OF HIV

I would also like to ask a few questions about counseling and testing of HIV. I do **NOT** want to know if you are negative or positive.

Previous VCT of HIV

T1. Have you ever heard of prenatal counseling and testing of HIV?

- 1 YES
- 2 NO
- 99 DON'T KNOW/ NOT SURE

T2. Have you ever had an HIV test?

- 1 YES
- 2 NO → T10
- 99 DON'T KNOW/ NOT SURE → T10

T3. Did you get a counseling before the test?

- 1 YES
- 2 NO
- 99 DON'T KNOW/ NOT SURE

T4. Did you receive the test results?

- 1 YES
- 2 NO → T 7
- 99 DON'T KNOW/ NOT SURE → T 7

T5. Did you get a counseling after the test?

- 1 YES
- 2 NO
- 99 DON'T KNOW/ NOT SURE

T6. Did you tell anyone the results of your test? (PROBE)

- 1 YES. I SHARED WITH (_____)
- 2 NO.
- 99 DON'T KNOW/ NOT SURE/ NO RESPONSE

T7. Who did you consult before deciding to take a test?

MULTIPLE ANSWERS

- 0 NO ONE
- 1 SPOUSE/PARTNER
- 2 FAMILY (PARENTS, SIBLINGS, IN-LAWS)
- 3 FRIENDS/NEIGHBOR
- 4 HEALTH WORKER (DOCTOR, NURSES, COUNSELOR)
- 88 OTHER (SPECIFY: _____)
- 99 DON'T KNOW/ NOT SURE

T8. What was the main reason for having an HIV test?

- 1 WERE WORRIED (SPECIFY: _____)
- 2 DOCTORS/NURSES SUGGESTED
- 3 MEDICAL EXAM FOR TRAVEL
- 4 MEDICAL EXAM FOR JOB
- 5 PRE-MARRIAGE
- 88 OTHER (SPECIFY: _____)
- 99 DON'T KNOW/ NOT SURE

T9. Where did you get the test?

- 1 KORLE-BU HOSPITAL
- 2 ADABRAKA POLYCLINIC
- 88 OTHER (SPECIFY: _____)

T10. Has your spouse/partner had an HIV test?

- 1 YES
- 2 NO → T13
- 99 DON'T KNOW/ NOT SURE → T13

T11. Has your spouse/partner received the test result?

- 1 YES
- 2 NO → T13
- 99 DON'T KNOW/ NOT SURE → T13

T12. Did your partner share the result with you?

- 1 YES
- 2 NO
- 99 DON'T KNOW/ NOT SURE

SP's intentions to take VCT

I am going to read you some statements about your Intentions regarding HIV testing. Please tell me whether you strongly agree, agree, not sure (neutral), disagree, strongly disagree with the following statements.

T13. You would have an HIV test... (REPEAT)

	A			D
A. DURING THIS PREGNANCY VOLUNTARILY	1	2	3	4 5
B. DURING THIS PREGNANCY, IF YOU WERE TOLD BY A DOCTOR OR A NURSE TO HAVE AN HIV TEST AS A PART OF ANTENATAL CARE	1	2	3	4 5

T14. What is the maximum amount of money you and your family are willing to pay for your prenatal HIV test?

- 0 NONE. THE GOV'T SHOULD PAY FOR IT _____ CEDIS
- 88 OTHER (SPECIFY: _____)
- 99 DON'T KNOW/ NOT SURE

T15. If you were to have an HIV test, where would you go for test?

- 1 KORLE-BU HOSPITAL
- 2 ADABRAKA POLYCLINIC
- 88 OTHER (SPECIFY: _____)
- 99 DON'T KNOW/ NOT SURE

T16. If you were to take an HIV test, who would you consult before deciding to take a test?

- MULTIPLE ANSWERS**
- 0 NO ONE
 - 1 SPOUSE/PARTNER
 - 2 FAMILY (PARENTS, SIBLINGS, IN-LAWS)
 - 3 FRIENDS/NEIGHBORS
 - 4 HEALTH WORKERS (DOCTORS, NURSES, COUNSELORS)
 - 88 OTHER (SPECIFY: _____)
 - 99 DON'T KNOW/ NOT SURE

T17. If you were to take an HIV test, who would you tell about the results of the test?

- MULTIPLE ANSWERS**
- 0 NO ONE
 - 1 SPOUSE/PARTNER
 - 2 FAMILY (PARENTS, SIBLINGS, IN-LAWS)
 - 3 FRIENDS/NEIGHBORS
 - 4 HEALTH WORKERS (DOCTORS, NURSES, COUNSELORS)
 - 88 OTHER (SPECIFY: _____)
 - 99 DON'T KNOW/ NOT SURE

T18. If you were to take an HIV test, who would you not tell about the results of the test?

- MULTIPLE ANSWERS**
- 0 I AM NOT GOING TO TELL ANYBODY (EXCEPT: _____)
 - 1 SPOUSE/PARTNER
 - 2 FAMILY (PARENTS, SIBLINGS, IN-LAWS)
 - 3 FRIENDS/NEIGHBORS
 - 4 HEALTH WORKERS (DOCTORS, NURSES, COUNSELORS)
 - 5 I WILL TELL EVERYBODY → T20
 - 88 OTHER (SPECIFY: _____)
 - 99 DON'T KNOW/ NOT SURE

T19. Why would you not tell some people the results of your HIV test?

- MULTIPLE ANSWERS**
- 1 THEY MAY GOSSIP TOO MUCH
 - 2 THEY WOULD ABANDON/LEAVE ME IF I AM HIV (+)
 - 3 THEY WOULD SHUN ME/MY FAMILY IF I AM HIV (+)
 - 4 THEY WOULD BE SCARED IF I AM HIV (+)
 - 5 IT IS NONE OF THEIR BUSINESS
 - 88 OTHER (SPECIFY: _____)
 - 99 DON'T KNOW/ NOT SURE

Attitudes, subjective norms, perceived control regarding taking VCT of HIV

I am going to read statements about perception regarding HIV testing. Please tell me whether you strongly agree, agree, not sure (neutral), disagree, or strongly disagree with the following statements.

T20. HAVING AN HIV TEST DURING THIS PREGNANCY IS... (REPEAT)		A	D	DK
A. ENJOYABLE/PLEASANT		1	2	99
B. BENEFICIAL		1	2	99
C. VALUABLE		1	2	99
D. GOOD		1	2	99
E. NECESSARY		1	2	99

T21.		A	D	DK
A. MOST PEOPLE WHO ARE IMPORTANT TO YOU THINK YOU <u>SHOULD</u> HAVE AN HIV TEST DURING THIS PREGNANCY		1	2	99
B. THE PEOPLE WHOSE OPINIONS YOU VALUE WOULD <u>APPROVE</u> YOUR HAVING AN HIV TEST DURING THIS PREGNANCY		1	2	99
C. MOST PEOPLE WHO ARE IMPORTANT TO YOU HAD AN HIV TEST		1	2	99
D. IT IS <u>POSSIBLE</u> FOR YOU TO HAVE AN HIV TEST DURING THIS PREGNANCY		1	2	99
E. YOU <u>COULD HAVE</u> AN HIV TEST DURING THIS PREGNANCY		1	2	99
F. IT IS MOSTLY <u>UP TO YOU</u> WHETHER YOU HAVE AN HIV TEST DURING THIS PREGNANCY		1	2	99
G. YOU BELIEVE YOU <u>DO HAVE CONTROL</u> OVER HAVING AN HIV TEST DURING THIS PREGNANCY		1	2	99

I am going to read statements about perception regarding HIV/AIDS. Please tell me whether you agree or not with the following statements

T22. HAVING AN HIV TEST DURING THIS PREGNANCY... (REPEAT)		A	D	DK
A. WASTES YOUR MONEY THAT CAN BE USED FOR SOMETHING ELSE		1	2	99
B. HELPS YOU KNOW YOUR HEALTH STATUS		1	2	99
C. HELPS YOU KNOW WHETHER YOUR HUSBAND IS FAITHFUL OR NOT		1	2	99

		A	D	DK
D. CAUSES EMOTIONAL DISTRESS (FEAR, PANIC)		1	2	99
E. HELPS YOU GET PROPER CARE FOR YOURSELF (MEDICINE, PREVENTION)		1	2	99
F. MAKES YOU STIGMATIZED		1	2	99
G. CAUSES A MISCARRIAGE OF YOUR BABY		1	2	99
H. HELPS YOU PROTECT YOUR BABY FROM GETTING THE VIRUS IF YOU WERE TESTED POSITIVE		1	2	99

T23. Who do you believe would approve your having HIV testing during this pregnancy?

MULTIPLE ANSWERS
RECORD VERBATIM:

T24. Who do you believe would disapprove your having HIV testing during this pregnancy?

MULTIPLE ANSWERS
RECORD VERBATIM:

We would like to know what pregnant and lactating women would do if they are tested positive. However, we do not have information regarding the HIV status of pregnant women attending this clinic. Thus I am going to ask you a series of questions about what you would do, "if" you had an HIV test and were tested positive. Please understand that it is a hypothetical situation and again all information you give will be kept confidential.

I am going to read you some statements about hypothetical situation. Please tell me whether you agree or not with the following statements.

T25. If you were tested positive, () would be HIV-positive as well (REPEAT)

		A	D	DK
A. YOUR HUSBAND		1	2	99
B. YOUR BABY		1	2	99

T26. If you were tested positive, how could you reduce your baby's chance of getting HIV? (PROBE)

MULTIPLE ANSWERS

- 0 THERE IS NO WAY. ALL THE BABIES WILL GET IT
- 1 BY TAKING ANTIRETROVIRAL MEDICINES
- 2 BY GETTING CESAREAN SECTION
- 3 BY MAINTAINING GOOD HEALTH (NUTRITIONAL STATUS)
- 4 BY NOT GIVING BREAST MILK
- 5 BY GIVING BREAST MILK FOR A SHORT PERIOD
- 6 BY GOOD BREASTFEEDING PRACTICE (E.G., ↓ MASTITIS)
- 88 OTHER (SPECIFY: _____)
- 99 DON'T KNOW/ NOT SURE

T27. If you were tested positive and your doctor advised you to take a medicine that can reduce your baby's chance of getting HIV, you would ... (REPEAT)

	A	D	DK
A. TAKE THAT MEDICINE.	1	2	99
B. TAKE THAT MEDICINE EVEN IF YOUR FAMILY AND FRIEND FIND OUT YOU ARE HIV-POSITIVE.	1	2	99

T28. What is the maximum amount of money you and your family would be willing to pay for the medicine each week?

- 0 NONE. THE GOV'T SHOULD PAY FOR IT
_____ CEDIS
- 88 OTHER (SPECIFY: _____)
- 99 DON'T KNOW/ NOT SURE

T29. If you were tested positive and your doctor advised you not to breastfeed your baby at all, you would ... (REPEAT)

	A	D	DK
A. NOT BREASTFEED YOUR BABY AT ALL.	1	2	99
B. NOT BREASTFEED YOUR BABY AT ALL EVEN IF YOUR FAMILY AND FRIEND FIND OUT YOU ARE HIV-POSITIVE.	1	2	99

T30. If you were tested positive and your doctor advised you to feed your baby infant formula (S.M.A., Lactogen, etc),

YOU WOULD FEED YOUR BABY ... (REPEAT)	A	D	DK
A. ONLY INFANT FORMULA AT LEAST 1 MONTH	1	2	99
B. ONLY INFANT FORMULA AT LEAST 3 MONTHS	1	2	99
C. ONLY INFANT FORMULA AT LEAST 6 MONTHS	1	2	99

T31. YOU WOULD FEED BOTH INFANT FORMULA AND BREAST MILK DUE TO ... (REPEAT)

	A	D	DK
A. LACK OF MONEY TO BUY INFANT FORMULA CONTINUOUSLY FOR 1 MONTH	1	2	99
B. LACK OF MONEY TO BUY INFANT FORMULA CONTINUOUSLY FOR 3 MONTHS	1	2	99
C. LACK OF MONEY TO BUY INFANT FORMULA CONTINUOUSLY FOR 6 MONTHS	1	2	99
D. FEAR OF STIGMA	1	2	99
E. PRESSURE FROM SPOUSE/FAMILY	1	2	99

T32. What is the maximum amount of money you and your family could afford to buy infant formula each week?

- 0 NONE. THE GOV'T SHOULD PAY FOR IT
_____ CEDIS
- 99 DON'T KNOW/ NOT SURE

T33. If the government/NGO provided infant formula at lower or no cost for HIV-positive mothers, you would get infant formula... (REPEAT)

	A	D	DK
A. IF YOU WERE TESTED POSITIVE.	1	2	99
B. EVEN THOUGH YOU DO NOT KNOW YOUR HIV STATUS OR YOU ARE HIV-NEGATIVE	1	2	99

T34. What would you do with that infant formula from gov't/NGO if you are not HIV-positive or you do not know your HIV status?

- 1 I WOULD FEED MY BABY (SPECIFY: _____)
- 2 I WOULD SELL IT
- 88 OTHER (SPECIFY: _____)
- 99 NOT SURE/ DON'T KNOW

Appendix 4.
Follow-up questionnaire

**DETERMINANTS OF FULLY INFORMED INFANT FEEDING DECISIONS AMONG
GHANAIAI PREGNANT WOMEN
[FOLLOW-UP 1: PRENATAL HOME VISIT]**

INFORMED CONSENT

With the growing number of people affected by the human immunodeficiency virus (HIV) and the possibility that infected mothers may pass the virus to their babies through breast milk, women have to make difficult decisions about how to feed their babies. We are interested in pregnant women's knowledge, attitudes, and intentions and behavior regarding infant feeding methods and participation of a HIV counseling and testing program. This is a research study conducted by Department of Food Science and Human Nutrition at Iowa State University, in collaboration with faculty at the Department of Nutrition and Food Science, at the University of Ghana.

We would like to visit your home three times; about a month after the first interview at the polyclinic, within three days after delivery and a month after delivery. When we visit your home, you will be asked to answer questions regarding 1) yourself and your household, 2) infant feeding intentions and practices, and 3) participation of voluntary counseling and testing of HIV. In addition, we are going to ask you to prepare an infant feed of your choice, if it is other than breast milk, while we are in your home. The interview and observation will take about two to four hours each time we visit you.

Risks and Benefits of Being in the Study

Some of the questions to come may be uncomfortable to answer, because they have to do with HIV. Some people feel uncomfortable discussing these things, but we would really like to know what you think about these issues. There is no direct benefit to you. However, the study results might be used to improve a prevention program of mother-to-child-transmission of HIV for pregnant women as well as a nutrition intervention program for children born to HIV-positive mothers in Ghana. For your time, you will receive a small thank you gift for participating in the study at the end of third visit..

Confidentiality

Once the interview is completed, personal information will be separated from other research data and kept locked by the investigator. The information will be only identified by a sequence number, when it is shared with others. When the study is completed, the personal information will be destroyed to ensure the confidentiality of study participants.

Voluntary Nature of the Study

You do not have to answer any questions that you do not want to answer, and you are free to withdraw at any time for any reason with no negative consequences.

Contacts

If you have an additional question, you can contact the study coordinator, Yi-Kyoung Lee, in the department of Nutrition and Food Science, University of Ghana, Legon (Tel: 310972) or the study advisor, Dr. Anna Lartey, in the department of Nutrition and Food Science, University of Ghana, Legon (Tel: 513293)

Statement of Consent

The study has been explained to me. I have asked questions and have received answers. I consent to participate in the study.

Signature/thumbprint of participant	Date	/	/2002
Signature/thumbprint of witness	Date	/	/2002
Signature/thumbprint of interviewer	Date	/	/2002

Participants ID	_ _ _ _				
Interviewer	Code _ _	Name	_____		
Language	1= Twi, 2 = Ga, 3 = English				
Time start	_____	: AM/PM	Time end	_____	: AM/PM
Checked by	_____				
Editing	Code _ _	Name	_____		
Schedule					
Follow-up 2	_____	/	_____	/2002	: AM/PM
Follow-up 3	_____	/	_____	/2002	: AM/PM

SES BACKGROUND CHARACTERISTICS

S1. What is the total number of your household? (**PROBE**)

***HOUSEHOLD: THOSE WHO REGULARLY SHARE THE MEAL FROM THE SAME POT**

_____ PEOPLE
SPECIFY:

S2. Of those, how many currently generate income? (**PROBE**)

_____ PEOPLE
SPECIFY:

S3. What is the average family income per day? (**PROBE**)

_____ CEDIS/DAY
SPECIFY:

99 DON'T KNOW/ NOT SURE/ NO RESPONSE

S4. Was your family income higher or lower before your pregnancy?

- 0 NO, IT WAS ABOUT THE SAME
- 1 YES, IT WAS HIGHER (SPECIFY: _____)
- 2 YES, IT WAS LOWER (SPECIFY: _____)
- 99 DON'T KNOW/ NOT SURE/ NO RESPONSE

S5. How many people regularly share the meal with you?

_____ PEOPLE
SPECIFY:

S6. Do you regularly cook for them?

- 0 No
- 1 YES
- 99 DON'T KNOW/ NOT SURE/ NO RESPONSE

S7. How much money, on average, do you spend each day on food? (**PROBE**)

_____ CEDIS/DAY

99 DON'T KNOW/ NOT SURE/ NO RESPONSE

S8. Do you currently stay with the father of baby in the same house?

- 0 No (SPECIFY: _____)
- 1 YES
- 88 OTHER (SPECIFY: _____)
- 99 DON'T KNOW/ NOT SURE/ NO RESPONSE

S9. What kinds of support do you regularly receive from the father of baby?

MULTIPLE ANSWERS

- 0 NONE
- 1 EMOTIONAL SUPPORT (EMPATHY, LOVE, TRUST, CARING)
- 2 INFORMATIONAL SUPPORT (ADVICE, COUNSELING)
- 3 MATERIAL/INSTRUMENTAL SUPPORT (MONEY, FOOD, CLOTHES)
- 88 OTHER (SPECIFY: _____)

S10. What language can you read well? (**PROBE**)

MULTIPLE ANSWERS

- 0 NONE
- 1 TWI
- 2 GA
- 3 ENGLISH
- 88 OTHER (SPECIFY: _____)
- 89 OTHER (SPECIFY: _____)
- 90 OTHER (SPECIFY: _____)

PREGNANCY CHARACTERISTICS

P1. When is the due date of this pregnancy?

____/____/200____
 99 DON'T KNOW/ NOT SURE

P2. Where do you plan to deliver your baby?

P3. Have you had any illnesses since last interview? (PROBE)

0 No
 1 YES (SPECIFY: _____)
 99 DON'T KNOW/ NOT SURE

INFANT FEEDING

Intentions: Infant feeding

I AM GOING TO READ YOU SOME STATEMENTS ABOUT YOUR INTENTIONS REGARDING INFANT FEEDING. PLEASE TELL ME WHETHER YOU STRONGLY AGREE, AGREE, NOT SURE (NEUTRAL), DISAGREE, OR STRONGLY DISAGREE WITH THE FOLLOWING STATEMENTS.

F1. Within the first month, you plan to feed your baby... (REPEAT)

	A	D
A. ONLY BREAST MILK	1 2 3 4 5	
B. PLAIN WATER	1 2 3 4 5	
C. INFANT FORMULA	1 2 3 4 5	
D. PORRIDGE	1 2 3 4 5	

F2. How long do you intend to feed your baby only breast milk?

____ MONTHS ____ WEEKS ____ DAYS
 99 DON'T KNOW/ NOT SURE

F3. How long do you intend to feed your baby breast milk (WITH OTHER FOODS)?

____ YEARS ____ MONTHS ____ WEEKS
 99 DON'T KNOW/ NOT SURE

F4. When do you intend to introduce plain water to your baby?

____ MONTHS ____ WEEKS ____ DAYS
 99 DON'T KNOW/ NOT SURE

F5. (IF SP INTENDS TO INTRODUCE PLAIN WATER BEFORE 6 MO) why do you plan to give plain water to your baby at ____?

F6. When do you intend to introduce cereal/porridge (e.g., Cerelac, kooko) to your baby?

____ MONTHS ____ WEEKS ____ DAYS
 99 DON'T KNOW/ NOT SURE

F7. (IF SP INTENDS TO INTRODUCE CEREAL/PORRIDGE BEFORE 6 MO) why do you plan to give cereal/porridge to your baby at ____?

F8. Do you intend to introduce infant formula such as S.M.A. or Lactogen (not Cerelac) to your baby?

(IF YES) When do you intend to introduce infant formula to your baby?
 0 No, I DO NOT INTEND TO INTRODUCE INFANT FORMULA
 1 YES (SPECIFY: ____ MONTHS ____ WEEKS ____ DAYS)
 99 DON'T KNOW/ NOT SURE

F9. (IF SP INTENDS TO INTRODUCE INFANT FORMULA BEFORE 6 MO) why do you plan to give infant formula to your baby at ____?

Attitudes, Subjective norms, & Perceived behavioral control: Infant feeding

I AM GOING TO READ YOU SOME STATEMENTS ABOUT INFANT FEEDING DURING THE 1ST MONTH. PLEASE TELL ME WHETHER YOU STRONGLY AGREE, AGREE, NOT SURE (NEUTRAL), DISAGREE, OR STRONGLY DISAGREE WITH THE FOLLOWING STATEMENTS AND WHY YOU THINK THAT WAY

Exclusive breastfeeding

- F10. FEEDING ONLY BREAST MILK DURING THE 1ST MONTH IS... (REPEAT)
- | | | A | | D | |
|-----------------------|-----------|---|--|---|--|
| A. ENJOYABLE/PLEASANT | | | | | |
| WHY? | | | | | |
| | 1 2 3 4 5 | | | | |
|
 | | | | | |
| B. BENEFICIAL | | | | | |
| WHY? | | | | | |
| | 1 2 3 4 5 | | | | |
|
 | | | | | |
| C. VALUABLE | | | | | |
| WHY? | | | | | |
| | 1 2 3 4 5 | | | | |
|
 | | | | | |
| D. GOOD | | | | | |
| WHY? | | | | | |
| | 1 2 3 4 5 | | | | |

- E. CONVENIENT 1 2 3 4 5
WHY?

- F11. A D
- A. MOST PEOPLE WHO ARE IMPORTANT TO YOU THINK YOU SHOULD FEED YOUR BABY ONLY BREAST MILK DURING THE 1ST MONTH
WHO ARE THEY? 1 2 3 4 5
- WHAT HAVE THEY SAID ABOUT FEEDING ONLY BM?
-
- B. THE PEOPLE WHOSE OPINIONS YOU VALUE WOULD APPROVE YOUR FEEDING ONLY BREAST MILK DURING THE 1ST MONTH
WHO ARE THEY? 1 2 3 4 5
- WHAT HAVE THEY SAID ABOUT FEEDING ONLY BM?
-
- C. IT IS POSSIBLE FOR YOU TO FEED YOUR BABY ONLY BREAST MILK DURING THE 1ST MONTH
WHY? 1 2 3 4 5

F11.

D. YOU COULD FEED YOUR BABY ONLY BREAST MILK DURING THE 1ST MONTH
WHY?

A				D
1	2	3	4	5

E. IT IS MOSTLY UP TO YOU WHETHER OR NOT YOU FEED YOUR BABY ONLY BREAST MILK DURING THE 1ST MONTH
WHY?

1 2 3 4 5

F. YOU BELIEVE YOU DO HAVE CONTROL OVER FEEDING YOUR BABY ONLY BREAST MILK DURING THE 1ST MONTH
WHY?

1 2 3 4 5

B. BENEFICIAL
WHY?

1 2 3 4 5

C. VALUABLE
WHY?

1 2 3 4 5

D. GOOD
WHY?

1 2 3 4 5

E. CONVENIENT
WHY?

1 2 3 4 5

Formula feeding

F12.

FEEDING INFANT FORMULA WITHIN 1 MONTH IS (REPEAT)

A. ENJOYABLE/PLEASANT
WHY?

A				D
1	2	3	4	5

F13.

A. MOST PEOPLE WHO ARE IMPORTANT TO YOU THINK YOU SHOULD FEED BABY INFANT FORMULA WITHIN 1 MONTH

WHO ARE THEY?

WHAT HAVE THEY SAID ABOUT FEEDING IF?

A				D
1	2	3	4	5

F13.

A	D
1	2
3	4
5	

B. THE PEOPLE WHOSE OPINIONS YOU VALUE WOULD APPROVE YOUR FEEDING INFANT FORMULA WITHIN 1 MONTH

WHO ARE THEY?

WHAT HAVE THEY SAID ABOUT FEEDING IF?

C. IT IS POSSIBLE FOR YOU TO FEED YOUR BABY INFANT FORMULA WITHIN 1 MONTH 1 2 3 4 5

WHY?

D. YOU COULD FEED YOUR BABY INFANT FORMULA WITHIN 1 MONTH 1 2 3 4 5

WHY?

E. IT IS MOSTLY UP TO YOU WHETHER OR NOT YOU FEED YOUR BABY INFANT FORMULA WITHIN 1 MONTH 1 2 3 4 5

WHY?

F. YOU BELIEVE YOU DO HAVE CONTROL OVER FEEDING YOUR BABY INFANT FORMULA WITHIN 1 MONTH 1 2 3 4 5

WHY?

F14. When you feed (→), how likely is it for your baby to get (disease)? Is it very likely, likely, maybe (neutral), unlikely, very unlikely? (REPEAT)

	BREAST MILK ONLY DURING THE 1 ST MO					INFANT FORMULA WITHIN 1 MONTH				
	L				U	L				U
A. DIARRHEA	1	2	3	4	5	1	2	3	4	5
B. CHOLERA	1	2	3	4	5	1	2	3	4	5
C. URI	1	2	3	4	5	1	2	3	4	5
D. CONSTIPATION	1	2	3	4	5	1	2	3	4	5
E. TB	1	2	3	4	5	1	2	3	4	5
F. MALARIA	1	2	3	4	5	1	2	3	4	5
G. HIV	1	2	3	4	5	1	2	3	4	5

F15. How serious do you think it is if your baby gets the following diseases? Is it very serious, serious, somewhat serious, not very serious, or not serious at all? (REPEAT)

	SERIOUS					NOT				
A. DIARRHEA	1	2	3	4	5					
B. CHOLERA	1	2	3	4	5					
C. URI	1	2	3	4	5					
D. CONSTIPATION	1	2	3	4	5					
E. TB	1	2	3	4	5					
F. MALARIA	1	2	3	4	5					
G. HIV	1	2	3	4	5					

F16. Could you tell me the name of person(s) whom you think you could get any kinds of supports (e.g., informational, material, or emotional) if you decide to feed only breast milk during the 1st month? (PROBE)

TYPE: What is the relationship of (person's name) to you?

DURATION: How many years have you known (person's name)?

PHYSICAL PROXIMITY: How close does (person's name) live from your place? (1=very close, 2=close, 3=somewhat close, 4=far, 5=very far)

EMOTIONAL PROXIMITY: How close do you feel (person's name) is emotionally? (1=very close, 2=close, 3=somewhat close, 4=not very close, 5=not close at all)

REGULARITY: How often do you see (person's name)? (1=very often, 2=often, 3=somewhat often, 4=not very often, 5=not often at all)

TYPE: What kind of supports would you get from (person's name)?

ADEQUACY: How adequate do you think the support would be? (1=very satisfactory, 2=satisfactory, 3=somewhat satisfactory/acceptable, 4=unsatisfactory, 5=very unsatisfactory)

CONFIDENCE: How confident are you about (person's name) giving you the support you are expecting? (1=very confident, 2=confident, 3=somewhat confident, 4=not very confident, 5=not confident at all)

NAME (FIRST NAME ONLY)	RELATIONSHIP					PERCEIVED SOCIAL SUPPORT		
	TYPE	DURATION (YEAR)	PHYSICAL PROXIMITY	EMOTI. PROXIMITY	REGULARITY	TYPE	ADEQUACY	CONFIDENCE

F17. Could you tell me the name of person(s) whom you think you could get any kinds of supports (e.g., informational, material, or emotional) if you decide to introduce infant formula within 1 month? (PROBE)

TYPE: What is the relationship of (person's name) to you?

DURATION: How many years have you known (person's name)?

PHYSICAL PROXIMITY: How close does (person's name) live from your place? (1=very close, 2=close, 3=somewhat close, 4=far, 5=very far)

EMOTIONAL PROXIMITY: How close do you feel (person's name) is emotionally? (1=very close, 2=close, 3=somewhat close, 4=not very close, 5=not close at all)

REGULARITY: How often do you see (person's name)? (1=very often, 2=often, 3=somewhat often, 4=not very often, 5=not often at all)

TYPE: What kind of supports would you get from (person's name)?

ADEQUACY: How adequate do you think the support would be? (1=very satisfactory, 2=satisfactory, 3=somewhat satisfactory/acceptable, 4=unsatisfactory, 5=very unsatisfactory)

CONFIDENCE: How confident are you about (person's name) giving you the support you are expecting? (1=very confident, 2=confident, 3=somewhat confident, 4=not very confident, 5=not confident at all)

NAME (FIRST NAME ONLY)	RELATIONSHIP					PERCEIVED SOCIAL SUPPORT		
	TYPE	DURATION (YEAR)	PHYSICAL PROXIMITY	EMOTI. PROXIMITY	REGULARITY	TYPE	ADEQUACY	CONFIDENCE

F18. Currently, World Health Organization (WHO) recommends replacement feeding for HIV positive women when it is "acceptable, feasible, affordable, sustainable, and safe".

ACCEPTABILITY: What would be acceptable *breast milk replacement foods* for the babies born to HIV-positive Ghanaian mothers?

AFFORDABILITY: How affordable is it for you to buy (food)? (1=very cheap, 2=cheap, 3=somewhat cheap, 4=expensive, 5=very expensive)

SAFETY: How safe is it to feed (food) to the baby under (___mo)? (1=very safe, 2=safe, 3=somewhat safe, 4=unsafe, 5=very unsafe)

AVAILABILITY: How easy is it to get (food)? (1=very easy, 2=easy, 3=somewhat easy, 4=difficult, 5=very difficult)

PREPARATION: How easy is it to prepare (food) appropriately for babies? (1=very easy, 2=easy, 3=somewhat easy, 4=difficult, 5=very difficult)

CONFIDENCE: If you have to prepare the food, how confident are you about appropriately preparing (food) for babies? (1=very confident, 2=confident, 3=somewhat confident, 4=not very confident, 5=not confident at all)

SUSTAINABILITY: If you are in a situation where you have to feed (food), how likely is it for you to feed mainly (foods) *without adding any breast milk* until the time the baby is ready to eat family food? (1=very likely, 2=likely, 3=somewhat likely, 4=unlikely, 5=very unlikely)

ACCEPTABLE REPLACEMENT FOODS	AFFORDABILITY	SAFETY			AVAILABILITY	PREPARATION	CONFIDENCE	SUSTAIN- ABILITY
		1MO	3MO	6MO				

Nutrition knowledge

F19. Have you ever received any information regarding ... (If Yes) What was the main content of the information? Who did you receive that information from?

	YES	NO	CONTENT	PROVIDER
A. EXCLUSIVE BF	1	2		
B. BREAST PROBLEM/CARE	1	2		
C. INFANT FORMULA	1	2		
D. COMPLEMENTARY FOOD	1	2		
E. CHILD NUTRITION	1	2		
F. MATERNAL NUTRITION	1	2		
G. FOOD SANITATION/HYGIENE	1	2		

HIVAIDS AND VOLUNTARY COUNSELING AND TESTING OF HIV

Intentions: VCT of HIV

I AM GOING TO READ YOU SOME STATEMENTS ABOUT YOUR INTENTIONS REGARDING PRENATAL HIV TESTING. PLEASE TELL ME WHETHER YOU STRONGLY AGREE, AGREE, NOT SURE (NEUTRAL), DISAGREE, STRONGLY DISAGREE WITH THE FOLLOWING STATEMENTS.

T1. You would have an HIV test...(REPEAT)

- | | A | | D | |
|---|---|---|---|-----|
| A. DURING THIS PREGNANCY <u>VOLUNTARILY</u> | 1 | 2 | 3 | 4 5 |
| B. DURING THIS PREGNANCY, IF YOU WERE TOLD BY A DOCTOR OR A NURSE TO HAVE AN HIV TEST AS A PART OF ANTENATAL CARE | 1 | 2 | 3 | 4 5 |

Attitudes, subjective norms, perceived controls: VCT of HIV

I AM GOING TO READ STATEMENTS ABOUT PERCEPTION REGARDING HIV TESTING. PLEASE TELL ME WHETHER YOU STRONGLY AGREE, AGREE, NOT SURE (NEUTRAL), DISAGREE, OR STRONGLY DISAGREE WITH THE FOLLOWING STATEMENTS.

- T2. HAVING AN HIV TEST DURING THIS PREGNANCY VOLUNTARILY IS... (REPEAT)
- | | A | | D | |
|--------------------------------------|---|---|---|-----|
| A. ENJOYABLE/PLEASANT
Why? | 1 | 2 | 3 | 4 5 |
| B. BENEFICIAL
Why? | 1 | 2 | 3 | 4 5 |

C. VALUABLE
Why? 1 2 3 4 5

D. GOOD
Why? 1 2 3 4 5

E. NECESSARY
Why? 1 2 3 4 5

T3.

- | | A | | D | |
|--|---|---|---|-----|
| A. MOST PEOPLE WHO ARE IMPORTANT TO YOU THINK YOU <u>SHOULD</u> HAVE AN HIV TEST DURING THIS PREGNANCY
WHO ARE THEY?

WHAT HAVE THEY SAID ABOUT TESTING? | 1 | 2 | 3 | 4 5 |
| B. THE PEOPLE WHOSE OPINIONS YOU VALUE WOULD <u>APPROVE</u> YOUR HAVING AN HIV TEST DURING THIS PREGNANCY
WHO ARE THEY?

WHAT HAVE THEY SAID ABOUT TESTING? | 1 | 2 | 3 | 4 5 |

T3.

A D

C. MOST PEOPLE WHO ARE IMPORTANT TO YOU HAD AN HIV TEST 1 2 3 4 5

D. IT IS POSSIBLE FOR YOU TO HAVE AN HIV TEST DURING THIS PREGNANCY 1 2 3 4 5

WHY?

E. YOU COULD HAVE AN HIV TEST DURING THIS PREGNANCY 1 2 3 4 5

WHY?

F. IT IS MOSTLY UP TO YOU WHETHER YOU HAVE AN HIV TEST DURING THIS PREGNANCY 1 2 3 4 5

WHY?

G. YOU BELIEVE YOU DO HAVE CONTROL OVER HAVING AN HIV TEST DURING THIS PREGNANCY 1 2 3 4 5

WHY?

T4. Did you discuss your personal risk or concerns about HIV/AIDS with anyone since the last interview?

1 YES (SPECIFY: _____)

2 No

99 DON'T KNOW/ NO RESPONSE

T5. What do you think would be your risk of getting HIV in the next 12 months? Is it none, low, moderate, high, or very high?

1 NONE

2 LOW

3 MODERATE

4 HIGH

5 VERY HIGH

99 DON'T KNOW/ NOT SURE/ NO RESPONSE

I AM GOING TO READ YOU SOME STATEMENTS ABOUT A HYPOTHETICAL SITUATION. PLEASE TELL ME WHAT YOU THINK.

T6. If a pregnant woman gets infected with HIV before delivery, what do you think would be the risk of her baby getting HIV from her? Is it none, low, moderate, high, or very high?

1 NONE

2 LOW

3 MODERATE

4 HIGH

5 VERY HIGH

99 DON'T KNOW/ NOT SURE/ NO RESPONSE

T7. If a lactating woman gets infected with HIV after delivery, what do you think would be the risk of her baby getting HIV from her? Is it none, low, moderate, high, or very high?

1 NONE

2 LOW

3 MODERATE

4 HIGH

5 VERY HIGH

99 DON'T KNOW/ NOT SURE/ NO RESPONSE

**DETERMINANTS OF FULLY INFORMED INFANT FEEDING DECISIONS AMONG
GHANAIAI PREGNANT WOMEN
[FOLLOW-UP 2: 1 WK]**

Participants ID

Interviewer Code Name _____

Language 1= Twi, 2 = Ga, 3 = English

Time start _____ : _____ AM/PM Time end _____ : _____ AM/PM

Checked by _____

Editing Code Name _____

Schedule

Follow-up 3 _____ / _____ /2002 _____ : _____ AM/PM

DELIVERY

- D1.** Where did you deliver your baby?
- D2.** How many hours were you in labour?
_____ HOURS
99 DON'T KNOW/ DON'T REMEMBER/ NO RESPONSE
- D3.** How did you deliver your baby? Is it...
1 VAGINAL DELIVERY
2 ELECTIVE CAESARIAN DELIVERY
3 EMERGENCY CAESARIAN DELIVERY
99 DON'T KNOW/ NO RESPONSE
- D4.** How many weeks pregnant were you when you delivered?
_____ WEEKS (_____ MONTHS)
99 DON'T KNOW/ NOT SURE

- D5.** Did you have any illnesses before delivery since last interview? (PROBE)
0 No
1 YES (SPECIFY: _____)
99 DON'T KNOW/ NOT SURE
- D6.** Did you have any illnesses after delivery? (PROBE)
0 No →C1
1 YES (SPECIFY: _____)
99 DON'T KNOW/ NOT SURE →C1
- D7.** Did this problem prevent you from breastfeeding your baby?
0 No
1 YES
99 DON'T KNOW/ NOT SURE

CHARACTERISTICS OF BABY

For the following questions, let's talk about the baby you just delivered.

- C1.** What is the sex of your baby?
1 MALE
2 FEMALE
- C2.** What is the date of birth?
_____ / _____ /2002
- C3.** What is the birth weight of the baby?
_____ . _____ KG (SPECIFY SOURCE _____)
- C4.** Did your baby have any illnesses since birth?
0 No →F1
1 YES (SPECIFY: _____)
99 DON'T KNOW/ NOT SURE/ DON'T REMEMBER →F1
- C5.** Did this problem prevent your baby from being breastfed?
0 No
1 YES
99 DON'T KNOW/ NOT SURE/ DON'T REMEMBER

INFANT FEEDING

F1. Did you ever breastfeed your baby?

- 0 NO (SPECIFY: _____) →F13
- 1 YES
- 99 DON'T KNOW/ NOT SURE/ NO RESPONSE →F13

F2. How soon after delivery was your baby first put to the breast?

_____ HOURS _____ MINUTES

F3. (IF THE BABY WAS PUT TO THE BREAST AFTER 1 HOUR) What was the main reason your baby was breastfed after (_____ hours)?

F4. Did you feed colostrum (yellow milk) to your baby?

- 0 No
- 1 YES
- 99 DON'T KNOW/ NOT SURE/ NO RESPONSE

F5. What was the main reason you (fed/didn't feed) colostrum?

F6. Did your baby receive anything to *taste, eat, or drink* before she/he was first put to the breast?

- 0 No →F8
- 1 YES (SPECIFY: _____)
- 99 DON'T KNOW/ NOT SURE/ NO RESPONSE →F8

F7. What was the main reason your baby was given (F6)?

F8. From the time you woke up yesterday until the time you woke up today, how many times did you breastfeed your baby?

_____ TIMES

_____ BETWEEN THE TIME YOU WOKE UP YESTERDAY AND THE TIME YOU ATE LUNCH, HOW MANY TIMES DID YOU BREASTFEED YOUR BABY?

_____ FROM THE TIME YOU HAD LUNCH UNTIL THE TIME YOU HAD YOUR DINNER, HOW MANY TIMES DID YOU BREASTFEED YOUR BABY?

_____ BEFORE YOU WENT TO BED AFTER DINNER, HOW MANY TIMES DID YOU BREASTFEED YOUR BABY?

_____ HOW MANY TIMES DID YOU BREASTFEED YOUR BABY DURING THE NIGHT BEFORE YOU WOKE UP TODAY?

F9. Have you experienced any difficulties breastfeeding your baby since birth?

- 0 No →F11
- 1 YES (SPECIFY: _____)
- 99 DON'T KNOW/ NOT SURE/ NO RESPONSE →F11

F10. How did you manage the problem?

F11. Has your baby experienced any difficulties being breastfed since birth?

- 0 No →F13
- 1 YES (SPECIFY: _____)
- 99 DON'T KNOW/ NOT SURE/ NO RESPONSE →F13

F12. How did you manage the problem?

F13. From the time you woke up yesterday until the time you woke up today, did your baby *taste, eat, or drink*...

(IF YES) What was the main reason your baby was introduced _____?

LIQUIDS/SOLIDS*	No	Yes	DK	(IF YES) SPECIFY NAME	REASON*
A. PLAIN WATER	0	1	99		
B. GLUCOSE WATER	0	1	99		
C. TEA/JUICE	0	1	99		
D. FORMULA	0	1	99		
E. OTHER MILK	0	1	99		
F. CEREAL/PORRIDGE	0	1	99		
G. VEGETABLE/FRUITS	0	1	99		
H. OTHER	0	1	99		

* 1=MOTHER UNWELL, 2=BABY UNWELL, 3=BOTH UNWELL,
4=NO/NOT ENOUGH BREAST MILK (MOTHER'S PERCEPTION),
5=HCW'S RECOMMENDATION, 88=OTHER (SPECIFY), 99=DK

F14. During the first five days of baby's life, did your baby receive anything to *taste, eat, or drink* other than breast milk?

- 0 No → F16
1 YES (SPECIFY: _____)
99 DON'T KNOW/ NOT SURE/ NO RESPONSE → F16

F15. What was the main reason you introduced _____ to your baby?

F16. Has your baby been with you all the time since birth?

- 0 No (SPECIFY: _____)
1 YES
99 DON'T KNOW/ NOT SURE/ NO RESPONSE

F17. How likely is it that someone fed other than breast milk such as plain water to your baby since birth without your consent?

- 1 VERY LIKELY
2 LIKELY
3 MAYBE/ NOT SURE
4 UNLIKELY
5 VERY UNLIKELY
99 DON'T KNOW/NO RESPONSE

F18. Did your baby receive any oral vaccination, supplement, or medicine since birth?

- 0 No
1 YES (SPECIFY: _____)
99 DON'T KNOW/ NOT SURE/ NO RESPONSE

F19. When do you intend to introduce plain water to your baby?

- ____ MONTHS ____ WEEKS ____ DAYS
66 I ALREADY INTRODUCED PLAIN WATER (SPECIFY: ____ DAYS)
99 DON'T KNOW/ NOT SURE

F20. When do you intend to introduce cereal/porridge (e.g., Cerelac, kooko) to your baby?

- ____ MONTHS ____ WEEKS ____ DAYS
66 I ALREADY INTRODUCED CEREAL/PORRIDGE (SPECIFY: ____ DAYS)
99 DON'T KNOW/ NOT SURE

F21. Do you intend to introduce infant formula? (IF YES) When do you intend to introduce infant formula such as S.M.A., Lactogen to your baby?

- 0 No, I DO NOT INTEND TO INTRODUCE INFANT FORMULA
1 YES (SPECIFY: ____ MONTHS ____ WEEKS ____ DAYS)
66 I ALREADY INTRODUCED INFANT FORMULA (SPECIFY: ____ DAYS)
99 DON'T KNOW/ NOT SURE

F22. Have you received information about how to breastfeed?

- 0 No → F24
1 YES
99 DON'T KNOW/ NOT SURE/ NO RESPONSE → F24

F23. Who did you receive the information from?

F24. How long do you intend to feed your baby only breast milk?

_____ MONTHS _____ WEEKS

66 I ALREADY INTRODUCED OTHER FOODS (SPECIFY: _____ DAYS)

99 DON'T KNOW/ NOT SURE

F25. How long do you intend to feed your baby breast milk (WITH OTHER FOODS)?

_____ YEARS _____ MONTHS _____ WEEKS

99 DON'T KNOW/ NOT SURE

BREASTFEEDING OBSERVATION

INTERVIEWER: PLEASE OBSERVE AND CHECK THE APPROPRIATE OPTIONS

Body position

- | | |
|---|---|
| <input type="checkbox"/> Mother relaxed and comfortable | <input type="checkbox"/> Shoulders tense, leans over baby |
| <input type="checkbox"/> Baby's body close, facing breast | <input type="checkbox"/> Baby's body away from mother's |
| <input type="checkbox"/> Baby's head and body straight | <input type="checkbox"/> Baby's neck twisted |
| <input type="checkbox"/> Baby's chin touching breast | <input type="checkbox"/> Baby's chin not touching breast |
| <input type="checkbox"/> Baby's bottom supported | <input type="checkbox"/> Only shoulder or head supported |

Suckling

- | | |
|--|--|
| <input type="checkbox"/> Mouth wide open | <input type="checkbox"/> Mouth not wide open, points forward |
| <input type="checkbox"/> Lower lip turned outwards | <input type="checkbox"/> Lower lip turned in |
| <input type="checkbox"/> Tongue cupped around breast | <input type="checkbox"/> Baby's tongue not seen |
| <input type="checkbox"/> Cheeks round | <input type="checkbox"/> Cheeks tense or pulled in |
| <input type="checkbox"/> More areola above baby's mouth | <input type="checkbox"/> More areola below baby's mouth |
| <input type="checkbox"/> Slow deep sucks, bursts w/ pauses | <input type="checkbox"/> Rapid sucks only |
| <input type="checkbox"/> Can see or hear swallowing | <input type="checkbox"/> Can hear smacking or clicking |

Time spent suckling

- | | |
|--|---|
| <input type="checkbox"/> Baby releases breast | <input type="checkbox"/> Mother takes baby off breast |
| <input type="checkbox"/> Baby sucked for _____ minutes | |

HIV/AIDS AND VOLUNTARY COUNSELING AND TESTING OF HIV

T1. Did you discuss your personal risk or concerns about HIV/AIDS with anyone since the last interview?

0 No

1 YES (SPECIFY: _____)

99 DON'T KNOW/ NOT SURE/ NO RESPONSE

T2. Did you have an HIV testing before you delivered the baby?

0 No

1 YES

99 DON'T KNOW/ NOT SURE/ NO RESPONSE

T3. What was the main reason you (had/didn't have) the HIV test during the pregnancy?

T4. (IF YES) What helped you have the HIV test?

(IF NO) What prevented you from having the test?

**DETERMINANTS OF FULLY INFORMED INFANT FEEDING DECISIONS AMONG
GHANAIAI PREGNANT WOMEN**
[FOLLOW-UP 3: 1MO]

Participants ID [] [] [] [] [] []

Interviewer Code [] [] Name _____

Language 1= Twi, 2 = Ga, 3 = English

Time start _____ : _____ AM/PM Time end _____ : _____ AM/PM

Checked by _____

Editing Code [] [] Name _____

MATERNAL & CHILD HEALTH STATUS

C1. Did you have any illnesses since last interview? (PROBE)

- 0 No →C3
1 YES (SPECIFY: _____)
99 DON'T KNOW/ NOT SURE →C3

C2. Did this problem prevent you from breastfeeding your baby?

- 0 No
1 YES
99 DON'T KNOW/ NOT SURE

C3. What is the current weight and length of the baby?

_____ . _____ Kg (MEASURED AT WEEK _____)
(SPECIFY SOURCE _____)

C4. Did your baby have any illnesses since last interview?

- 0 No →C5
1 YES (SPECIFY: _____)
99 DON'T KNOW/ NOT SURE/ DON'T REMEMBER →C5

C5. Did this problem prevent your baby from being breastfed?

- 0 No
1 YES
99 DON'T KNOW/ NOT SURE/ DON'T REMEMBER

INFANT FEEDING

F1. Do you still breastfeed your baby?

- 0 No →F3
1 YES
99 DON'T KNOW/ NOT SURE/ NO RESPONSE →F3

F2. From the time you woke up yesterday until the time you woke up today, how many times did you breastfeed your baby?

_____ TIMES
_____ BETWEEN THE TIME YOU WOKE UP YESTERDAY AND THE TIME YOU ATE LUNCH, HOW MANY TIMES DID YOU BREASTFEED YOUR BABY?

_____ FROM THE TIME YOU HAD LUNCH UNTIL THE TIME YOU HAD YOUR DINNER, HOW MANY TIMES DID YOU BREASTFEED YOUR BABY?

_____ BEFORE YOU WENT TO BED AFTER DINNER, HOW MANY TIMES DID YOU BREASTFEED YOUR BABY?

_____ HOW MANY TIMES DID YOU BREASTFEED YOUR BABY DURING THE NIGHT BEFORE YOU WOKE UP TODAY?

F3. Have you experienced any difficulties breastfeeding your baby since last interview?

- 0 No →F5
1 YES (SPECIFY: _____)
99 DON'T KNOW/ NOT SURE/ NO RESPONSE →F5

F4. How did you manage the problem?

- F5. Has your baby experienced any difficulties being breastfed since last interview?
- 0 No →F7
 1 YES (SPECIFY: _____)
 99 DON'T KNOW/ NOT SURE/ NO RESPONSE →F7
- F6. How did you manage the problem?
- F7. Have you expressed the breast milk?
- 0 No →F12
 1 YES
 99 DON'T KNOW/ NOT SURE/ NO RESPONSE →F12
- F8. Why did you express the breast milk?
- 1 FULL BREAST – TO RELEASE THE PRESSURE/PAIN
 2 TO FEED THE BABY DURING MY ABSENCE
 3 BABY WAS UNABLE TO SUCK BREAST MILK
 88 OTHER (SPECIFY: _____)
- F9. Where did you store the expressed milk?
- 1 FEEDING BOTTLE
 2 CUP WITH LID
 3 CUP WITHOUT LID
 88 OTHER (SPECIFY: _____)
- F10. How long did you store it before it was given to the baby?
- _____ HOURS
 88 OTHER (SPECIFY: _____)
- F11. How did you feed it to your baby?
- 1 WITH FEEDING BOTTLE
 2 WITH CUP
 3 WITH SPOON
 88 OTHER (SPECIFY: _____)

- F12. From the time you woke up yesterday until the time you woke up today, did your baby *taste, eat, or drink*...

(IF YES) What was the main reason your baby was introduced _____?

LIQUIDS/SOLIDS*	No	Yes	DK	(IF YES) SPECIFY NAME	REASON*
A. PLAIN WATER	0	1	99		
B. GLUCOSE WATER	0	1	99		
C. TEA/JUICE	0	1	99		
D. FORMULA	0	1	99		
E. OTHER MILK	0	1	99		
F. CEREAL/PORRIDGE	0	1	99		
G. VEGETABLE/FRUITS	0	1	99		
H. OTHER	0	1	99		

* 1=MOTHER UNWELL, 2=BABY UNWELL, 3=BOTH UNWELL,
 4=NO/NOT ENOUGH BREAST MILK (MOTHER'S PERCEPTION),
 5=HCW'S RECOMMENDATION, 88=OTHER (SPECIFY), 99=DK

- F13. During the first month of baby's life, did your baby receive anything to *taste, eat, or drink* other than breast milk?

0 No →F15
 1 YES (SPECIFY: _____)
 99 DON'T KNOW/ NOT SURE/ NO RESPONSE →F15

- F14. What was the main reason you introduced _____ to your baby?

- F15. Has your baby been with you all the time since last interview?

0 No (SPECIFY: _____)
 1 YES
 99 DON'T KNOW/ NOT SURE/ NO RESPONSE

F16. How likely is it that someone fed other than breast milk such as plain water to your baby since last interview without your consent?

- 1 VERY LIKELY
- 2 LIKELY
- 3 MAYBE/ NOT SURE
- 4 UNLIKELY
- 5 VERY UNLIKELY
- 99 DON'T KNOW/NO RESPONSE

F17. Did the infant receive any oral vaccination or supplement since last interview?

- 0 No
- 1 YES (SPECIFY: _____)
- 99 DON'T KNOW/ NOT SURE/ NO RESPONSE

F18. When do you intend to introduce plain water to your baby?

- _____ MONTHS _____ WEEKS _____ DAYS
- 66 I ALREADY INTRODUCED PLAIN WATER (SPECIFY: _____ DAYS)
 - 99 DON'T KNOW/ NOT SURE

F19. When do you intend to introduce cereal/porridge (e.g., Cerelac, kooko) to your baby?

- _____ MONTHS _____ WEEKS _____ DAYS
- 66 I ALREADY INTRODUCED CEREAL/PORRIDGE (SPECIFY: _____ DAYS)
 - 99 DON'T KNOW/ NOT SURE

F20. Do you intend to introduce infant formula? (If yes) When do you intend to introduce infant formula such as S.M.A., Lactogen to your baby?

- 0 No, I DO NOT INTEND TO INTRODUCE INFANT FORMULA
- 1 YES (SPECIFY: _____ MONTHS _____ WEEKS _____ DAYS)
- 66 I ALREADY INTRODUCED INFANT FORMULA (SPECIFY: _____ DAYS)
- 99 DON'T KNOW/ NOT SURE

F21. How long do you intend to feed your baby only breast milk?

- _____ MONTHS _____ WEEKS
- 66 I ALREADY INTRODUCED OTHER FOODS (SPECIFY: _____ DAYS)
 - 99 DON'T KNOW/ NOT SURE

F22. How long do you intend to feed your baby breast milk (WITH OTHER FOODS)?

- _____ YEARS _____ MONTHS _____ WEEKS
- 99 DON'T KNOW/ NOT SURE

F23. Could you tell me the name of person(s) who gave you any kind of support (e.g., informational, material, or emotional) so that you can feed your baby successfully?

What kind of supports did you receive from (person's name)?

NAME OR RELATIONSHIP	ACTUAL SUPPORT

Appendix 5.

Price of infant formula, commercial complementary foods, and powdered milk

Appendix 5. Price of infant formula, commercial complementary foods, and powdered milk ^a

Company	Brand name	Amount (g)	Recommended age	Average price ^b	Minimum price ^b	Maximum price ^b
Formula						
S.M.A.	S.M.A. gold	450	Birth onward	56,500	55,000	57,000
	S.M.A. progress	450	6 - 24 mo	55,560	55,000	57,000
	S.M.A. progress	860	6 - 24 mo	110,000	110,000	110,000
Nestle	Lactogen step1	450	Birth onward	23,700	22,000	25,500
	Lactogen step2	450	6 mo onward	23,500	22,000	25,500
Friesland	Frisolac	450	1- 8 mo	22,300	22,000	22,900
Commercial complementary foods						
Nestle	Celerac: maize	50	4 mo onward	1,900	1,900	1,900
	Celerac: maize	400	4 mo onward	13,000	12,000	13,600
	Celerac: wheat	400	4 mo onward	13,000	12,000	13,600
Friesland	Frisocream: rice base	300	4 mo onward	20,500	20,000	21,100
	Frisocream: wheat base	300	4 mo onward	20,500	20,000	21,100
Beech Nut	Beech Nut Naturals: rice apple	227	6 mo onward	16,500	16,000	17,000
Naturals	Beech Nut Naturals: rice banana	227	6 mo onward	16,300	16,000	16,500
	Beech Nut: barley	227	Beginner	16,000	16,000	16,000
	Beech Nut: mixed	227	6 mo onward	16,000	16,000	16,000
Powered milk						
Nestle	Nido	400	–	17,600	16,000	19,800
Friesland	Peak	400	–	19,100	17,000	21,000
Cowbell	Cowbell	7.5	–	300	300	300
	Cowbell	22.5	–	800	800	800

^a Price was checked in 50 different stores and pharmacies in Accra. Some products were not available in every store/pharmacy.

^b \$1≅7,900 cedis

Appendix 6.

Study summary and recommendation sent to Mrs. Agble, Ministry of Health

Ministry of Health
Nutrition Division
P. O. Box M27
Accra, Ghana

Oct 30, 2003

Dear Mrs. Agble:

Given the risk of HIV transmission via breast milk, the health community has been struggling with the need to help each woman make their best decision about infant feeding. To contribute to the knowledge base to support this effort, we examined the factors that help pregnant women to make an informed decision about prenatal voluntary HIV testing (VCT) and infant feeding.

The data were collected using focus group discussions and in-person interviews with 403 pregnant women attending antenatal care clinics at Kaneshie and Mamprobi polyclinics from March 2002 to January 2003.

Our study found that:

- Pregnant women's intention to use VCT services was generally low, but their intention would have increased significantly with a health professional's recommendation.
- Pregnant women's knowledge about HIV and transmission modes of HIV including mother-to-child transmission (MTCT) was high, but misconception about transmission routes (e.g., mosquito, spiritual) was still common.
- Most pregnant women lacked knowledge about the prevention methods of MTCT.
- Most pregnant women preferred exclusive breastfeeding to formula feeding at least during the first month because of the health benefits of breast milk for their infants. Most women did not know the benefits of exclusive breastfeeding for themselves.
- Most women would like to receive a subsidized formula if they were infected with HIV. About one quarter of the women stated that they would like to receive subsidized formula even if they were uninfected with HIV and they would give the formula to their infant before six months of age.

Based on our study results, we concluded that:

- An 'opt-out' approach of VCT of HIV and a systematic nutrition education program including the risks and benefits of exclusive breastfeeding and formula feeding should be routinely offered to all pregnant women to enable them to make an informed infant feeding decision as a part of antenatal care.
- Distribution of subsidized formula for HIV-infected women should be considered to have a high possibility of 'spill-over', in which HIV-uninfected women would use formula feeding for their young infants. Careful attention needs to be given to an appropriate distribution and monitoring mechanism if the GHS provides infant formula for HIV-infected mothers.

If you have further questions regarding the study or any comments, please feel free to contact me.
Thank you very much.

Sincerely,

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