



Women's willingness to be tested for human immunodeficiency virus during pregnancy: A review

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Abstract

Mother-to-child-transmission of human immunodeficiency virus (HIV) is a primary cause of pediatric infections with HIV. Many of these infections involve women who were not tested early enough in pregnancy, or who did

not receive prevention services. HIV testing of pregnant women is considered to be one of the key strategies for preventing mother-to-child-transmission of HIV, but HIV testing rates among pregnant women in various countries remain suboptimal. Understanding the factors relating to women's willingness to be tested for HIV during pregnancy is critical for developing strategies to increase HIV testing rates among pregnant women. Extensive research points to various factors relating to women's willingness to be tested for HIV during pregnancy, and various recommendations aimed at improving testing rates among pregnant women have been suggested based on the research. In light of the goals set by the United Nations to reduce the rate of infants infected with HIV, it is necessary to summarize what is currently known regarding factors related to women's willingness to be tested for HIV during pregnancy. The purpose of this review is therefore to examine factors related to women's willingness to be tested for HIV during pregnancy, and to summarize recommendations for practice and further research.

Key words: Female; Human immunodeficiency virus infection; Pregnancy; Testing/screening; Patient acceptance of health care; Research

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Core tip: The willingness of women to be tested for human immunodeficiency virus (HIV) during pregnancy is a complex phenomenon. There is frequent inconsistency in research results; however, studies have shown that certain major factors are steadily identified over time as associated with the phenomenon. Numerous factors related to pregnant women's willingness to be tested suggest multiple possible interventions to maximize HIV testing efficiency and increase testing rates. There is a need in further research of the phenomenon, as the majority of the research literature focuses on sub-Saharan Africa.

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INTRODUCTION

In 2012, there were more than 210000 new cases of human immunodeficiency virus (HIV) in children. This figure is in addition to the existing 3.4 million children already living with the virus worldwide^[1]. More than 90% of these infections were the result of Mother-To-Child Transmission (MTCT). Many new MTCT cases of HIV occurred in women who did not receive testing for HIV early in their pregnancy, or who did not have access to preventative prenatal care^[2].

Over 90% of MTCT of HIV occurs in sub-Saharan Africa, where women in their reproductive years represent 50% of the HIV-infected population^[3]. MTCT of HIV is not limited to low-income countries: according to one source, each year in the United States there are between 100 to 200 new cases^[2].

HIV testing of pregnant women has been advocated by UNAIDS as one of the key strategies for preventing MTCT^[4]. In 2004, the World Health Organization (WHO) and UNAIDS issued recommendations for routine HIV testing of pregnant women in resource-limited countries^[5]. At present, routine prenatal HIV testing is considered to be standard care in the United States and other developed nations. Nearly half of African countries have also adopted routine prenatal HIV testing policies, with 42.7% of them adopting these policies in 2006^[6]. Despite these positive developments, HIV testing rates of pregnant women in many countries remain suboptimal^[7].

Testing for HIV is voluntary and dependent on the willingness of women to receive testing. Understanding factors related to women's willingness to receive HIV testing during pregnancy is critical to developing strategies to increase HIV testing rates for pregnant women. Extensive research elucidates various factors as being related to women's willingness to be tested for HIV during pregnancy. Considering the goals set by the United Nations to reduce the rate of infants infected with HIV^[8,9], the purpose of this review is to summarize the current research on factors related to the willingness of women to receive testing during pregnancy, and to formulate recommendations for practice and further research. Moreover, this review summarizes the advantages of testing for HIV during pregnancy, and provides recent statistics of testing rates for HIV during pregnancy in various countries.

ADVANTAGES OF TESTING FOR HIV DURING PREGNANCY

Testing for HIV detects HIV infections that would

otherwise be missed. Timely HIV detection provides opportunity for interventions to alter the course of disease and prolong life^[10]. Testing for HIV during pregnancy has additional advantages. First, results of a systematic review and meta-analysis showed a high incidence of HIV infection in pregnant and postpartum women in African countries as compared to non-African countries (cumulative HIV incidence being 3.6% and 0.3%, respectively), thus making testing during pregnancy especially important^[11]; Second, most women in countries with low- to mid-level incomes will visit prenatal health clinics at least once during the course of their pregnancies^[12], making the prenatal visit a valuable opportunity to test women for HIV^[13].

Without appropriate health care management of HIV positive pregnant women, there is a high risk of MTCT. The risk of HIV MTCT in low- and mid-income countries is 15% to 40%. Of these, 5%-10% of MTCT will occur during the pregnancy itself, another 10%-20% of MTCT will occur during labor and delivery, and breastfeeding will account for 5%-20% of MTCT cases. Proper therapy for HIV in pregnancy is crucial to prevent MTCT^[14]. The most important advantage of testing women for HIV during pregnancy is that timely identification of a pregnant woman infected with HIV allows planning and initiation of care, which may significantly lower the risks of MTCT of HIV, and, consequently, lead to healthier populations^[15].

In high-income countries, MTCT rates have decreased dramatically following the introduction of recommendations for routine HIV testing for all pregnant women^[16-18]. Programs promoting Prevention of Mother-To-Child Transmission (PMTCT) of HIV, including routine testing for HIV, have also led to a substantial decrease in MTCT rates in Sub-Saharan Africa, by around 50% since 2009^[9].

Identification of the HIV-status of a pregnant woman allows establishment of three interventions for PMTCT of HIV: (1) administration of antiretroviral prophylaxis to mothers during pregnancy and delivery, and to newborn infants following delivery; (2) delivery of infants by scheduled cesarean section; and (3) avoidance of breastfeeding in favor of appropriate replacement feeding^[15]. These interventions have been shown to be both effective and cost-effective in lowering MTCT of HIV^[19-21]. Maternal treatment with antiretroviral therapy reduces cases of MTCT of HIV to < 2% of deliveries by women with HIV. The appropriate (scheduled cesarean) mode of delivery^[22] and avoidance of breastfeeding^[23,24] have also been shown to support reduction of MTCT of HIV. At present, delivery by scheduled cesarean section is recommended for women with a viral load of over 1000 copies/mL. PMTCT programs can lower MTCT rates to about 5% even in low-income countries with limited availability of combination antiretroviral regimens, and those without the ability to provide delivery by cesarean section and replacement feeding. However, this is dependent on women being tested for HIV during pregnancy as well as their enrolling in and completing a PMTCT program^[25].

Early identification of HIV infected pregnant women enables health care providers to test infants for HIV infection following delivery, as well as for the early administration of prophylaxis to protect HIV-infected infants and those whose HIV status remains unknown from opportunistic infections. It also allows an opportunity for counseling women on the risks of infant infection *via* breastfeeding and proper initiation of appropriate replacement feeding^[15,26].

Testing early in the pregnancy has several advantages over testing in late stages of pregnancy. Testing and identification of HIV status during pregnancy allows health care providers to use the three known effective interventions for prevention of MTCT of HIV (maternal antiretroviral treatment during pregnancy and delivery and postpartum infant prophylaxis; delivery by scheduled cesarean section; and avoidance of breastfeeding)^[15].

When HIV infection is not detected during pregnancy, it is not possible to administer antiretroviral treatment during the course of the pregnancy itself. In such cases, the only remaining strategy for health care providers is to administer antiretroviral therapy during delivery and to the infant immediately following birth, and to instruct the mother to avoid breastfeeding and to begin replacement feeding. However, it is known that antiretroviral prophylaxis is more effective in preventing MCTC when begun during pregnancy^[15]. In a study by Wade *et al.*^[27], maternal prophylaxis treatment during delivery with intravenous zidovudine, together with a six-week course of zidovudine administered to the newborn following delivery reduced the rate of MCTC by 60%.

HIV TESTING RATES AMONG PREGNANT WOMEN

Worldwide efforts to increase testing rates for HIV among pregnant women, such as implementation of routine HIV testing of all pregnant women, have led to a general increase in testing rates in various countries^[7]. However, reported testing rates remain suboptimal. It is not always clear whether suboptimal testing rates are due to pregnant women's refusal to be tested or due to the fact that they have not been offered or have not had access to testing services.

The CDC reported that the percentage of pregnant women tested for HIV in the United States remained stable overall during the time period from 2000 to 2010, at around 50%-60%. The percentage of pregnant women tested remained stable among non-Hispanic whites, non-Hispanic blacks, and all age groups, although the rate did increase significantly among Hispanics^[28]. Remis *et al.*^[29] reported a dramatic increase in the percentage of women in Ontario undergoing prenatal HIV testing, from 33% in 1999 to 96% in 2010. It has been suggested that measures undertaken to increase HIV testing, such as sending reminders to health care providers who did not order prenatal HIV testing, at least partially contributed to such success.

According to a report by UNICEF, in 2012 an estimated 40% of pregnant women in low- and middle-income countries received HIV testing, which represented an increase from 30% in 2010 and 8% in 2005^[30]. Interestingly, other recently available sources usually point to higher testing rates in several low- and middle-income countries. For example, the Indian Health Service has reported a 22% increase in HIV testing rates over a 4-year period^[2]. Another source cited that the national health services in South Africa in 2007/2008 tested 80% of pregnant women for HIV^[31]. It has been reported that in Uganda in 2010, 63% of pregnant women were tested for HIV^[32].

Several other relatively recent studies of prenatal testing for HIV in low- and middle-income countries also point to higher testing rates. In a study by Kizito *et al.*^[33], of a total of 20738 women who received prenatal services at Entebbe Hospital in Uganda from May 2002 to January 2006, 62.8% accepted testing for HIV. In contrast, in a study by Chandisarewa *et al.*^[34], following the initiation of routine HIV testing in urban Zimbabwe, 99.9% were tested for HIV. These results may not have been representative of the total population of pregnant women in these countries^[33,34].

Despite the high reported testing rates, as long as HIV testing coverage of pregnant women is not 100%, every pregnant woman with unknown HIV-status potentially endangers the health of her future child and the health of future generations. This is particularly true in countries with high HIV infection rates^[33].

FACTORS RELATED TO WOMEN'S WILLINGNESS TO BE TESTED FOR HIV DURING PREGNANCY

The term "HIV testing" is often used to describe both testing and counseling. Several voluntary testing approaches have been applied. In "opt-in testing", health care providers ask patients if they would like to receive HIV testing, while in "opt-out testing" patients are notified that, unless they decline, HIV testing is included in routine prenatal care. The WHO recently proposed a formulation that distinguishes between two types of HIV testing: client-initiated testing and provider-initiated testing. Client-initiated testing corresponds to what is usually referred to as voluntary counseling and testing (VCT) or "opt-in testing", while provider-initiated testing corresponds to "opt-out testing"^[35].

Various terminology has been used to describe services of HIV testing ("opt-in testing", "opt-out testing", "client-initiated testing", "VCT", "provider-initiated testing"). The literature also uses varying terminology to describe the target variable: willingness, readiness, HIV test acceptance, HIV test uptake, *etc.* To simplify matters, the original terms from the studies mentioned in this literature review were used.

Studies report varying willingness of women to be tested for HIV during pregnancy. For example, around

50% of respondents expressed willingness to be tested in a Chinese study by Li *et al.*^[36] and in an Ethiopian study by Moges and Amberbir^[37]; in contrast, other studies reported higher willingness to be tested (more than 75% of respondents expressed willingness to be tested)^[38-40]. Some African studies demonstrated significant gaps between the willingness of pregnant women to receive HIV testing and their actual testing rates, as in studies from Sudan^[41] and Tanzania^[42]. Similarly, a South African study showed that pregnant women had a good level of knowledge and understanding about HIV testing in pregnancy, and their perceptions of HIV testing were positive, but they were not consistent with their behavior. That is, the women's positive attitudes towards HIV testing were not reflected in their actual behavior^[43]. The difference between women's willingness to receive HIV testing and actual testing rates implies that willingness to be tested for HIV during pregnancy is a complex phenomenon influenced by an interplay of factors^[42,44].

Based on the classification used by Deblonde *et al.*^[45] in their literature review on impediments to HIV testing in Europe, in the present review factors related to the willingness of women to be tested for HIV during pregnancy have been classified as policy-related factors, woman-related factors, and health care provider-related factors.

POLICY RELATED FACTORS

HIV testing rates among pregnant women depend on the prenatal HIV-testing approaches used at a particular location. The CDC reviewed HIV testing rates among pregnant women and found that opt-out testing resulted in higher rates of testing (71%-98%) than the opt-in approach (25%-83%). The opt-out approach has been shown to be more successful in terms of testing rates than the opt-in approach in sub-Saharan Africa^[6,34,46-48]. It has been suggested that the opt-out approach destigmatizes the test, which might explain higher testing rates when the opt-out approach is applied^[34]. It is also possible that the opt-out approach merely requires less effort on the part of the woman to be tested.

It should be noted that there is no uniformity in testing approaches, as various countries use different testing approaches^[44]. Testing approaches may frequently vary within a single country. For example, at present both the opt-in and the opt-out approaches are used in the United States^[49]. In addition, there are countries where prenatal HIV testing is still performed only in women who are in risk groups for HIV infection, such as Israel^[50], although the Israeli Ministry of Health has recently recommended universal testing for all pregnant women^[51].

WOMAN RELATED FACTORS

Based on this literature review, major woman related factors may be summarized as referring to social factors, fear of the HIV test results, knowledge (of HIV/AIDS and MTCT of HIV), perceived susceptibility to HIV, perceived benefits of the test, prior HIV testing, and

sociodemographic characteristics (age, marital status, education, and economic factors).

Social factors

A considerable amount of literature on the willingness of women to be tested for HIV during pregnancy has focused on social factors. Women infected with HIV/AIDS often describe stigma as a major factor influencing their health behaviors^[52]. Women's fear of receiving stigma and discrimination at the hands of their community, spouses, family, and health care providers have been shown to be major impediments to HIV testing during pregnancy in various countries^[36,37,53-58]. Even in settings where prenatal HIV testing is normative, women's expectation that they will experience stigma as a result of HIV testing can impede their willingness to be tested^[59]. Conversely, intensive family support^[60] and support from significant others^[61,62] have been recognized to be facilitating factors.

An important role in the willingness of women to be tested for HIV during pregnancy has been attributed to the male partner, who can be either a barrier or a source of support^[31,37,40,42,55,63-65]. Women feel that their spouses' support and approval for HIV testing is a necessary condition for them to agree to receive an HIV test during pregnancy^[37,63,66-68]. Bajunirwe and Muzoora^[63] found that rural Ugandan women had a higher tendency than did urban women to believe that they need their spouses' approval to receive testing.

Fears of negative reactions from the male partner as a factor influencing the willingness of women to receive HIV testing have been discussed in several studies^[59]. In light of societal expectations of women's sexual monogamy to their spouse^[69], a male partner may blame an HIV-infected woman for unfaithfulness. As a consequence, women may face negative repercussions due to their identification as being infected with HIV, such as domestic violence^[59].

In their study of pregnant women in rural Kenya, Turan *et al.*^[59] found that fear of their spouses' reaction and possible repercussions were a more powerful influence on the willingness of women to be tested for HIV during pregnancy than were their concerns regarding any other significant others. Turan *et al.*^[59] suggested that because community members are not easily able to identify if a woman is infected with HIV, women have less fear of receiving negative consequences from the whole community.

It should be noted that male partner factors also play a role in whether women return for results, as demonstrated by Msuya *et al.*^[70]. In their study, when women's spouses did not undergo testing, the women themselves were less likely to return to the clinic to receive their own test results.

Fear of the test results

Fear of the test results has been shown to be a major barrier to being tested for HIV during pregnancy, both in earlier and in more recent studies^[31,37,55,56,58]. Dube and Nkosi^[43] found that half of the women in their study felt

that getting tested for HIV was emotionally stressful. Similarly, Moges and Amberbir^[37] found that pregnant women resist HIV testing because they are afraid to receive a positive result. A similar finding was also seen in Tanzania^[42]. In contrast, an Ethiopian study by Maedot *et al.*^[71] found that pregnant women who felt that they were capable of coping with a positive HIV test result were identified as being more likely to accept VCT.

Knowledge, perceived susceptibility to HIV, and perceived benefits of the test

Most reviewed studies demonstrate that women's willingness to be tested for HIV during pregnancy was influenced by their knowledge about HIV/AIDS and MTCT^[36,37,39,41,58,60,72-74]. Other studies found that knowledge was not related to willingness to be tested. It has been suggested that results need to be interpreted within the context of a particular society^[75].

Turan *et al.*^[59] found that knowing someone who was HIV-positive was associated with willingness to receive HIV testing during pregnancy. They suggested that knowledge of MTCT and knowing someone who was HIV-positive might increase women's awareness of the possibility of MTCT and the advantages of receiving HIV testing. Indeed, many studies found that high perceived susceptibility to HIV was associated with willingness to receive HIV testing during pregnancy^[36,37,42,65,76-78]. Research from multiple countries has shown that many pregnant women did not believe that they were at risk for contracting HIV because they are in monogamous relationships and trust their male partner^[37,40,42,79].

Many studies also identified an association between women's perception of the benefits of the test, either for their infants' or for their own health, and the willingness of women to be tested^[37,38,42,62,63]. However, in a study by Baiden *et al.*^[80], willingness to be tested for HIV was not associated with women's view on the usefulness of the test.

Several studies have found that HIV testing participation was related to the number of prenatal care visits a pregnant woman had already received^[58,60,68]. Women who have less access to prenatal health care are less likely to know about PMTCT and other preventative care^[58]. It has been shown that improving women's access to prenatal care improves PMTCT uptake^[81].

Several studies have identified certain obstetric factors, such as bad obstetric history, or being multi gravida vs primigravida, as associated with uptake of VCT^[41,63,65,67,82]. It is possible that multigravida women had more contact with prenatal care services and therefore had prior experience of HIV testing, or that they were more aware of the MTCT of HIV.

Prior HIV testing

Several studies found that prior HIV testing was related to experience with HIV counseling and testing (HCT)^[66,83]. In contrast, in a study in Ghana by Holmes *et al.*^[84] it was found that 95% of women who had been previously tested for HIV declined to receive additional testing.

Similarly, Peltzer *et al.*^[31] found that women declined to receive HCT because they already had been tested for HIV previously.

It is possible that the inconsistency in results may reflect women's varying underlying beliefs. For example, Matovu *et al.*^[83] suggested that women may seek repeat testing in order to be certain that they have not been infected. In contrast, it has also been suggested that women who have received a negative test result in the past, and who do not feel that they are at any new risk, will not consider repeat testing to be useful to them^[84]. Similarly, focus group discussions in a study by Matovu *et al.*^[83] suggested that women who have received repeat negative HIV testing results feel that they may not be susceptible to HIV, or that they have been lucky. Such beliefs raise concerns, as a previous negative result does not absolutely guarantee a negative result during a subsequent pregnancy.

Sociodemographic characteristics

Age: In a Sudanese study, women older than 26 years had higher acceptance of VCT^[41]. Similarly, in a study conducted in Burkina Faso, the uptake rate of VCT increased linearly with age, being particularly low among adolescents (15-19 years)^[67]. Enosolease and Offor^[85] have shown that older Nigerian women had higher rates of acceptance of HIV testing. It has been suggested that older women may be more aware of a higher cumulative risk of infection and are more likely to take autonomous decisions^[67]. Other studies have found that older age was actually associated with test refusal^[58,66]. There were also studies which found no correlation at all, as in a UK study^[77]. These findings suggest that age is a confounding factor.

Marital status: Fabiani *et al.*^[86] found that being married was associated with lower VCT uptake. Conversely, in a study by Matovu *et al.*^[83], VCT acceptance was actually higher among married women. Perez *et al.*^[58] also found that women living with a partner were more likely to accept HIV testing. It is possible that inconsistency in results reflects variation in women's perception of susceptibility to HIV. Some married women may perceive themselves as less susceptible to HIV because they trust their husbands^[37], while other married women may actually feel that they are more at risk^[58]. Perez *et al.*^[58] also suggested that married women are more accepting of HIV testing because they feel that they can depend on their spouse to support them in the event of a positive test result.

Education: Previously conducted studies in different countries have demonstrated that higher educational status was associated with higher willingness to accept VCT^[37,54,58,63,74,79,84,86]. Perez *et al.*^[58] suggested that women with less education also have less knowledge about and access to prenatal healthcare.

Conversely, it has also been found that lower education sometimes leads to higher rates of test acceptance^[87,88].

Barragán *et al.*^[87] suggested that when HIV testing is encouraged by healthcare workers, women's low level of knowledge may not be an impediment to their acceptance of testing.

Economic factors: Moges and Amberbir^[37] found that the occupational status of women in Northwestern Ethiopia was an important factor in their readiness to utilize VCT. Employed pregnant women accepted VCT at higher rates than unemployed married women. Similar results were obtained in a Vietnamese study^[54] and in a Sudanese study^[41]. The researchers suggested that when women leave the home and are employed, they have greater access to information about VCT compared to unemployed married women who spent most of their time at home^[37]. Perez *et al.*^[58] also found that rural Zimbabwean women with unemployed partners and lower incomes were less likely to be tested because these women are less economically independent and less able to make decisions for themselves.

HEALTH CARE PROVIDER RELATED FACTORS

Based on the literature review, health care provider-related factors may be classified as relating to access to antiretroviral therapy, site characteristics, woman-provider dynamics, and belief in the HIV test's reliability. Perceived ability to get continuous medical care following a positive HIV test result^[71], knowledge about the availability of the antiretroviral therapy^[89], and lack of access to antiretroviral therapy^[66] are often listed among factors associated with the willingness of women to be tested during pregnancy.

In a study from Kenya, Anand *et al.*^[90] found that site factors were the most significant element in PMTCT program acceptance. In a government hospital in Uganda, administrative problems, lack of resources and lack of staff were cited as significant causes for failure to counsel women about routine HIV testing during pregnancy^[91]. Dahl *et al.*^[66] found that the longer that testing sites were in operation, the higher their rates of HIV test acceptance. Larsson *et al.*^[25] examined the willingness of women in rural Uganda to receive HIV testing. They found that for women of all income levels, those who lived further than three kilometers from an HIV testing site were less likely to be tested. Long waiting times were identified as another major reason for refusing the test^[31].

Several studies have demonstrated the positive effects of combining PMTCT programs with prenatal care^[92-94]. There are several possible explanations for this: it may be that combining these services helps women by reducing the cost, time, and travel required to receive care. Additionally, women seeking care at a site that offers combined services are less likely to be identified as seeking HIV testing, and therefore may be less fearful that they will be stigmatized or discriminated against by

their communities^[92]. In addition, it has been previously documented that perceived unreliability of test results and distrust of HIV testing technologies can discourage uptake of HIV testing^[66,95,96]. Combining services may improve and increase technology available at testing sites, which in turn can improve women's confidence in both the technology and their health care providers.

Site characteristics seem to play an important role in acceptance of testing for HIV and also in women's intention to come back for results, which is crucial in prevention of MTCT. In a study by Sarker *et al.*^[68], operational factors were the most significant reason why women failed to return to a testing site to get their results. These operational factors included poor scheduling of the post-test counseling sessions and a lack of doctors. Msuya *et al.*^[70] also found that the site of recruitment was associated with women's motivation to return to receive their HIV test results.

Varga *et al.*^[97] examined impediments to willingness to be tested for HIV of 15 to 19-year-old mothers in rural and urban Limpopo Province, South Africa. The study found that the relationship and communication between the pregnant women and the HCT counselor was a significant factor influencing the rate of acceptance of HIV testing, as were the counselors' profiles, which impacted the interaction between pregnant women and clinic staff. Peltzer *et al.*^[31] found that the more trust pregnant women had in their HCT counselor, the higher their rate of acceptance of pre- and post- test counseling. A study in Alberta, Canada, found that counselors' gender and education were the most significant influence on women's willingness to participate in routine opt-out prenatal HIV testing^[98].

Studies have also found that lack of confidentiality was associated with less participation in HCT^[31,42,56,97]. Negative experiences with medical personnel^[55,82], as well as low quality of pre-test counseling, were also associated with less participation in HCT^[66,95,96]. In addition, women's failure to understand the HIV testing procedure as explained during group counseling, as well as dislike for group counseling, were listed among the major reasons for refusing the test^[31]. Perez *et al.*^[58] showed that group counseling had a negative effect on acceptance of HIV testing. The researchers suggested that this demonstrates a need for revision of counseling methods.

RECOMMENDATIONS

The extensive literature on this topic provides recommendations aimed at increasing HIV testing rates among pregnant women in different countries. Numerous factors related to pregnant women's willingness to be tested suggest multiple possible interventions to maximize HIV testing efficiency and increase testing rates. In general, major recommendations suggested in various studies aimed at increasing HIV testing rates among pregnant women can be conceptually mapped as falling into one of three primary domains: male partner involvement, education, and improvement of site-level factors.

Male partner involvement

Male partner involvement in the process of prenatal HIV testing is necessary. This involvement includes HIV counseling for couples and testing with facilitated disclosure. There is a need to advance strategies to address women's fear of negative repercussions from their spouses in response to a positive HIV test result. One potential strategy is teaching prenatal healthcare providers to facilitate discussions between women and their spouses about HIV testing in order to improve their acceptance of testing. However, women should be also equipped with tools to help them safely and effectively communicate with their spouses about HIV testing. Prenatal healthcare workers should be aware of signs of domestic violence and include domestic violence reduction programs in their prenatal care.

Education

Women's education in general should be promoted, including knowledge of HIV testing, MTCT of HIV, and PMTCT programs. Emphasis should be put on HIV susceptibility and benefits of the HIV test, while various misperceptions should be corrected through proper counseling. Moreover, education should include support and empowerment of women to reduce fear of the test and provide tools to cope with the results.

Improvement of site-level factors

Improving women's willingness to participate in HIV testing and PMTCT programs should include addressing deficiencies at the site level as well as focusing on participant factors. Positive site-level factors to encourage HIV testing in pregnant women include improving staff availability and knowledge, improving scheduling and patient management, developing better counseling methods, and increasing health care providers' access to test kits and on-site laboratory capabilities. Mistrust towards HCT providers should be reduced. These factors should be periodically evaluated, including comparison of sites with high and low rates of HIV testing and PMTCT acceptance.

CONCLUSION

There are several factors that are usually identified as associated with the willingness of women to be tested for HIV during pregnancy. Studies have shown that certain major factors remain stable over time. However, frequent inconsistent results concerning certain factors suggest that there is no magic formula for understanding and predicting women's willingness to be tested. The inconsistencies in results may reflect the complexity of the phenomenon of women's willingness to be tested. Factors may be interrelated and influenced by cultural and social characteristics of a society, requiring further research and meta-analyses of the phenomenon.

It should be noted that the majority of the research literature focuses on sub-Saharan Africa. There is dearth of research on factors related to the willingness of

women in countries with middle and high income levels to be tested for HIV during pregnancy. Research on the willingness of women to be tested in certain countries is completely lacking.

REFERENCES

- 1 **Kellerman SE**, Sugandhi N. Pediatric AIDS in the elimination agenda. *PLoS Med* 2013; **10**: e1001503 [PMID: 24015112 DOI: 10.1371/journal.pmed.1001503]
- 2 **Health Resources and Services Administration**. HIV screening for pregnant women, 2012. Available from: URL: <http://www.hrsa.gov/quality/toolbox/508pdfs/hivscreeningpregnantwomen.pdf>
- 3 **UNAIDS**. Global report: UNAIDS report on the global AIDS epidemic 2010. Geneva: UNAIDS, 2010. Available from: URL: http://www.unaids.org/globalreport/Global_report.htm
- 4 **UNAIDS**. A focus on women: a key strategy to preventing HIV among children, 2014. Available from: URL: http://www.unaids.org/sites/default/files/media_asset/JC2538_preventingHIVamongchildren_en_0.pdf
- 5 **UNAIDS; WHO**. UNAIDS/WHO policy statement on HIV testing, 2004. Available from: URL: http://www.who.int/rpc/research_ethics/hivtestingpolicy_en_pdf.pdf
- 6 **Baggaley R**, Hensen B, Ajose O, Grabbe KL, Wong VJ, Schilsky A, Lo YR, Lule F, Granich R, Hargreaves J. From caution to urgency: the evolution of HIV testing and counselling in Africa. *Bull World Health Organ* 2012; **90**: 652-658B [PMID: 22984309 DOI: 10.2471/BLT.11.100818]
- 7 **WHO; UNAIDS; UNICEF**. Towards universal access: scaling up priority HIV/AIDS interventions in the health sector. Geneva: WHO, 2010. Available from: URL: <http://www.who.int/hiv/pub/2010progressreport/en/>
- 8 **UNAIDS**. Countdown to zero: global plan towards the elimination of new HIV infections among children by 2015 and keeping their mothers alive. Geneva: UNAIDS, 2011. Available from: URL: <http://reliefweb.int/report/world/countdown-zero-global-plan-towards-elimination-new-hiv-infections-among-children-2015>
- 9 **UNAIDS**. 2013 Progress report on the global plan: towards the elimination of new HIV infections among children by 2015 and keeping their mothers alive. Geneva: UNAIDS, 2013. Available from: URL: <http://reliefweb.int/report/world/2013-progress-report-global-plan-towards-elimination-new-hiv-infections-among-children>
- 10 **Paltiel AD**, Walensky RP, Schackman BR, Seage GR, Mercincavage LM, Weinstein MC, Freedberg KA. Expanded HIV screening in the United States: effect on clinical outcomes, HIV transmission, and costs. *Ann Intern Med* 2006; **145**: 797-806 [PMID: 17146064 DOI: 10.7326/0003-4819-145-11-200612050-00004]
- 11 **Drake AL**, Wagner A, Richardson B, John-Stewart G. Incident HIV during pregnancy and postpartum and risk of mother-to-child HIV transmission: a systematic review and meta-analysis. *PLoS Med* 2014; **11**: e1001608 [PMID: 24586123 DOI: 10.1371/journal.pmed.1001608]
- 12 **WHO**. World health statistics 2010. Geneva: WHO Press, 2010. Available from: URL: <http://www.who.int/whosis/whostat/2010/en/>
- 13 **Yartey J**, Kumoji K. Technical consultation on the integration of HIV interventions into maternal, newborn and child health services. Geneva: WHO, 2006. Available from: URL: http://www.who.int/maternal_child_adolescent/documents/hiv_interventions/en/
- 14 **Shrim A**, Garcia-Bournissen F, Murphy K, Koren G, Farine D. When pregnant women are not screened for HIV. *Can Fam Physician* 2007; **53**: 1663-1665 [PMID: 17934027]
- 15 **American Academy of Pediatrics Committee on Pediatric AIDS**. HIV testing and prophylaxis to prevent mother-to-child transmission in the United States. *Pediatrics* 2008; **122**: 1127-1134 [PMID: 18977995 DOI: 10.1542/peds.2008-2175]
- 16 **Centers for Disease Control and Prevention (CDC)**. HIV/AIDS surveillance report, 2004. Atlanta: US Department of Health and Human Services, CDC, 2005

- 17 **McKenna MT**, Hu X. Recent trends in the incidence and morbidity that are associated with perinatal human immunodeficiency virus infection in the United States. *Am J Obstet Gynecol* 2007; **197**: S10-S16 [PMID: 17825639 DOI: 10.1016/j.ajog.2007.02.032]
- 18 **Townsend CL**, Cortina-Borja M, Peckham CS, de Ruiter A, Lyall H, Tookey PA. Low rates of mother-to-child transmission of HIV following effective pregnancy interventions in the United Kingdom and Ireland, 2000-2006. *AIDS* 2008; **22**: 973-981 [PMID: 18453857 DOI: 10.1097/QAD.0b013e3282f9b67a]
- 19 **Chou R**, Cantor AG, Zakher B, Bougatsos C. Screening for HIV in pregnant women: systematic review to update the 2005 U.S. Preventive Services Task Force recommendation. *Ann Intern Med* 2012; **157**: 719-728 [PMID: 23165663 DOI: 10.7326/0003-4819-157-10-201211200-00009]
- 20 **Paintsil E**, Andiman WA. Update on successes and challenges regarding mother-to-child transmission of HIV. *Curr Opin Pediatr* 2009; **21**: 94-101 [PMID: 19242245 DOI: 10.1097/MOP.0b013e32831ec353]
- 21 **Sweat MD**, O'Reilly KR, Schmid GP, Denison J, de Zoysa I. Cost-effectiveness of nevirapine to prevent mother-to-child HIV transmission in eight African countries. *AIDS* 2004; **18**: 1661-1671 [PMID: 15280777]
- 22 **Read JS**, Newell MK. Efficacy and safety of cesarean delivery for prevention of mother-to-child transmission of HIV-1. *Cochrane Database Syst Rev* 2005; **(4)**: CD005479 [PMID: 16235405 DOI: 10.1002/14651858.CD005479]
- 23 **Coutsoudis A**, Dabis F, Fawzi W, Gaillard P, Haverkamp G, Harris DR, Jackson JB, Leroy V, Meda N, Msellati P, Newell ML, Nsuati R, Read JS, Wiktor S. Late postnatal transmission of HIV-1 in breast-fed children: an individual patient data meta-analysis. *J Infect Dis* 2004; **189**: 2154-2166 [PMID: 15181561 DOI: 10.1086/420834]
- 24 **Committee on Pediatric AIDS**. Infant feeding and transmission of human immunodeficiency virus in the United States. *Pediatrics* 2013; **131**: 391-396 [PMID: 23359577 DOI: 10.1542/peds.2012-3543]
- 25 **Larsson EC**, Thorson AE, Pariyo G, Waiswa P, Kadobera D, Marrone G, Ekström AM. Missed Opportunities: barriers to HIV testing during pregnancy from a population based cohort study in rural Uganda. *PLoS One* 2012; **7**: e37590 [PMID: 22916089 DOI: 10.1371/journal.pone.0037590]
- 26 **Havens PL**, Mofenson LM. Evaluation and management of the infant exposed to HIV-1 in the United States. *Pediatrics* 2009; **123**: 175-187 [PMID: 19117880 DOI: 10.1542/peds.2008-3076]
- 27 **Wade NA**, Zielinski MA, Butsashvili M, McNutt LA, Warren BL, Glaros R, Cheku B, Pulver W, Pass K, Fox K, Novello AC, Birkhead GS. Decline in perinatal HIV transmission in New York State (1997-2000). *J Acquir Immune Defic Syndr* 2004; **36**: 1075-1082 [PMID: 15247561]
- 28 **Centers for Disease Control and Prevention (CDC)**. HIV testing trends in the United States, 2000-2011, 2013. Available from: URL: http://www.cdc.gov/hiv/pdf/testing_trends.pdf
- 29 **Remis RS**, Merid MF, Palmer RW, Whittingham E, King SM, Danson NS, Vernich L, Swantee C, Major C. High uptake of HIV testing in pregnant women in Ontario, Canada. *PLoS One* 2012; **7**: e48077 [PMID: 23152762 DOI: 10.1371/journal.pone.0048077]
- 30 **UNICEF**. Wide political support for eliminating 90 per cent of new HIV infections in children is yielding impressive results, 2014. Available from: URL: <http://www.data.unicef.org/hiv-aids/emtct>
- 31 **Peltzer K**, Mlambo G, Phaweni K. Factors determining prenatal HIV testing for prevention of mother to child transmission of HIV in Mpumalanga, South Africa. *AIDS Behav* 2010; **14**: 1115-1123 [PMID: 20049520 DOI: 10.1007/s10461-009-9662-7]
- 32 **WHO**; UNAIDS; UNICEF. Global HIV/AIDS response. Epidemic update and health sector progress towards universal access. Progress report 2011. Geneva: WHO, 2011. Available from: URL: http://www.who.int/hiv/pub/progress_report2011/en/
- 33 **Kizito D**, Woodburn PW, Kesande B, Ameke C, Nabulime J, Muwanga M, Grosskurth H, Elliott AM. Uptake of HIV and syphilis testing of pregnant women and their male partners in a programme for prevention of mother-to-child HIV transmission in Uganda. *Trop Med Int Health* 2008; **13**: 680-682 [PMID: 18331533 DOI: 10.1111/j.1365-3156.2008.02052.x]
- 34 **Chandisarewa W**, Stranix-Chibanda L, Chirapa E, Miller A, Simoyi M, Mahomva A, Maldonado Y, Shetty AK. Routine offer of antenatal HIV testing ("opt-out" approach) to prevent mother-to-child transmission of HIV in urban Zimbabwe. *Bull World Health Organ* 2007; **85**: 843-850 [PMID: 18038074 DOI: 10.2471/BLT.06.035188]
- 35 **Obermeyer CM**, Osborn M. The utilization of testing and counseling for HIV: a review of the social and behavioral evidence. *Am J Public Health* 2007; **97**: 1762-1774 [PMID: 17761565 DOI: 10.2105/AJPH.2006.096263]
- 36 **Li C**, Yang L, Kong J. Cognitive factors associated with the willingness for HIV testing among pregnant women in China. *Chin Med J (Engl)* 2014; **127**: 3423-3427 [PMID: 25269906]
- 37 **Moges Z**, Amberbir A. Factors Associated with Readiness to VCT Service Utilization among Pregnant Women Attending Antenatal Clinics in Northwestern Ethiopia: A Health Belief Model Approach. *Ethiop J Health Sci* 2011; **21**: 107-115 [PMID: 22435013]
- 38 **Okonkwo KC**, Reich K, Alabi AI, Umeike N, Nachman SA. An evaluation of awareness: attitudes and beliefs of pregnant Nigerian women toward voluntary counseling and testing for HIV. *AIDS Patient Care STDS* 2007; **21**: 252-260 [PMID: 17461720 DOI: 10.1089/apc.2006.0065]
- 39 **Raba G**, Skret-Magierlo J, Skret A. Knowledge about HIV infection and acceptability of HIV testing among women delivered in Podkarpackie Province, Poland. *Int J Gynaecol Obstet* 2010; **108**: 108-110 [PMID: 19892331 DOI: 10.1016/j.ijgo.2009.08.024]
- 40 **Rogers A**, Meundi A, Amma A, Rao A, Shetty P, Antony J, Sebastian D, Shetty P, Shetty AK. HIV-related knowledge, attitudes, perceived benefits, and risks of HIV testing among pregnant women in rural Southern India. *AIDS Patient Care STDS* 2006; **20**: 803-811 [PMID: 17134354 DOI: 10.1089/apc.2006.20.803]
- 41 **Mahmoud MM**, Nasr AM, Gasmelseed DE, Abdalrhafiz MA, Elsheikh MA, Adam I. Knowledge and attitude toward HIV voluntary counseling and testing services among pregnant women attending an antenatal clinic in Sudan. *J Med Virol* 2007; **79**: 469-473 [PMID: 17385672 DOI: 10.1002/jmv.20850]
- 42 **de Paoli MM**, Manongi R, Klepp KI. Factors influencing acceptability of voluntary counselling and HIV-testing among pregnant women in Northern Tanzania. *AIDS Care* 2004; **16**: 411-425 [PMID: 15203410 DOI: 10.1080/09540120410001683358]
- 43 **Dube FN**, Nkosi ZZ. The acceptability, knowledge and perceptions of pregnant women toward HIV testing in pregnancy at Ilembe District. *Curationis* 2008; **31**: 12-20 [PMID: 19177966 DOI: 10.4102/curationis.v31i3.1011]
- 44 **Njau B**, Ostermann J, Brown D, Mühlbacher A, Reddy E, Thielman N. HIV testing preferences in Tanzania: a qualitative exploration of the importance of confidentiality, accessibility, and quality of service. *BMC Public Health* 2014; **14**: 838 [PMID: 25124140 DOI: 10.1186/1471-2458-14-838]
- 45 **Deblonde J**, De Koker P, Hamers FF, Fontaine J, Luchters S, Temmerman M. Barriers to HIV testing in Europe: a systematic review. *Eur J Public Health* 2010; **20**: 422-432 [PMID: 20123683 DOI: 10.1093/eurpub/ckp231]
- 46 **Centers for Disease Control and Prevention (CDC)**. Introduction of routine HIV testing in prenatal care--Botswana, 2004. *MMWR Morb Mortal Wkly Rep* 2004; **53**: 1083-1086 [PMID: 15565017]
- 47 **Creek TL**, Ntuny R, Seipone K, Smith M, Mogodi M, Smit M, Legwaila K, Molokwane I, Tebele G, Mazhani L, Shaffer N, Kilmarx PH. Successful introduction of routine opt-out HIV testing in antenatal care in Botswana. *J Acquir Immune Defic Syndr* 2007; **45**: 102-107 [PMID: 17460473]
- 48 **Hensen B**, Baggaley R, Wong VJ, Grabbe KL, Shaffer N, Lo YR, Hargreaves J. Universal voluntary HIV testing in antenatal care settings: a review of the contribution of provider-initiated testing & counselling. *Trop Med Int Health* 2012; **17**: 59-70 [PMID: 22032300 DOI: 10.1111/j.1365-3156.2011.02893.x]
- 49 **Hallmark CJ**, Skillicorn J, Giordano TP, Davila JA, McNeese M, Rocha N, Smith A, Cooper S, Castel AD. HIV testing

- implementation in two urban cities: practice, policy, and perceived barriers. *PLoS One* 2014; **9**: e110010 [PMID: 25310462 DOI: 10.1371/journal.pone.0110010]
- 50 **Riskin-Mashiach S.** Is there justification to operate a program of screening tests for human immunodeficiency virus (HIV) among pregnant women in Israel? *Harefuah* 2014; **153**: 27-30
 - 51 **Gal I.** Soon: HIV test for every pregnant woman, 2014. Available from: URL: <http://www.ynet.co.il/articles/0,7340,L-4485461,00.html>
 - 52 **Thorsen VC, Sundby J, Martinson F.** Potential initiators of HIV-related stigmatization: ethical and programmatic challenges for PMTCT programs. *Dev World Bioeth* 2008; **8**: 43-50 [PMID: 18302543 DOI: 10.1111/j.1471-8847.2008.00227.x]
 - 53 **Brickley DB, Le Dung Hanh D, Nguyet LT, Mandel JS, Giang le T, Sohn AH.** Community, family, and partner-related stigma experienced by pregnant and postpartum women with HIV in Ho Chi Minh City, Vietnam. *AIDS Behav* 2009; **13**: 1197-1204 [PMID: 19085100 DOI: 10.1007/s10461-008-9501-2]
 - 54 **Dinh TH, Detels R, Nguyen MA.** Factors associated with declining HIV testing and failure to return for results among pregnant women in Vietnam. *AIDS* 2005; **19**: 1234-1236 [PMID: 15990581]
 - 55 **Kebaabetswe PM.** Barriers to participation in the prevention of mother-to-child HIV transmission program in Gaborone, Botswana a qualitative approach. *AIDS Care* 2007; **19**: 355-360 [PMID: 17453569 DOI: 10.1080/09540120600942407]
 - 56 **Minnie K, Klopfer H, van der Walt C.** Factors contributing to the decision by pregnant women to be tested for HIV. *Health SA Gesondheid* 2008; **13**: 50-65 [DOI: 10.4102/hsag.v13i4.404]
 - 57 **Peltzer K, Mosala T, Shisana O, Nqueko A, Mngqundaniso N.** Barriers to prevention of HIV transmission from mother to child (PMTCT) in a resource poor setting in the Eastern Cape, South Africa. *Afr J Reprod Health* 2007; **11**: 57-66 [PMID: 17982948 DOI: 10.2307/30032488]
 - 58 **Perez F, Zvandiza C, Engelsmann B, Dabis F.** Acceptability of routine HIV testing ("opt-out") in antenatal services in two rural districts of Zimbabwe. *J Acquir Immune Defic Syndr* 2006; **41**: 514-520 [PMID: 16652062 DOI: 10.1097/01.qai.0000191285.70331.a0]
 - 59 **Turan JM, Bukusi EA, Onono M, Holzemer WL, Miller S, Cohen CR.** HIV/AIDS stigma and refusal of HIV testing among pregnant women in rural Kenya: results from the MAMAS Study. *AIDS Behav* 2011; **15**: 1111-1120 [PMID: 20827573 DOI: 10.1007/s10461-010-9798-5]
 - 60 **Kominami M, Kawata K, Ali M, Meena H, Ushijima H.** Factors determining prenatal HIV testing for prevention of mother to child transmission in Dar Es Salaam, Tanzania. *Pediatr Int* 2007; **49**: 286-292 [PMID: 17445058 DOI: 10.1111/j.1442-200X.2007.02355.x]
 - 61 **Ben Natan M, Kuttygaro R.** Predictors of women's intention to be screened for HIV during pregnancy. *JANAC* 2014; In press
 - 62 **Mirkuzie AH, Sisay MM, Moland KM, Aström AN.** Applying the theory of planned behaviour to explain HIV testing in antenatal settings in Addis Ababa - a cohort study. *BMC Health Serv Res* 2011; **11**: 196 [PMID: 21851613 DOI: 10.1186/1472-6963-11-196]
 - 63 **Bajunirwe F, Muzoora M.** Barriers to the implementation of programs for the prevention of mother-to-child transmission of HIV: a cross-sectional survey in rural and urban Uganda. *AIDS Res Ther* 2005; **2**: 10 [PMID: 16255776 DOI: 10.1186/1742-6405-2-10]
 - 64 **Ekabua JE, Oyo-Ita AE, Ogaji DS, Omuemu VO.** KAP of HIV prevention and screening among pregnant women attending specialist antenatal clinics in Calabar, Nigeria. *Niger J Med* 2006; **15**: 409-412 [PMID: 17111727 DOI: 10.4314/njm.v15i4.37256]
 - 65 **Martin-Herz SP, Shetty AK, Bassett MT, Ley C, Mhazo M, Moyo S, Herz AM, Katzenstein D.** Perceived risks and benefits of HIV testing, and predictors of acceptance of HIV counselling and testing among pregnant women in Zimbabwe. *Int J STD AIDS* 2006; **17**: 835-841 [PMID: 17212862 DOI: 10.1258/095646206779307630]
 - 66 **Dahl V, Mellhammar L, Bajunirwe F, Björkman P.** Acceptance of HIV testing among women attending antenatal care in south-western Uganda: risk factors and reasons for test refusal. *AIDS Care* 2008; **20**: 746-752 [PMID: 18576178 DOI: 10.1080/09540120701693990]
 - 67 **Pignatelli S, Simpore J, Pietra V, Ouedraogo L, Conombo G, Saleri N, Pizzocolo C, De Iaco G, Tall F, Ouiminga A, Carosi G, Castelli F.** Factors predicting uptake of voluntary counselling and testing in a real-life setting in a mother-and-child center in Ouagadougou, Burkina Faso. *Trop Med Int Health* 2006; **11**: 350-357 [PMID: 16553915 DOI: 10.1111/j.1365-3156.2006.01564.x]
 - 68 **Sarker M, Sanou A, Snow R, Ganame J, Gondos A.** Determinants of HIV counselling and testing participation in a prevention of mother-to-child transmission programme in rural Burkina Faso. *Trop Med Int Health* 2007; **12**: 1475-1483 [PMID: 18076555 DOI: 10.1111/j.1365-3156.2007.01956.x]
 - 69 **Blanc AK.** The effect of power in sexual relationships on sexual and reproductive health: an examination of the evidence. *Stud Fam Plann* 2001; **32**: 189-213 [PMID: 11677692 DOI: 10.1111/j.1728-4465.2001.00189.x]
 - 70 **Munya SE, Mbizvo E, Uriyo J, Stray-Pedersen B, Sam NE, Hussain A.** Predictors of failure to return for HIV test results among pregnant women in Moshi, Tanzania. *J Acquir Immune Defic Syndr* 2006; **43**: 85-90 [PMID: 16878044 DOI: 10.1097/01.qai.0000225016.50890.7e]
 - 71 **Maedot P, Haile A, Lulseged S, Belachew A.** Determinants of vct uptake among pregnant women attending two ANC clinics in Addis Ababa City: unmatched case control study. *Ethiop Med J* 2007; **45**: 335-342 [PMID: 18326343]
 - 72 **Iliyasu Z, Kabir M, Galadanci HS, Abubakar IS, Aliyu MH.** Awareness and attitude of antenatal clients towards HIV voluntary counselling and testing in Aminu Kano Teaching Hospital, Kano, Nigeria. *Niger J Med* 2005; **14**: 27-32 [PMID: 15832639]
 - 73 **Lee K, Cheung WT, Kwong VS, Wan WY, Lee SS.** Access to appropriate information on HIV is important in maximizing the acceptance of the antenatal HIV antibody test. *AIDS Care* 2005; **17**: 141-152 [PMID: 15763710 DOI: 10.1080/09540120512331325644]
 - 74 **Worku G, Enquselassie F.** Factors determining acceptance of voluntary HIV counseling and testing among pregnant women attending antenatal clinic at army hospitals in Addis Ababa. *Ethiop Med J* 2007; **45**: 1-8 [PMID: 17642152]
 - 75 **Hesketh T, Duo L, Li H, Tomkins AM.** Attitudes to HIV and HIV testing in high prevalence areas of China: informing the introduction of voluntary counselling and testing programmes. *Sex Transm Infect* 2005; **81**: 108-112 [PMID: 15800085 DOI: 10.1136/sti.2004.009704]
 - 76 **Mpairwe H, Muhangi L, Namujju PB, Kisitu A, Tumusiime A, Muwanga M, Whitworth JA, Onyango S, Biryahwaho B, Elliott AM.** HIV risk perception and prevalence in a program for prevention of mother-to-child HIV transmission: comparison of women who accept voluntary counseling and testing and those tested anonymously. *J Acquir Immune Defic Syndr* 2005; **39**: 354-358 [PMID: 15980698]
 - 77 **Stokes SH, McMaster P, Ismail KM.** Acceptability of perinatal rapid point-of-care HIV testing in an area of low HIV prevalence in the UK. *Arch Dis Child* 2007; **92**: 505-508 [PMID: 17293365 DOI: 10.1136/adc.2006.106070]
 - 78 **Thierman S, Chi BH, Levy JW, Sinkala M, Goldenberg RL, Stringer JS.** Individual-level predictors for HIV testing among antenatal attendees in Lusaka, Zambia. *Am J Med Sci* 2006; **332**: 13-17 [PMID: 16845236]
 - 79 **Ekanem EE, Gbadegesin A.** Voluntary counselling and testing (VCT) for Human Immunodeficiency Virus: a study on acceptability by Nigerian women attending antenatal clinics. *Afr J Reprod Health* 2004; **8**: 91-100 [PMID: 15623124]
 - 80 **Baiden F, Remes P, Baiden R, Williams J, Hodgson A, Boelaert M, Buve A.** Voluntary counseling and HIV testing for pregnant women in the Kassena-Nankana district of northern Ghana: is couple counseling the way forward? *AIDS Care* 2005; **17**: 648-657 [PMID: 16036251 DOI: 10.1080/09540120412331319688]
 - 81 **Teeraratkul A, Simonds RJ, Asavapiriyant S, Chalermchokcharoenkit A, Vanprapa N, Chotpitayasonondh T, Mock PA, Skunodum N, Neeyapun K, Jetsawang B, Culnane M, Tappero**

- J. Evaluating programs to prevent mother-to-child HIV transmission in two large Bangkok hospitals, 1999-2001. *J Acquir Immune Defic Syndr* 2005; **38**: 208-212 [PMID: 15671807]
- 82 **Painter TM**, Diaby KL, Matia DM, Lin LS, Sibailly TS, Kouassims MK, Ekpini ER, Roels TH, Wiktor SZ. Sociodemographic factors associated with participation by HIV-1-positive pregnant women in an intervention to prevent mother-to-child transmission of HIV in Cote d'Ivoire. *Int J STD AIDS* 2005; **16**: 237-242 [PMID: 15829025 DOI: 10.1258/0956462053420158]
- 83 **Matovu JK**, Gray RH, Makumbi F, Wawer MJ, Serwadda D, Kigozi G, Sewankambo NK, Nalugoda F. Voluntary HIV counseling and testing acceptance, sexual risk behavior and HIV incidence in Rakai, Uganda. *AIDS* 2005; **19**: 503-511 [PMID: 15764856]
- 84 **Holmes C**, Preko P, Bolds R, Baidoo J, Jolly P. Acceptance of Voluntary Counselling, Testing and Treatment for HIV Among Pregnant Women in Kumasi, Ghana. *Ghana Med J* 2008; **42**: 8-15 [PMID: 18560557]
- 85 **Enosolease ME**, Offor E. Acceptance rate of HIV testing among women seeking induced abortion in Benin City, Nigeria. *Afr J Reprod Health* 2004; **8**: 86-90 [PMID: 15623123]
- 86 **Fabiani M**, Cawthorne A, Nattabi B, Ayella EO, Ogwang M, Declich S. Investigating factors associated with uptake of HIV voluntary counselling and testing among pregnant women living in North Uganda. *AIDS Care* 2007; **19**: 733-739 [PMID: 17573592 DOI: 10.1080/09540120601087731]
- 87 **Barragán M**, Hicks G, Williams MV, Franco-Paredes C, Duffus W, del Rio C. Low health literacy is associated with HIV test acceptance. *J Gen Intern Med* 2005; **20**: 422-425 [PMID: 15963165 DOI: 10.1111/j.1525-1497.2005.40128.x]
- 88 **Fernández MI**, Collazo JB, Bowen GS, Varga LM, Hernandez N, Perrino T. Predictors of HIV testing and intention to test among Hispanic farmworkers in South Florida. *J Rural Health* 2005; **21**: 56-64 [PMID: 15667010 DOI: 10.1111/j.1748-0361.2005.tb00062.x]
- 89 **Mfundisi C**, Chiranjan N, Rodrigues C, Kirchner L, Bock P, Myer L. Availability of antiretroviral therapy is associated with increased uptake of HIV testing services. *S Afr Med J* 2005; **95**: 483-485 [PMID: 16156445]
- 90 **Anand A**, Shiraishi RW, Sheikh AA, Marum LH, Bolu O, Mutsotso W, Sabin K, Ayisi R, Diaz T. Site factors may be more important than participant factors in explaining HIV test acceptance in the prevention of mother-to-child HIV transmission programme in Kenya, 2005. *Trop Med Int Health* 2009; **14**: 1215-1219 [PMID: 19708898 DOI: 10.1111/j.1365-3156.2009.02367.x]
- 91 **Homsy J**, Kalanya JN, Obonyo J, Ojwang J, Mugumya R, Opio C, Mermin J. Routine intrapartum HIV counseling and testing for prevention of mother-to-child transmission of HIV in a rural Ugandan hospital. *J Acquir Immune Defic Syndr* 2006; **42**: 149-154 [PMID: 16760796 DOI: 10.1097/01.qai.0000225032.52766.c2]
- 92 **Kasenga F**, Byass P, Emmelin M, Hurtig AK. The implications of policy changes on the uptake of a PMTCT programme in rural Malawi: first three years of experience. *Glob Health Action* 2009; **2**: [PMID: 20027274 DOI: 10.3402/gha.v2i0.1883]
- 93 **Lindgren ML**, Kennedy CE, Bain-Brickley D, Azman H, Creanga AA, Butler LM, Spaulding AB, Horvath T, Kennedy GE. Integration of HIV/AIDS services with maternal, neonatal and child health, nutrition, and family planning services. *Cochrane Database Syst Rev* 2012; **9**: CD010119 [PMID: 22972150 DOI: 10.1002/14651858.CD010119]
- 94 **van't Hoog AH**, Mbori-Ngacha DA, Marum LH, Otieno JA, Misore AO, Nganga LW, Decock KM. Preventing mother-to-child transmission of HIV in Western Kenya: operational issues. *J Acquir Immune Defic Syndr* 2005; **40**: 344-349 [PMID: 16249710]
- 95 **Chopra M**, Doherty T, Jackson D, Ashworth A. Preventing HIV transmission to children: quality of counselling of mothers in South Africa. *Acta Paediatr* 2005; **94**: 357-363 [PMID: 16028656 DOI: 10.1111/j.1651-2227.2005.tb03080.x]
- 96 **Delva W**, Mutunga L, Quaghebeur A, Temmerman M. Quality and quantity of antenatal HIV counselling in a PMTCT programme in Mombasa, Kenya. *AIDS Care* 2006; **18**: 189-193 [PMID: 16546777 DOI: 10.1080/09540120500456425]
- 97 **Varga C**, Brookes H. Factors influencing teen mothers' enrollment and participation in prevention of mother-to-child HIV transmission services in Limpopo Province, South Africa. *Qual Health Res* 2008; **18**: 786-802 [PMID: 18503020 DOI: 10.1177/1049732308318449]
- 98 **Wang FL**, Larke B, Gabos S, Hanrahan A, Schopflocher D. Potential factors that may affect acceptance of routine prenatal HIV testing. *Can J Public Health* 2005; **96**: 60-64 [PMID: 15682699]

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