Review Article

Vertical Transmission of HIV in Sub-Saharan Africa: Applying Theoretical Frameworks to Understand Social Barriers to PMTCT

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In sub-Saharan Africa, over 1,000 newborns are infected with HIV every day, despite available medical interventions. Pediatric HIV is a large contributor to the high rates, the largest in the world, of infant and child mortality in this region. Prevention of mother-to-child transmission of HIV (PMTCT) can dramatically reduce the risk of infection for the infant during pregnancy, childbirth, and breastfeeding. Throughout most urban areas of Africa, free medications are readily available. However, approximately 50% of HIV-positive pregnant women in sub-Saharan Africa are not accessing or adhering to the necessary medications to prevent mother-to-child transmission. In order for this region to eliminate the vertical transmission of HIV and meet the Millennium Development Goals, interventions need to move beyond the individual-level and address the structural and social barriers preventing women from utilizing PMTCT services. This paper reviews current literature on PMTCT interventions in sub-Saharan Africa from 2006–2012, specifically examining theoretical underpinnings. Overwhelmingly, the approach has been education and counseling. This paper calls to action a paradigm shift to a social ecological approach that addresses barriers at all societal levels, especially gender inequality, enabling a much greater impact on mother-to-child transmission of HIV.

1. Introduction

Worldwide, 1% of pregnant women are HIV-positive. However, sub-Saharan Africa where 95% of HIV-positive women live carries the vast majority of this burden [1]. Without treatment, approximately 25%–50% of HIV-positive mothers will transmit the virus to their newborns during pregnancy, childbirth, or breastfeeding [2]. In 2007, over 2 million children worldwide were living with HIV/AIDS, with the overwhelming majority again in sub-Saharan Africa [3, 4]. Approximately 400,000 infants contract HIV from their mother every year, which is about 15% of the total global HIV incidence [5–7]. The rate of pediatric HIV infections in sub-Saharan Africa remains unacceptably high, with over 1,000 newborns infected with HIV per day [8].

Pediatric HIV is a large contributor to the excessive infant and child mortality rates in sub-Saharan Africa. The life expectancy of HIV-positive infants is extremely short. One-third of HIV-positive infants is estimated to die before their first birthday and over one-half will die by their second birthday [9, 10]. Annually, there are approximately 260,000 pediatric deaths due to AIDS-related illnesses [7]. AIDS remains one of the leading causes of death among children under the age of five years in sub-Saharan Africa [11].

Mother-to-child transmission (i.e., vertical transmission) of HIV is almost completely preventable through a set of interventions referred to as prevention of mother-to-child transmission (PMTCT). PMTCT begins during antenatal care (ANC) when the woman is tested for HIV and receives the result that she is HIV positive. The recommendation in sub-Saharan Africa is for the woman to then take medication throughout pregnancy, during labor, and the postnatal period while exclusively breastfeeding. The infant must also undergo periodic HIV testing and take medication to prevent transmission of the virus while he/she is breastfed.

PMTCT can reduce the risk of vertical transmission of HIV to less than 1% [2]. Mother-to-child transmission has almost been eradicated in the United States and Europe, but continues to be a largely uncontrolled problem in African countries [5]. In 2001, the UN General Assembly committed to reduce mother-to-child transmission by 20% by 2005 and by an additional 50% by 2010. The vast majority of countries...
in sub-Saharan Africa, however, have not been able to meet these goals [12]. Improving access and utilization to PMTCT in this region is an essential component of addressing the global HIV/AIDS pandemic and to achieving Millennium Development Goals 4, 5, and 6.

PMTCT utilization in sub-Saharan Africa has significantly increased over the past decade but is still far from universal. In 2003, only 3% of HIV-positive pregnant women in this region utilized PMTCT. This percentage dramatically increased to 33% in 2007 and 53% in 2010 [5, 12]. Unfortunately, this still leaves about half of all HIV-positive pregnant women not utilizing PMTCT, putting them at high risk for transmitting the virus to their infants. The global health community’s efforts to eliminate mother-to-child transmission has been primarily focused on scaling up biomedical services with little examination of the social barriers that may be preventing women from utilizing and adhering to PMTCT. “Despite technical means and political will, the percentage of pregnant women involved in PMTCT interventions is not increasing as fast as public health authorities, health professionals, and scientists would expect” [5, page 807].

There is a current lack of analysis regarding the social structures in place hindering HIV-positive mothers’ PMTCT behavior. In order to eliminate mother-to-child transmission of HIV, the context in which HIV-positive mothers make decisions regarding adherence to PMTCT needs to be better understood and addressed. This analytic paper uses theoretical frameworks from public health and social science to highlight how barriers to PMTCT have typically been understood and applied. In addition, the paper suggests a more comprehensive theory-based approach to understand underutilization and nonadherence to PMTCT.

2. Methods

From May 10th to June 25th, 2012, the author conducted an online review of PMTCT literature from sub-Saharan Africa using Pubmed, Web of Science, and Google Scholar databases. Search terms include: “PMTCT Africa,” “Pediatric HIV Africa,” and “mother-to-child transmission Africa.” The review was restricted to publication dates between 2006 and 2012 to provide the most recent and relevant research. Only articles published in English were included. A review of previous findings was conducted with specific examination of public health or social science theory in the application of PMTCT interventions or study results within sub-Saharan Africa.

3. Results

3.1. Individual-Level Theories and Constructs. The Health Belief Model has been used extensively in PMTCT literature as a conceptual framework for women’s health-seeking behavior and to inform interventions. The Health Belief Model construct of perceived susceptibility has been used to explain mothers’ acceptance of HIV testing, receiving the result, and believing that her infant is susceptible to contracting HIV through vertical transmission [13, 14]. Perceived benefits are related to mothers’ knowledge and belief that PMTCT interventions are beneficial and effective in preventing mother-to-child transmission [13], which is not a universal belief across sub-Saharan Africa.

Perceived barriers are the most widely addressed Health Belief construct in the literature and the most influential piece for PMTCT utilization. Perceived barriers are defined as a cost-benefit analysis that the individual will make, influencing her decisions [15]. Does the mother believe that the benefit of adhering to PMTCT outweighs the costs/barriers? Established barriers in the literature for PMTCT adherence include fear of knowing one’s own HIV status; stigma and discrimination of HIV status being disclosed to partner, family, or the community; opposition of the male intimate partner [16, 17].

Perceived self-efficacy indicates the woman’s level of confidence that she is able to complete the steps necessary for PMTCT adherence [18]. A PMTCT intervention in South Africa used this construct as one of its main outcome measures. The authors found that HIV-positive pregnant women who participated in the Mothers2Mothers intervention were “significantly more likely to feel that they could do things to help themselves” and to “feel less overwhelmed by problems” [8]. However, this report did not indicate if the mother’s beliefs were actually translated into health seeking behavior regarding PMTCT or adherence to medication.

Interventions that use the Health Belief Model framework typically attempt to increase knowledge through education and counseling as the “cue to action” for mothers [13, 18]. For example, a study from 2009 concluded that using the constructs of (1) perceived benefits and (2) cues to action may increase HIV testing during antenatal care (ANC), which is the first step of PMTCT. The author states that a “major information campaign focused on the advantages for pregnant women and their future children of knowing HIV status” is recommended [5, page 810]. However, in many sub-Saharan African countries, widespread PMTCT campaigns are already in place [2, 10], yet there is still poor utilization. For example, in Zambia, over 89% of women in 2007 knew that HIV can be transmitted by breastfeeding [19]; however, only approximately 21% in 2009 took ARVs while breast feeding [20].

The Information Motivation Behavior model was developed specifically to address HIV prevention efforts. The model applies psychosocial concepts and methodologies to create behavior change. The model focuses on increasing individuals inclination and “ability to practice risk-reduction acts” [21, page 25]. The model affirms that HIV prevention information, motivation, and behavioral skills are the “fundamental determinants of HIV preventative behavior” [21, page 26]. Most of the Information Motivation Behavior-specific interventions have focused on increasing safe sex and adult HIV testing. However, the constructs are also applicable to PMTCT and have been implied in several studies.

Constructs from this model are the basis for PMTCT counseling interventions during ANC that are widespread throughout sub-Saharan Africa [12, 22]. Many interventions have attempted to provide mothers with information and increase motivation regarding PMTCT through counseling
during ANC visits. The lack of quality counseling has been cited as a reason for poor utilization and adherence. A study in Nyanza, Kenya found that “inadequate counseling services delivered to (pregnant women) were found to affect (PMTCT) service utilization” [14, page 244].

The Theory of Planned Behavior is explicitly mentioned in the literature on PMTCT and constructs from Integrated Behavioral Model can be inferred. These models focus on individual motivating factors as the main determinants of health behavior. The major assumption in these frameworks is that intention is the best predictor of behavior [15].

Constructs of attitude, perceived norms, and personal agency are appropriate to an understanding of PMTCT utilization and have been referenced in many research articles. Several studies in sub-Saharan Africa have used qualitative methods to explore HIV-positive mothers’ attitudes (i.e., feelings about the behavior and behavioral beliefs) and perceived norm (i.e., other’s expectations, other’s behavior) regarding PMTCT [12, 16, 17, 22, 23]. Frequently, these constructs have been used to analyze pregnant women’s acceptance of HIV testing during ANC. Authors have found that intention to get tested has been limited, due to fear of knowing their status [16]; cost of services and confidentiality [17]; fear of stigma and discrimination [17, 22].

Igumbor et al. [13] explicitly use constructs from Theory of Planned Behavior to analyze a clinic-based health education intervention in South Africa. Their measures include “salient beliefs” and “behavioral intentions” to use PMTCT services [13, page 396]. Behavioral elements that the authors discuss are attitudes, normative beliefs, subjective norms, perceived control, outcome evaluation, motivation, and perceived power. Findings include that women consistently reported low-control beliefs and a weak association between PMTCT salient beliefs and behavioral intention [13, page 394]. The authors, unfortunately, did not measure actual behavioral outcomes.

Several authors have used Empowerment Theory or have advocated women’s empowerment based on their findings. Igumbor et al. [13] recommend expanding and enhancing interventions that empower women, in order to improve behavioral intention to use PMTCT. Besser [2, 8] also concludes that underutilization is related to women’s disempowerment. Mothers2Mothers is a PMTCT intervention that began in South Africa and has spread throughout numerous other sub-Saharan African countries. One of its goals is to “empower mothers living with HIV/AIDS, enabling them to fight stigma in their communities and to live positive and productive lives” [2, page 37]. Women’s empowerment appears to be an underemphasized, yet crucial, component of increasing PMTCT in sub-Saharan Africa.

3.2. Interpersonal Theories and Constructs. Interpersonal-level factors are especially relevant for the study of PMTCT utilization. Researchers who used individual-level approaches were generally unsuccessful in increasing uptake of PMTCT among HIV-positive pregnant women (e.g., see [13]). As mentioned previously, social stigma and discrimination are widely discussed as perceived barriers to PMTCT. In addition, fear of partner’s reaction or fear of violence/conflict with the woman’s partner may also prevent women from utilizing these services. Thus, theories regarding social networks and social support are useful in understanding the interpersonal influences on HIV-positive pregnant women’s decision-making and health-seeking behaviors.

Adherence to ART in general has been linked to notions of social capital and social responsibility [24]. Social Networks Theory is especially relevant to woman’s HIV status disclosure, which has been associated with significant improvements in PMTCT utilization [25, 26]. Social integration refers to the social ties that affect women’s decision making [15]. Awiti Ujiji et al. [23] found that the type of relational ties that exist between the HIV pregnant woman and her network determines disclosure of an HIV diagnosis. Social influence describes how the actions of others affect women’s thoughts and actions towards PMTCT [15]. Moth et al. [14] found that pregnant women did not disclose their HIV status to relatives for fear of stigma and discrimination. Lastly, social undermining is the expression of negative affect or criticisms from others [15] that may hinder pregnant women’s utilization of PMTCT. For example, pregnant women are often reluctant to disclose HIV status for fear of family exclusion [5].

Emotional (empathy, love, trust, and caring), instrumental (tangible aid and services), and appraisal (constructive feedback and affirmation) support from one’s partner also appears to affect women’s HIV status disclosure to their male partners and subsequent PMTCT utilization [15, 23]. Unfortunately, disclosure rates remain extremely low; a multi-site mixed methods study in Burkino Faso, Kenya, Malawi, and Uganda found that only 37% of HIV-positive pregnant women disclosed their HIV status to their husband [12]. One study found that a major deterrent to returning for HIV results among young women in South Africa was fear of partner’s reactions if the test were positive [22]. Msellati [5] also discusses that women are often reluctant to disclose their HIV diagnosis to their husband out of fear of the consequences, especially intimate partner violence.

4. Discussion

The major theoretical shortcomings in the current literature on PMTCT are the lack of an ecological approach and analysis of structural inequality. Health education and counseling, although not entirely ineffective, are the “least effective type of intervention” [27, page 592]. Socioeconomic factors (i.e., social determinants of health), which form “the basic foundation of a society”, have the greatest influence over health behaviors [27, page 591] and should be given greater priority in our approach to decrease pediatric HIV infections.

Very few papers or interventions from sub-Saharan Africa move beyond the individual or interpersonal level to explore the context of women’s behavior and decisions regarding PMTCT utilization. For example, the onus has traditionally been placed entirely on the choices and behavior of infected women [28, page 182]. However, this grossly
overestimates the personal agency and control of HIV-positive women, especially in populations that are historically patrilineal and have large inequalities in the sexual division of power. Without examining higher levels of the social ecology, we are limited in our understanding and ability to address barriers to PMTCT. The current literature has led to a “desocialization” and “decontextualization” of women’s health seeking behavior, unjustly leaving the sole responsibility to prevent vertical transmission on the infected mother [28, pages 172, 182, 198, 199].

Theoretical and applied literature needs to move beyond the individual and interpersonal levels to explain why women experience social barriers to PMTCT. There is a pressing need to take into account the sexual division of labor, the sexual division of power, and the structure of catheysis (e.g., social norms) in HIV-endemic countries. In addition, there is a lack of investigation into the imbalances in control power women experience in the family. The impact on PMTCT of gendered power imbalances that may be exhibited in the form of physical, emotional, or sexual violence in women’s intimate relationships has not been appropriately investigated.

Research and interventions that address multiple levels of influence (structural, societal, institutional, community, interpersonal) will have the greatest likelihood of creating effective behavior change [15]. The Social ecological model (i.e., ecological perspective) was created to examine and address human transactions within their physical and sociocultural environments [15]. The ecological perspective proposes that by adjusting the conditions in which individuals live and interact, we can alter health behaviors and health outcomes [29]. The main hypothesis of this theory is that structural factors, not individual factors, are critical determinants of health.

Intrapersonal factors have been widely addressed throughout the literature on uptake of PMTCT in sub-Saharan Africa, including mothers’ attitudes, perceptions, beliefs, and intentions, as seen in the individual-level theories discussed above. However, there is very limited evidence of success among interventions that have only addressed intrapersonal factors. One of the reasons that PMTCT remains underutilized is that the barriers women have discussed in numerous studies cannot be addressed solely through biomedical education and counseling efforts.

Interpersonal processes and primary groups have been recognized in the literature as being an influencing factor for HIV-positive pregnant women and new mothers. However, the interventions aimed at increasing PMTCT have again generally relied on targeting the individual with education and training messages. There has been some outreach recently in sub-Saharan Africa to involve men in PMTCT, which is a step in the right direction. A couple’s risk reduction intervention in South Africa found a significant increase in PMTCT uptake and adherence when men are involved [25]. There are no studies to my knowledge on extended family interventions, which could be promising, as many women discussed fear of disclosure to family members as a major barrier to PMTCT. Addressing stigma in communities, rather than spending money on mass-education campaigns, may be a more effective means of increasing PMTCT, based on HIV-positive women’s cited perceptions of fear around disclosure.

Institutional-level barriers to PMTCT, including stock-outs of drugs, lack of health care workers, and poor HIV counseling, have been widely addressed in the medical literature as well. This is a separate topic beyond the scope of this paper, since the author is primarily interested in social barriers to PMTCT instead of logistical constraints.

Lastly, public policy and the political economy are the largest influencing factors for almost all health-related behaviors, including PMTCT utilization and adherence. Public policy surrounding gender inequality is a largely missing piece from the PMTCT literature in sub-Saharan Africa. The cultural and social constraints on women’s behavior that may prevent them from accessing PMTCT interventions have not been thoroughly examined. In addition, research in sub-Saharan Africa regarding mother-to-child transmission rates has not been disaggregated by socioeconomic status (SES). Most sub-Saharan African countries suffer from absolute poverty, but there certainly are differing social classes and varying levels of access to health care based on SES.

The Theory of Gender and Power has mostly been applied to women’s risk of contracting HIV, but many of the constructs are also useful in our understanding of PMTCT behavior. In many sub-Saharan Africa populations, women hold very little power in their lives and decision-making. Women’s health outcomes and health-seeking behavior are intrinsically related to social structures of gender inequality. There are three different interlinked social structures that can be used to understand women’s risk (in this case, ability to utilize PMTCT): the sexual division of labor, the sexual division or power, and the structure of catheysis [21]. These societal factors are exhibited on the institutional level (e.g., work, school, family, relationships, church, medical system) and through social mechanisms (e.g., unequal pay and economic opportunity; imbalances in control power; constraints in expectations; disparities in norms) [21].

In addition, a structural violence perspective highlights the economic subordination that is a major constraint in the lives of millions of women in the developing world. The social forces that have the greatest constraint on human agency are gender and class [28, page 167]. PMTCT research and interventions aimed at that the individual incorrectly assume that HIV-positive women in sub-Saharan Africa have agency, when in reality, the living conditions and environment of “poverty and gender inequality erode personal agency” [28, page 202].

The barriers that women face to PMTCT stem from the broader macrolevel economic and social conditions [28]. Socioeconomic barriers include: persistent unequal power between men and women; legal discrimination against women; women’s low economic status; women’s low educational status; and domestic violence [28, pages 165-166]. Using a theoretical framework of structural justice, “the creation of policies and programs which improve women’s social status as well as their economic status” [28, page 166] would remove many of the social barriers HIV-positive women experience that prevent them from utilizing PMTCT.
5. Conclusion

What is needed currently in the research on mother-to-child transmission is a clear understanding of all the factors influencing underutilization and poor adherence to PMTCT. How and why are women's health-seeking behaviors constrained by gender, culture, public policy, and economic factors? Both biomedical and social approaches are needed to address the complex behavior of HIV-positive mothers' adherence to PMTCT. Instead of addressing only individual-level factors through education and counseling about medical interventions, we should also be targeting women's broader living conditions. Only through a combination of individual, community, and structural interventions will we achieve an AIDS-free generation, which requires the elimination of vertical transmission of HIV in sub-Saharan Africa.

References
