MALE PARTNER INVOLVEMENT IN THE REDUCTION OF MOTHER-TO-CHILD TRANSMISSION OF HIV IN MALAWI: A SECONDARY ANALYSIS USING THE 2010 MALAWI DEMOGRAPHIC HEALTH SURVEY (MDHS) DATA

by

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ABSTRACT

ROSELYNE REINE KEWE. Male partner involvement in the reduction of mother-to-child transmission of HIV in Malawi: A secondary data analysis using the 2010 Malawi Demographic Health Survey (MDHS) data. (Under the direction of DR. ELIZABETH RACINE)

Male partner involvement in maternal reproductive health has been demonstrated to be beneficial for both the mother and the child, yet male involvement in low and middle income countries of sub-Saharan Africa remain low. Many factors influence male involvement in the reduction of mother-to-child transmission of HIV, particularly the culture and the social norms. This study analyzed data from the 2010 Malawi Demographics and Health Survey to examine the association between male partner involvement and maternal HIV testing.

Logistic regression was used to examine the crude association between the male partner knowledge about the therapy of HIV and the expectant woman getting HIV tested. The results were statistically significant with odds ratios 2.06 and the 95% Confidence Intervals (1.26-3.37). However, after adjusting for the relevant covariates, education attainment, ethnicity, religion, religion, wealth quintile, it was found that the association between male partner involvement and the expectant women getting tested was attenuated and not statistically significantly (OR=1.56 and 95% CI: 0.94-2.58). These findings were inconsistent with previous studies. Further research in the area is needed using larger, nationally representative Malawian samples. Furthermore, more explicit categorization of our exposure variable is needed to confirm these findings.

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CHAPTER 1: INTRODUCTION

Three decades after the discovery of the Human Immunodeficiency Virus (HIV), low and middle income countries in sub-Saharan Africa continue to struggle with the pandemic. It represents one of the greatest public health challenges of our generation (Hodges-Mameletzis et al., 2011).

At the end of 2013, 35 million people worldwide were living with HIV/AIDS (World Health Organization (WHO), 2014). Of these, 3.2 million were children less than fifteen years old (WHO, 2014). Sub-Saharan Africa remains the most affected region with 24.7 million people living with HIV (WHO, 2014). Women account for 58% of the people living with HIV and more than 90% of pregnant women living with HIV reside in sub-Saharan Africa (Joint United Nations Program on HIV/AIDS (UNAIDS), 2013; UNAIDS, 2012). According to UNAIDS, in 2013, there were 210,000 new HIV infections among children in sub-Saharan Africa (UNAIDS, 2013). The majority of these children acquired the virus during pregnancy, labor, delivery or breastfeeding (Aizire, et al., 2013). Mother-to-child transmission of HIV, also called vertical transmission of HIV, remains the leading mode of transmission of HIV among children in sub-Saharan Africa (Aizire, et al., 2013). It is estimated that without any intervention, between 15- 45% of infants born to HIV-positive mothers will become infected and 50% of all infants infected with HIV will die before their second birthday in absence of treatment; while

intervention can reduce vertical transmission to less than 5% (United Nations Children's Fund (UNICEF), 2014) (WHO, 2010). Male involvement in the prevention of mother-to-child transmission of HIV has been recognized as one of the pivotal strategies for the uptake and the adherence of women to HIV services (Becker et al. 2010; Alusio et al. 2011). However, in many African countries, lack of male involvement remains a challenge negatively impacting the health of the women and the infants.

In 2013, the number of people living with HIV in Malawi was 1,000,000 with a prevalence rate of 10.3% (UNAIDS, 2013). Of these, 500,000 were women and 170,000 children (UNAIDS, 2013). Mother-to-child transmission is the second most common mode of transmission in Malawi, accounting for approximately 25% of new infections (UNAIDS, 2013). Malawi is one of the 22 countries with the highest estimated numbers of pregnant women living with HIV (UNAIDS, 2012).

In 2011, the Malawian government implemented a practical and innovative approach called “Option B+” for prevention of mother-to-child transmission of HIV (Center of Disease Control and Prevention (CDC), 2013). “Option B+” offers all HIV-positive pregnant or breastfeeding women antiretroviral treatment for their entire lives regardless of CD4 count or clinical stage. “Option B+” simplifies the antiretroviral treatment regimen to one pill a day making it easier for the patient to take and for the health care provider to implement. Not only does this approach help to ensure the reduction of mother-to-child transmission to less than 5% for all future pregnancies, but it also maintains the mother’s health, reduces HIV transmission to uninfected sexual

partners, and reduces the risk of children becoming orphaned (WHO, 2013). Also, the intervention strengthens the relationship between reproductive health and antiretroviral treatment programs; provides protection against mother-to-child transmission of HIV in future pregnancies; and decreases the risk of women stopping and re-starting antiretroviral treatment. One year after implementation of "Option B+", the number of HIV-positive pregnant and breastfeeding women on antiretroviral treatment increased by more than 700% in Malawi (MMWR, 2013).

Malawi has one of the highest rates of HIV/AIDS prevalence in Africa (Amouzou et al., 2014). Yet, Malawi has improved child survival in recent years, with an annual rate of reduction in under-five mortality at 5.6% (Amouzou et al., 2014). Designing and implementing prevention methods for mother-to-child transmission of HIV services, considering the social factors and cultural norms might encourage male partner participation in HIV prevention. Taking this approach, has the potential to increase the adherence of mother-to-child transmission of HIV prevention strategies among pregnant women, but also it will maintain the mother's health, reduce HIV transmission to uninfected sexual partners, and prevent the transmission of the virus to the infants.

CHAPTER 2: LITERATURE REVIEW

The literature review examined studies across sub-Saharan Africa and Malawi for the current knowledge on the topic. An overview of the global HIV epidemic and a particular accent on Malawi HIV epidemic was emphasized.

2.1 Malawi

The Republic of Malawi, well-known as Malawi, is a small landlocked country about the size of Pennsylvania. Malawi has an area of 118,500 square km. Located in southeast Africa, Malawi is bordered by Tanzania to the northeast, Zambia to the northwest, and Mozambique to the south, southwest and southeast. In 2013, the World Bank estimated the population of Malawi at 16.83 million (World Bank, 2014). The population is divided in different ethnic groups: Chewa 32.6%, Lomwe 17.6%, Yao 13.5%, Ngoni 11.5%, Tumbuka 8.8%, Nyanja 5.8%, Sena 3.6%, Tonga 2.1%, Ngonde 1%, other (Asian and Europeans) 3.5% (Central Intelligence Agency (CIA), 2014).

Malawi is predominately Christian (82.6%). Muslim population accounts for 13%; 1.9% practice different other religion and 2.5% are atheist (CIA, 2014). In 2011, life expectancy at birth for both women and men was 54 years old and infant mortality rate was estimated at 84 deaths per 1000 live births (CDC, 2013). Regardless of the high economic growth, poverty remains prevalent within the country. In 2013, the Human

Development Index ranked Malawi 170 out of 186 countries with a gross national income per capita of $320 in 2012 (World Bank, 2014).

2.2 Malawi and HIV/AIDS

The primary mode of HIV transmission in Malawi is unprotected heterosexual sex (Malawi Demographic Survey, 2010). Mother-to-child transmission is the second major mode of transmission, accounting for approximately 25% of new infections (UNAIDS, 2012). Intra-partum vertical transmission rates declined marginally from 16.5% in 2008 to 13.8% by the end of 2009; the decline was explained by the introduction of the National HIV and AIDS Action Framework (NAF) and the National HIV Prevention Strategy initiatives enacted in 2005 (Malawi Demographic Survey, 2010).

Extensive literature analysis to evaluate different perspectives on male involvement in prevention of mother-to-child transmission of HIV in Malawi yielded two main considerations: (1) the role of the male in women's health seeking behavior, and (2) the uptake of HIV testing by the expectant women and of other strategies to prevent mother-to-child transmission of HIV among pregnant women when male partners are involved.

2.3 The Role of Male Partners in Women's Health Seeking Behavior

Regardless of the improvement in medical knowledge and the health care system, women-seeking health care is not guaranteed. Assessing the factors that shape a woman's decision to get HIV testing is imperative. The opinion of the male partner is a factor that

may impact a woman's health seeking behavior. Male involvement in the prevention of mother-to-child transmission of HIV has been studied from different perspectives in sub-Saharan Africa.

Kululanga, Sundby, Malata and Chirwa (2012) investigated the involvement of male partners in the maternal health. The authors found that male involvement in the female partner's health care was associated with the earlier uptake of antenatal care and couple HIV counseling and testing (Kululanga, 2012). These findings were consistent with previous research examining male participation with women in voluntary counseling and testing for HIV (Wall et al. 2012; Musheke et al.2013). Male participation was viewed as supportive, an act of love from the partner and increased the likelihood that the women would take part in the different prevention of mother-to-child transmission of HIV activities (Kululanga et al. 2013; Musheke et al. 2013) Kalembo et al., 2013). Male partner's participation in prevention of mother-to-child transmission of HIV has been studied; however, their involvement continues to be low in sub-Saharan African countries (Alusio et al.2011; Byamugisha et al. 2011). There are numerous barriers that impede involvement of the male in prevention of mother-to-child transmission of HIV; related to social norms, cultural beliefs and the health care system (Ditekemena et al. 2012; Endawoke et al 2013; Morfaw et al. 2013; Adelekan et al. 2014).

For societal norms, several studies identified the lack of time that men had because they were busy making ends meet and were not willing to wait for long hours in the antenatal clinic (Morfaw et al.2013; Theuring et al. 2009). Among men, there was a lack of

information/knowledge noted in different studies (Adelekan et al. 2014; Byamugisha et al. 2010; Katz et al. 2009). The fear of being tested also emerged as a barrier to male involvement in women's antenatal care (Katz et al. 2009; Ditekemena et al. 2012). Cultural beliefs and customs were hindrances for male involvement. In Malawi and other African countries, men perceived the prevention of mother-to-child transmission of HIV clinics as the woman's responsibility. Across reviewed studies, men attending antenatal clinical services were viewed negatively by the community (Adelekan et al. 2014; Byamugisha et al. 2010, Falnes at al.2011). Men were perceived as over-protective and they were ostracized by other men (Kululanga et al. 2012; Morfaw et al.2013). The negative attitude of the health care personnel, the lack of space to accommodate women and their partners, perception of antenatal health services as male unfriendly and distrust of the health care system were recurrent findings in studies as barriers due to health care system (Ditekemena et al. 2012; Katz et al.2009; Morfaw et al. 2013). Ditekema and colleagues (2012) demonstrated that male involvement in voluntary counseling and testing is more successful in community venues such as bars and churches rather than health care facilities. These findings suggest that suitable venues that are male friendly could increase the male involvement in the prevention of mother-to-child prevention of HIV (Ditekemena et al., 2012).

Strategies based on the specific socio-cultural context might address these challenges of male involvement in prevention of mother-to-child transmission of HIV. Previous research has assessed strategies for male involvement such as extending an

invitation to men, providing information, education and communication (Kululanga et al., 2011; Nyondo et al, 2013). Extending an invitation in an envelope, addressed to the male partner, was the most widely accepted strategy; men perceived the strategy as respectful (Nyondo et al, 2013). The acceptability of male participation was linked to the cultural context as men perceived their acceptance as preservation of their masculinity (Kululanga et al. 2012; Nyondo et al., 2013). These findings were consistent with other research studies conducted in Tanzania, Kenya, Uganda and Malawi (Byamugisha et al. 2010; Katz et al. 2009; Nyondo et al. 2013; Theuring et al. 2009).

Information and education are strategies that showed an increased uptake of HIV testing (Akarro et al. 2011; Onsomu et al. 2013, Nyondo et al., 2013; Morfaw et al. 2013). Similarly, other studies conducted in Africa suggest education as a means to sensitize the male to participate in the prevention of mother-to-child transmission of HIV activities (Byamugisha et al. 2010; Theuring et al., 2009).

In a study by Ditekemena and colleagues (2012), inter-partnership communication between women and their male partner was associated with an increase of HIV therapy. Another facilitator to male involvement in the prevention of mother-to-child transmission of HIV was being in a monogamous relations and/or cohabitation. (Ditekemena et al., 2012). Likewise, older age, higher education attainment, higher profession and high income levels were associated with male involvement (Ditekemena et al., 2012). In mother and child health, and prevention of mother-to-child transmission of HIV, education attainment, higher profession and high income levels were also associated with

male involvement in mother and child health and in prevention of mother-to-child transmission of HIV (Ditekemena et al., 2012).

Couple counseling in antenatal clinics has been advocated by different African studies as one method for men involvement; however mixed results have been obtained (Falnes et al., 2011; Larsson et al., 2012). This might be due to men's perception of the antenatal clinics as women's territory or that pregnancy is viewed as the women responsibility (Falnes et al., 2011; Larsson et al. 2012).

Involving men in prevention of mother-to-child transmission of HIV has been demonstrated as a strategy to reduce the transmission of the virus to the infant; however, male participation continues to be low not only in Malawi, but in other African countries. Involving men will require a combination of multiple interdependent strategies, specifically cultural and gender acceptable activities. In addition, there was a need to reorganize health care services to accommodate both men and women.

2.4 The Uptake of HIV Testing and Other Prevention Mother-to-Child Transmission of HIV Intervention among Pregnant When Partner are Involved

In many parts of sub-Saharan Africa, high rates of refusal of HIV testing by pregnant women continue. The lack of disclosure of a positive HIV diagnosis to the partner and stigmatization of persons with HIV were two major barriers to women accessing testing or treatment (Duff et al. 2012; Turan et al. 2012). Women who anticipated male partner stigma were more than twice as likely to refuse HIV testing

(Duff et al. 2012; Turan et al. 2012). Anticipation of HIV-stigma was a barrier for the acceptance of HIV testing by pregnant woman (Duff et al. 2012; Turan et al. 2012). A study conducted in Uganda, found 50% of pregnant women refused HIV testing in a prevention of mother-to-child transmission of HIV setting due to the absence of male permission before being tested (Homsy et al., 2006).

Results varied for disclosure of HIV status. In a study conducted by Falnes and colleagues (2011), participants stated that they would confide their HIV positive diagnosis with their partners; however, the lack of disclosure of a positive HIV diagnosis to the partner was cited in different studies conducted in African countries (Reece et al. 2010; Duff et al. 2012; Falnes et al 2011). The reasons for not disclosing an HIV diagnosis were fear of abandonment, rejection, violence and loss of economic support (Duff et al., 2012). To reduce these barriers, male partner involvement may be important for pregnant women in the participation of mother-to-child transmission programs and for infant survival.

Carmone et al. (2014) examined the relationship between a parent-to-child transmission of HIV program and partner testing and infant outcome in the Highlands of Papua New Guinea. Authors found a significantly higher risk of infant death, infant HIV infection, and loss to follow-up among mother–infant pairs in which the mother reported having no partner or a partner who was not tested. Also, infants born to women with more time on antiretroviral treatment or who enrolled in the program in later years experienced greater survival. In addition, having a tested partner was associated with

program retention and infant survival (Carmone et al., 2014). Several studies mentioned the increased uptake of the core prevention mother-to-child transmission of HIV services by pregnant women due to male involvement (Busza et al. 2012; Carmone et al. 2014; Kalembo et al., 2013). Male presence was also critical in the prevention of HIV and avoidance of unintended pregnancy (Maman et al. 2008; Uganda, 2008).

Kalembo et al. (2013), examined the association between male partner involvement and the uptake of prevention of mother-to-child transmission of HIV interventions in Mwanza District, Malawi (Kalembo et al., 2013). Researchers found male partner involvement was significantly associated with the women completion of a follow-up program (Adjusted odds ratio [AOR] = 16.8, 95% CI: 8.5-33.4, $P<0.001$). The results show that male partner involvement increased the uptake of the prevention of mother-to-child transmission of HIV programs by HIV positive women. These findings were consistent with previous studies conducted in African countries (Becker et al. 2010; Alusio et al. 2011). Father involvement appeared to be associated with the entry and the retention of the women in prevention of mother-to-child transmission of HIV program.

Research advocated for the involvement of the male partner in the prevention of mother-to-child transmission of HIV in order to reduce the vertical transmission of HIV to infant and for the retention of the mother in the care (Adelekan et al. 2014; Busza et al. 2012; Bwirire et al. 2008; Katz at al. 2009; Kululanga et al. 2012; Nyondo et al. 2013.

CHAPTER 3: HYPOTHESIS

This study examined the association between male partner knowledge of the benefits of HIV testing and subsequent uptake of HIV testing by the pregnant woman in a nationally representative sample of Malawi during the 2010 Demographic Health Survey.

The following was the specific hypothesis addressed:

- Male partner knowledge about HIV therapy will be positively associated with the woman getting tested for the virus.

CHAPTER 4: CONCEPTUAL MODEL

The Social Ecological Model focused on the intertwined relationship existing between an individual and their environment (Glanz et al., 2008). The model allowed us to recognize that an individual's decisions and health behavior was influenced by social, physical and political factors encountered at the different levels encompassed in the Social Ecological Model (Mc Leroy et al., 1988). According to the Social Ecological Model, interventions were more effective when they target multiple levels to support health behavior change (Mc Leroy et al., 1988).

For this study, the Social Ecological Model of health behavior was applied. Kenneth Mc Leroy classifies different levels of influence on health behavior (Mc Leroy et al., 1988). The individual level included the knowledge of the pregnant women about her HIV status and prevention of mother-to-child transmission of the virus, her beliefs and fear. The interpersonal level focused on the male partner involvement, communication, and disclosure. The organizational level focused on the infrastructures of the health care and the health care system. The community level comprised the culture, the norms, and the stigma. The "Option B+" program was discussed at the policy level.

Through the lens of the Social Ecological Model, we recognized how all factors were interdependent for pregnant woman to get tested for HIV. The expectant woman remains at the center of the model; however, her choices were embedded in the multiple layers of the framework. This study analyzed the impact of the male partner involvement to motivate the uptake, adherence and retention of the expectant woman in prevention of mother-to-child transmission of HIV services.

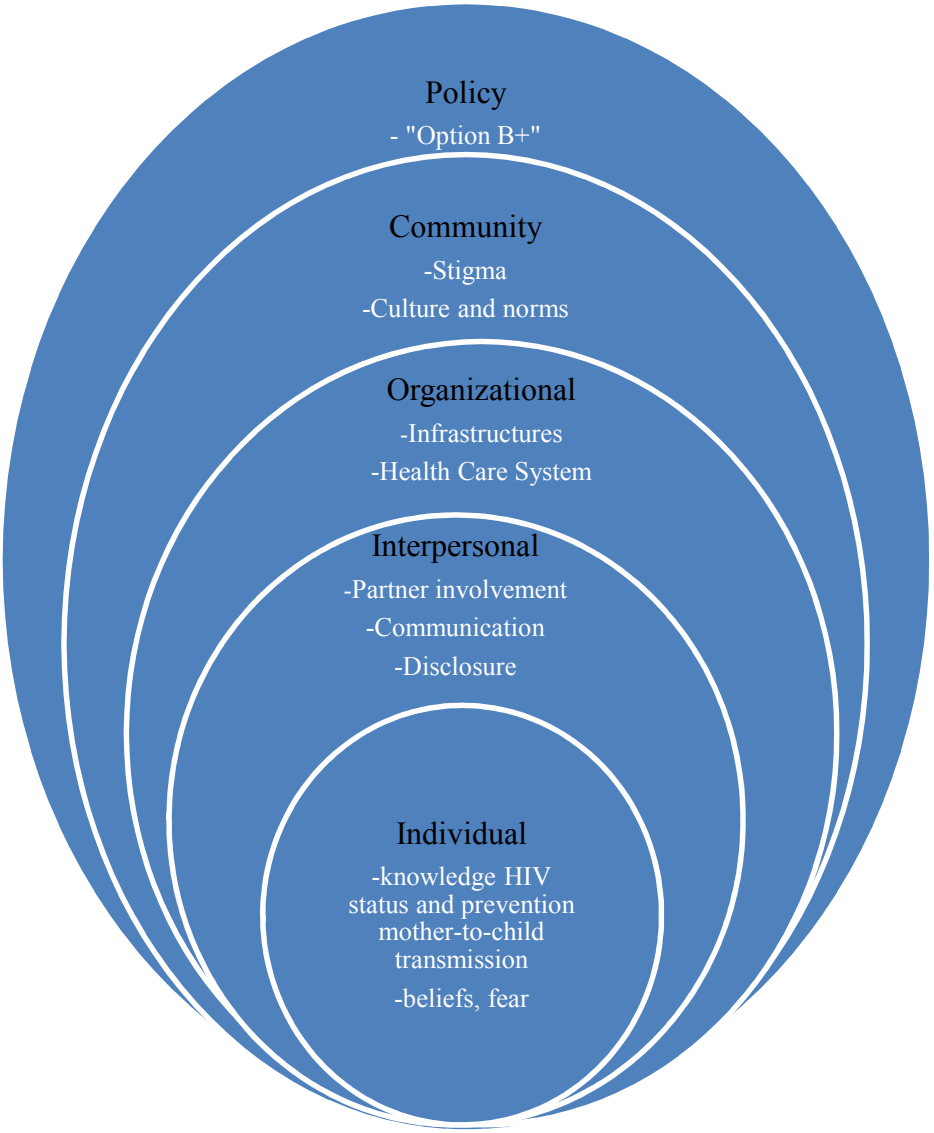

Figure 1: Social Ecological model
Source: (Busza & al. 2012; Glanz & al., 2008)

CHAPTER 5: METHODS

5.1 Study Design and Population

This retrospective study used data from the 2010 Malawi Demographic Health and Survey (2010 MDHS), to examine the association between the male partner knowledge of the therapy of HIV and the pregnant woman getting tested for HIV. The survey was conducted by the National Statistical Office (NSO), in collaboration with the Ministry of Health Community Sciences Unit (Malawi Demographic Health Survey, 2010). The objective of the survey was to provide updated information on fertility levels, nuptiality, sexual activity, fertility preferences, awareness and family planning methods, breastfeeding practices, nutritional status of mothers and young children, early childhood mortality, maternal mortality, maternal and child health, malaria, awareness and behavior regarding HIV/AIDS and other sexually transmitted infection and HIV prevalence (Malawi Demographic Health Survey, 2010).

The 2010 MDHS was conducted from June through November 2010. The survey expanded content and provided updated estimates of the basic demographic and health indicators covered in earlier surveys (Malawi Demographic Health Survey, 2010). The

2010 Malawi Demographic Health Survey, was chosen for use in this analysis because it was the most recent survey with data on HIV, also due to publically assessable data sets. The survey encompassed a nationally representative sample of more than 27,000 households. All eligible women age 15-49 in these households and all eligible men age 15-54. The sample frame used for the 2010 Malawi Demographic Health Survey was the 2008 Malawi Population and Housing Census (PHC). Each of the 28 districts in Malawi was subdivided in Enumeration Areas' (EAs) or clusters, where each EA was classified as urban or rural. In the 2010 Malawi Demographic Health Survey, the sample was selected using a stratified, two-stage cluster design, with enumeration areas being the sampling units for the first stage. 849 clusters were formed: 158 urban areas and 691 in rural areas. A complete list of the households was done in each cluster and served as sampling frame. Households comprised the second stage of sampling. At least 950 households were required to be sampled per district to provide an acceptable level of precision for the indicators measured in the survey. A representative sample of 27,345 households was selected for the 2010 MDHS survey (Malawi Demographic Health Survey, 2010).

Participants included in this analysis were from the subsample of one-third of the households selected to conduct HIV testing. They were eligible women age 15-49 and eligible men age 15-54 with suitable responses to the outcome and exposure variables. Three questionnaires were used from the 2010 MDHS: the Household Questionnaire, the Woman's Questionnaire, and the Man's Questionnaire. For this study, we utilized the four of the Malawi DHS files: women, couple, household and HIV to obtain our data for

the analysis. In addition to English, the questionnaires were translated into two major languages, Chichewa and Tumbuka (Malawi Demographic Health Survey, 2010).

5.2 Exposure Assessment

The main exposure variable of interest for this study is the male partner knowledge about HIV therapy. This variable was measured in the 2010 MDHS questionnaire by asking if the male partner knows about the existence of any specific drugs that doctors or nurses can give to an expectant woman that reduce the transmission of HIV virus to her unborn child. The response choices include "Yes", "No", "Don't know" (Malawi Demographic Health Survey, 2010).

5.3 Outcome Assessment

The outcome of interest for this study is getting the expectant woman tested for HIV. This variable was measured in the 2010 MDHS questionnaire by inquiring if the expectant woman was tested for HIV at an antenatal care visit. Response choices are "Yes", "No" or "Don't Know" (Malawi Demographic Health Survey, 2010).

5.4 Covariate Assessment

Records on ethnicity, education attainment, wealth quintile region and religion were acquired from the 2010 Malawi Demographic Health and Survey as potential control variables. The 2010 MDHS categorized education attainment as no education, incomplete primary, complete primary, incomplete secondary, complete secondary, higher. For the purpose of this study, complete primary, incomplete secondary, complete secondary, higher were combined and education was classified as none, incomplete

primary and secondary or higher. Region was categorized as Northern, Central and Southern; these categories were used in the analysis. Wealth quintile was categorized as lowest, second, middle, fourth, and highest. This study categorized wealth quintile as lowest, middle and high. The 2010 MDHS asked about the following religions: Catholic, CCAP, Anglican, Seventh Day Advent /Baptist, Other Christian, Muslim The different ethnicities were Chewa, Tumbuka, Lomwe, Tonga, Yao, Sena, Nkonde, Ngoni, Manganja, Ndali, Lambya and Nyanja.

5.5 Data Analysis

5.5.1 Univariate Analysis

Summary statistics for each variable were calculated and weighted to account for study design. Descriptive statistics for women tested and for women not tested were also calculated.

5.5.2 Bivariate Analysis

Unadjusted odds ratios (ORs) and the 95% Confidence Intervals (CIs) were calculated using logistic regression to provide a crude association between the male partner knowledge about the therapy of HIV and the expectant woman getting tested.

5.5.3 Multivariate Analysis

To calculate adjusted ORs and the 95% CIs for the association between the male partner knowledge about HIV therapy and the expectant woman getting tested, we used multivariate logistic regression. The control variables were ethnicity, education attainment, wealth quintile, region and religion. The analysis was conducted using SAS (version 9.4). Weights were applied to all analyses.

5.6 Sample Size and Power

In the 2010 Malawi Demographic Health and Survey, the total sample size was 2285. Setting the power at 80%, alpha at 0.05, the prevalence of the male partner knowledge about the therapy of HIV was 91%, and the smallest detectable OR was estimated at 1.833 (Demidenko, 2008).

CHAPTER 6: RESULTS

6.1 Univariate Results

A total of 3,764 women participated in the 2010 Malawi demographic health survey with their partners. There were 1,210 women excluded from this study if the question about HIV testing was not answered because they were either not between the ages of 15 and 49 years old (n=1186) or they refused to answer the question or didn't know (n=114). Of the 2,554 women eligible for study inclusion, 269 of their male partners did not answer the knowledge of HIV therapy question. Thus 2,285 women were available for analysis.

Many of the women in the study were from the Chewa ethnic group (41.6%) and 14. 6% were from the Lomwe ethnic group. More than half of the women did not complete their primary education (58.3%), while 25.3% obtained secondary education or higher. Of the religions practiced in Malawi, 43.1% of the women were of non-denomination Christian and 23% of the women were Catholic. About half of the women were from the central region (47.9%) and 4.5% were from the southern region. For the outcome of interest, 86.4% of the women responded that they were tested as part of their antenatal visit. For the exposure, a substantial number of men knew about the therapy for HIV during pregnancy (91.3%) (Table1).

The women who did not receive HIV testing were from the Chewa ethnic group. A higher percentage had an incomplete primary education (63.3%) and lived in the central region of Malawi (49.9%). Among the women who were tested, more than 90% of their male partners were knowledgeable about HIV therapy compared to women who were not tested where about 85% of their male partners were knowledgeable about HIV therapy. Also over half of the women tested for HIV were in the highest wealth category compared to the women who were not tested for HIV where 43% were in the highest wealth category.

6.2 Bivariate Results

Among the logistic regression analyses, the exposure variable and one of the covariates were predictive of women getting tested for HIV (Table 2). When the male partner had knowledge of HIV therapy, the women had doubled the odds of getting tested for HIV (OR 2.06, 95% CI: 1.26-3.37). Likewise, Anglican women had 6.34 (95% CI: 1.69-23.80) the odds of getting tested for HIV during their antenatal visit as compared to the women of the non-denomination Christian religion.

6.3 Multivariate Results

After adjusting for ethnicity, education attainment, wealth quintile, region, religion, the association between the exposure and the outcome of interest became attenuated and was not statistically significant. Specifically, male knowledge of HIV therapy was not association with their female partner getting tested for HIV (OR1.56, 95% CI 0.94-2.58).

CHAPTER 7: DISCUSSION

7.1 Summary of Main Findings

This study found that there is an increased odds between the man knowledge and the women getting tested for HIV in bivariate analyses. However, after adjusting for the principal covariates, ethnicity, education attainment, wealth quintile, region, religion, the magnitude of the association became attenuated and the results were not statistically significant. The results do not support the hypothesis that male partner knowledge about HIV therapy is positively associated with the woman getting tested for the virus. The findings are not consistent with results from past studies that found an association between male partner involvement and the women uptake of prenatal care (Adelekan et al. 2014; Busza et al. 2012; Bwirire et al. 2008; Katz at al. 2009; Kululanga et al. 2012; Nyondo et al. 2013). The aforementioned studies were conducted in different countries of sub-Sahara Africa, which might imply different culture and social norms from Malawi. However, one of the studies was conducted in Malawi and showed consistency with the literature; suggesting that there is an increased association between male partner involvement and the increased uptake of prenatal care by the pregnant women. Kalembo et al. (2013), examined the association between male partner involvement and the uptake of prevention of mother-to-child transmission of HIV interventions in Mwanza District, Malawi (Kalembo et al., 2013).

Researchers found male partner involvement was significantly associated with the women completion of a follow-up program (Adjusted odds ratio [AOR] = 16.8, 95% CI: 8.5-33.4, P<0.001). The results showed that male partner involvement increased the uptake of the prevention of mother-to-child transmission of HIV programs by HIV positive women. Discrepancies in statistical significance might be due to the considerably larger sample size available in the current study as compared to the study by Kalembo et al. (N=2284 current study vs. N=476 Kalembo study). It is important to notice that this study is a quantitative as compared to Kululanga et al. (2012).

When more than 90% of male partners knew about the therapy, more than 80% of the women were tested during their antenatal care visit. It is interesting to notice that despite the men high knowledge about the therapy of HIV their involvement in their partner antenatal care is still considered a challenge. These very high percentages might suggest that the health care system, the government, or non-profit organizations achieved significant effort in educating the public and providing services for women to get tested.

These findings continue to raise questions about what exactly is encompassed in the definition of male partner involvement. This study examined awareness of HIV therapy, we did not examine other aspects of support such as accompanying the women to prenatal visits. It is not clear the extent to which the male partner communicated his knowledge of therapy to the women and to what extent his knowledge influenced her decision to get tested for HIV.

7.2 Strengths and Limitations

This current study has several strengths and limitations, which are described in the passages that follow:

7.2.1 Nondifferential Misclassification

Nondifferential misclassification of the outcome and exposure was possible. The outcome variable, women getting tested for HIV at the antenatal clinic visit, was obtained through self-report. The responses to the outcome variables were obtained through face-to-face interview. The respondents may have felt reluctant to answer the question due to fear of stigma, violence by the partner or discrimination.

The exposure variable, men knowledge about the therapy of HIV, was also obtained through self-report. If misclassification occurred, it would likely bias the results toward the null.

7.2.2 Selection Bias

The 2010 MDHS uses a complex stratified two-stage cluster sampling method to select participants for the survey (MDHS, 2010). The average response rate among women age 15-49 who completed the interview was 97% (MDHS, 2010). Although this high response rate limits concern about selection bias, it is possible that the women agreed to participate differed from women who did not participate.

7.2.3 Information Bias

In the 2010 MDHS study the potential for information bias (in the form of observational bias) by the interviewer was low. The MDHS trained interviewers to conduct interviews and health screenings, information bias is unlikely to occur.

The likelihood of information bias (in the form of social desirability bias) occurring for the exposure variable is possible in the current study. Because the exposure variable (men knowledge of the therapy of HIV) was self-reported, it is possible that some men reported the knowledge of treatment in an effort to provide a response they perceived as socially desirable. These answers were potentially given in an effort to please the interviewer, and/or to appear knowledgeable. If information bias occurred in the study, it potentially resulted in an over or underestimate of the true association.

7.2.4 Confounding

There is a possibility that there are other variables related to both the exposure and outcome that are not on the causal pathway and were not included in this study due to the complexity of the dataset. Failure to control for a known or unknown confounder could result in an over or underestimation of the true association. Likewise, we initially listed women's age as a covariate in this study, but due to the complexity of the dataset, the variable was dropped. Its might have introduce the possibility of systematic error in our study.

7.2.5 Strengths

This study used a nationally representative sample of women in Malawi to investigate the association between male partner involvement and the reduction of mother-to-child the transmission of HIV. The high response rate of the MDHS minimizes concerns about selection bias. Lastly, the complex sampling design adopted by the 2010 MDHS ensures that participants are representative of Malawi population.

7.3 Implications and Future Research

Findings from the current study raised the problem about the exact characteristics encompassed in the definition of male partner's involvement. The high percentage of both men being knowledgeable of HIV therapy (91%) and women being tested for HIV (86%) may be due to the laudable effort of the Malawian government, non-profit organizations and may be the health care system to provide educational programs for the communities to raise awareness on HIV infection.

It is necessary for future research to investigate how a multi-strategic level of care, culturally tailored, might increase the rate of male partner involvement in the prevention intervention in the reduction of mother-to-child transmission of HIV. Furthermore, researchers should also continue to define male partner involvement for more specific characteristics encompassed in the definition so that it might be generalize across African countries of different cultures. Additionally, a suggestion for future research to conduct formative research through interview, focus group, to develop an appropriate survey that will measure the level of involvement of the husband, then using that context-specific adapted survey to categorized male partner's involvement as low, medium, or high.

In summary, although the present study found a non- statistically significant association between male partner involvement and getting tested, more research is still needed to fill the gap in the literature because, male partner involvement remains a challenge in the low to middle income sub-Saharan African countries. Male partners should be provided with culturally accepted information to help them understand the

impact of their participation not only in the life of their partner life but also of their unborn child.

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APPENDIX: TABLES

Table 1: Descriptive demographic characteristics of pregnant women in Malawi whose male partner responded to the question regarding HIV treatment knowledge stratified by male partner HIV therapy knowledge

Variables	**Full sample Size (N= 2285) n (%[w])**	**Women tested n= 2010 (86.42%)**	**Women not tested n=275 (13.57%)**
Men Knowledge			
Yes	2086 (91.3%)	1848 (92.2)	238 (85.3)
No	199 (8.65%)	162 (7.7)	37 (14.7)
Ethnicity			
Chewa	858 (41.6)	684 (41.6)	110 (41.7)
Tumbuka	260 (9.1)	201 (9.3)	23 (7.5)
Lomwe	366 (14.2)	292 (14.4)	40 (12.6)
Tonga	56 (1.3)	43 (1.4)	3 (0.7)
Yao	250 (11.6)	188 (11.1)	26 (14.8)
Sena	163 (4.8)	128 (4.9)	11 (4.0)
Nkonde	57 (1.3)	46 (1.3)	4 (1.7)
Ngoni	309 (10.9)	248 (11.1)	30 (9.7)
Manganja	62 (2.4)	49 (2.5	5 (1.8)
Ndali	24 (0.5)	19 (0.6)	1 (0.1)
Lambya	23 (0.4)	22 (0.4)	1 (0.2)
Nyanja	42 (1.8)	25 (1.3)	14 (5.1)
Education			
None	648 (16.3)	313 (16.0)	58 (18.4)
Incomplete Primary	2246 (58.3)	1193 (57.5)	172 (63.3)
Secondary or more	870 (25.3)	504 (26.5)	45 (18.2)
Wealth Quintile			
Low	627 (21.1)	365 (20.5)	64 (24.5)
Middle	839 (28.8)	469 (28.3)	73 (31.7)
High	1660 (50.1)	867 (51.2)	113 (43.8)
Region			
Northern	444 (10.6)	346 (11.0)	31 (7.9)
Central	496 (47.9)	736 (47.6)	131 (49.9)
Southern	1164 (41.5)	928 (41.4)	113 (42.2)

Table 1: Continued			
Religion			
Catholic	529 (23.0)	417 (22.9)	56 (23.6)
CCAP	339 (13.6)	278 (14.3)	30 (9.3)
Anglican	59 (1.8)	49 (2.0)	3 (0.3)
Seventh Day Advent	171 (6.2)	142 (6.2)	16 (5.8)
Baptist			
Other Christian	1170 (43.1)	914 (43.0)	134 (43.6)
Muslim	261 (11.6)	191(10.8)	33 (17.0)
No religion other	15 (0.6)	12 (0.6)	1 (0.2)

Table 2: Unadjusted and adjusted Odds Ratios and 95% Confidence Intervals of the Association Between male partner knowledge of HIV therapy and the expectant woman getting tested (Malawi demographic and survey, 2010), N=**2285**

	Unadjusted		**Adjusted***	
Variables	**OR**	**95% CI**	**OR**	**95% CI**
Men knowledge				
Yes	2.06	(1.26-3.37)	1.56	(0.94-2.58)
No	1.00	Referent	1.00	Referent
Ethnicity				
Chewa	1.00	Referent	1.00	Referent
Tumbuka	1.25	(0.67- 2.31)	1.04	(0.33-3.20)
Lomwe	1.14	(0.72 - 1.82)	0.83	(0.42- 1.62)
Tonga	2.15	(0.57 - 8.06)	1.76	(0.26-11.58)
Yao	0.74	(0.42 - 1.32)	0.99	(0.42- 2.30)
Sena	1.21	(0.49 - 2.99)	2.00	(0.76- 5.22)
Nkonde	0.75	(0.193-2.98)	0.57	(0.09- 3.68)
Ngoni	1.14	(0.64 - 2.03)	1.04	(0.52- 2.08)
Manganja	1,40	(0.42- 45.98)	0.94	(0.27- 3.32)
Ndali	8.23	(0.96 -70.07)	5.19	(0.39- 67.83)
Lambya	2.20	(0.31-15.41)	1.50	(0.15- 14.76)
Nyanja	0.24	(0.11- 0.53)	0.13	(0.05-0.33)
Education				
No	0.95	(0.65-1.39)	1.09	(0.70-1.68)
Primary	1.00	Referent	1.00	Referent
Secondary or more	1.60	(0.99- 2.58)	1.54	(0.93-2.54)
Wealth Quintile				
Low	0.71	(0.49-1.05)	0.80	(0.53-1.20)
Middle	0.76	(0.52-1.12)	0.85	(0.57-1.28)
High	1.00	Referent	1.00	Referent
Region				
Northern	1.42	(0.77-2.60)	0.99	(0.27- 3.66)
Central	0.97	(0.67- 1.40)	0.73	(0.42-1.28)
Southern	1.00	Referent	1.00	Referent
Religion				
Catholic	0.97	(0.66-1.44)	0.87	(0.58 -1.30)

Table 2: Continued				
CCAP	1.55	(0.93- 2.59)	1.87	(1.01-3.45)
Anglican	6.34	(1.69 - 23.80)	6.20	(1.44-26.74)
Seventh Day Advent /Baptist	1.08	(0.56-2.05)	0.78	(0.38-1.60)
Other Christian	1.00	Referent	1.00	Referent
Muslim	0.64	(0.39,1.05)	0.63	(0.30,1.30)
No religion other	2.94	(0.36, 23.91)	>999	(>999, >999)

Note: All analyses weighted

* Adjusted for Ethnicity, Education, Wealth Quintile, Region, Religion.