

APPROVAL SHEET

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Name of Candidate: Yelizaveta Shats
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Thesis and Abstract Approved:

A handwritten signature in black ink, appearing to read 'Christine A. Mair', written over a horizontal line.

Christine A. Mair, Ph.D
Associate Professor of Sociology
Sociology, Anthropology, and Health
Administration and Policy

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ABSTRACT

Title of Document: **PREDICTORS OF EXCLUSIVE
BREASTFEEDING AMONG MOTHERS OF
INFANTS IN LESOTHO.**

Yelizaveta Shats,
Master of Applied Sociology, 2019

Directed By: **Dr. Christine A. Mair**
Associate Professor of Sociology
Sociology, Anthropology, and Health
Administration and Policy

Mother-to-child transmission of HIV continues to be a prevalent mode of transmission in southern Africa. This study examines the factors of exclusive breastfeeding of HIV-positive and negative mothers. Analyzing data from the Demographic and Health Survey in Lesotho (2014) of mothers of infants 6 months or younger, this study conducted correlation matrices, a t-test analysis, logistic regression and examined bi-variate relationships between exclusive breastfeeding and various predictor variables. Overall, the results showed minimal to no association between exclusive breastfeeding and the predictor variables. However, the cultural implications of mixed feeding and the burden current recommendations put on marginalized women shed light on a greater need for antiretroviral therapy adherence and support in southern Africa.

PREDICTORS OF EXCLUSIVE BREASTFEEDING AMONG MOTHERS OF
INFANTS IN LESOTHO.

By

Yelizaveta Shats

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Introduction

Recent studies have demonstrated that the prevalence of human immunodeficiency virus (HIV) in southern Africa is substantially higher than in other, more industrialized parts of the world (Central Intelligence Agency (CIA), 2016). While heterosexual intercourse is the primary mode of transmission, from mother-to-child is also a common mode of disease transmission in parts of southern Africa (Kharsany & Karim, 2016; (World Health Organization (WHO), 2017d). Although rates of HIV transmission from mother-to-child have been reduced through increased uptake of antiretroviral medications, other factors have the potential to further reduce rates of infections and related infant mortality, particularly in conjunction with antiretroviral treatment (United Nations Joint Programme on HIV/AIDS (UNAIDS), 2015; WHO, 2018a; WHO, 2016). Studies suggest one factor that could reduce rates of transmission is exclusive breastfeeding, which occurs when an infant receives only breast milk without any additional food, drink or water (WHO, 2017b).

While the body of literature on HIV in southern African countries is substantial, gaps still exist around cultural, economic, and social factors associated with transmission of HIV from mother-to-child. This paper aims to address the gaps in the literature related to exclusive breastfeeding among mothers in southern African countries. Employing data from the Demographic Health Survey (DHS) Program, this study examines feeding practices of mothers of infants in Lesotho, in order to begin to assess some of the cultural and sociological barriers that impact the

feasibility of exclusive breastfeeding. This study examines barriers to successful implementation of exclusive breastfeeding as a mechanism of reducing mother-to-child transmission of HIV.

Literature Review

HIV in Lesotho

According to the CIA's World Factbook, southern African countries have the highest global prevalence rates of HIV, with Lesotho having the second-highest prevalence rate of adults living with HIV, at 25 percent (CIA, 2016). In 2016, there were approximately 330,000 adults and children living with HIV in Lesotho; of those, about 180,000 were women 15 years or older (UNAIDS, 2016). Due to the high prevalence of HIV, the average life expectancy (at birth) of people in Lesotho, referred to as Basotho, is only 53 years (CIA, 2016). While sub-Saharan Africa comprises only 12 percent of the global population, it accounts for 71 percent of all global HIV infections (Kharsany & Karim, 2016). In 2013, there were approximately 1.5 million incident cases of HIV infection in sub-Saharan Africa (UNAIDS, 2014). Additionally, sub-Saharan African women, who account for 58 percent of the global HIV-positive population, had the greatest number of deaths due to AIDS, and had a higher number of children living with HIV than any other region in the world (Kharsany & Karim, 2016). Yet, estimates from 2013 suggest that only 33 percent of men and 43 percent of women in Sub-Saharan Africa were receiving antiretroviral therapy (ART) (UNAIDS, 2014).

The most common mechanism through which HIV is transmitted in the sub-Saharan African region is heterosexual intercourse, followed by a high rate of transmission from mother-to-child. (Kharsany & Karim, 2016). Mother-to-child-transmission (MTCT) or vertical transmission is the transmission of HIV from mother-to-child prenatally, during childbirth, or through breastfeeding (WHO,

2017a). Without any intervention, MTCT rates range from 15 to 45 percent (WHO, 2017a). While incidents of child HIV infections has decreased from 2,000 in 2012 to 1,600 in 2014, due to MTCT, the rate of transmission has increased from 3.5 percent in 2012 to 5.9 percent in 2015 (UNAIDS, 2015). Globally, in 2008, 430,000 children under 15 years of age were infected with HIV, many of them due to MTCT. Ninety percent of these infections were reported in Sub-Saharan Africa (Ministry of Health, 2016a). Prior studies have shown that when intervention treatments are utilized, transmission rates can be reduced to below 5 percent. The most common treatment intervention for both infected mothers and their babies is ART (WHO, 2012; WHO, 2017a).

Prior research indicates a few risk factors for MTCT of HIV; these include rural residency, delivery at home, infant not receiving ART prophylaxis, and mixed feeding (Wudineh & Damtew, 2016). Compared to infants who were exclusively breastfed, infants who were mixed fed were 42 times more likely to become infected with HIV (Wudineh & Damtew, 2016). Mixed fed infants are at greater risk of infection and microbes entering the bloodstream (Buskens et al., 2007; Wudineh & Damtew, 2016). Lack of any social support has also been found to be a risk factor for MTCT of HIV (Onono et al., 2015). Women who were informed of their HIV status for the first time during their pregnancy had higher rates of vertical transmission compared to women who were aware of their HIV status prior to pregnancy (Onono et al., 2015).

Life in Lesotho

Lesotho is a small, mountainous country, located within South Africa, with a population of about 2 million people (CIA, 2019). Lesotho has a rural population of about 72 million people constituting 72 percent of the country's population (World Bank, 2016). Basotho men and women have an estimated life expectancy of only 53 years, and the rate of infant mortality is 44.6 deaths per 1,000 live births (CIA, 2019). Women in Lesotho have a higher literacy rate than their male counterparts (88 percent versus 70 percent, respectively). While 82 percent of the population has access to improved drinking water, sanitary facilitation access is low, with only 30 percent of the population having access to an improved sanitation facility (CIA, 2019). Fertility in Lesotho has decreased in the last few decades; Basotho women have an average of 3.3 children, with urban-dwelling women having an average of 2.3 children, as compared to rural-dwelling women who have an average of 3.9 children (Ministry of Health, 2016a). Regarding family planning and contraception, an estimated 24 percent of married women in Lesotho use condoms, while an estimated 45 percent of unmarried women use condoms (Ministry of Health, 2016a). According to DHS, 86 percent of women are aware that the use of condoms and having only one uninfected partner can reduce the risk of HIV (Ministry of Health, 2016a).

Unfortunately, gender disparities in Lesotho make it difficult for women to negotiate safe sex practices (Olowu, 2014). Estimates from the DHS suggest that 84 percent of Basotho women have been tested for HIV in their lifetime, and 58 percent have been tested for HIV in the past 12 months and received their results (Ministry of

Health, 2016a). While HIV-testing and condom use have increased, women continue to face gender inequities in Lesotho society that increase their risk of contracting HIV. This inequity is evident in the difference in HIV prevalence rates by sex: the rate of infection among Basotho women is 30 percent, but only 19 percent in Basotho men (Ministry of Health, 2016a). Research suggests, this may be partially attributed to the migratory labor patterns of men traveling to South Africa for extended time (Kroeker & Beckwith, 2011; DiCarlo et al., 2014; Harrison, Short, & Tuoane-Nkhasi, 2014; Olowu, 2014). Basotho women continue to unfairly bear the burden of higher HIV prevalence rates and the responsibility of preventing MTCT of HIV. Thus, culturally-appropriate support interventions are needed to alleviate burden placed on women.

Antiretroviral Therapy (ART)

Antiretroviral therapy is considered the most effective treatment for individuals with HIV. ART is commonly comprised of a minimum of three drugs that work together to suppress HIV replication (WHO, 2018b). ART works by lowering the viral load in the blood and bodily fluid, which is effective both prophylactically, as well as in slowing the progression of virus in individuals already infected with HIV (Secretary's Minority AIDS Initiative Fund (SMAIF), 2018). Studies conducted among infected individuals have shown that, not only ART reduced the risk of morbidity and mortality, but also improved participants' quality of life (WHO, 2018b). Additionally, rates of infection attributable to vertical transmission greatly decrease with ART adherence (UNAIDS, 2015). The WHO recommends all HIV-positive mothers adhere to lifelong ART, and in resource

limited settings where health authorities are recommending breastfeeding, that mothers exclusively breastfeed their infants while receiving ART (WHO, 2017c). Researchers found that in Lesotho alone, the number of new infections averted through use of ART for HIV-positive mothers increased from 1,700 in 2012 to 2,200 in 2015 (UNAIDS, 2015). Unfortunately for Basotho people, the percentage of HIV-positive women receiving ART decreased from 89 to 72 between 2012 and 2014 (UNAIDS, 2015).

Breastfeeding in the African Context

The many health benefits of breastfeeding infants are well documented in the literature; breastfeeding provides optimal nutrition, protection against common childhood infections through passive immunity, and reduces the risk of child mortality (Young et al., 2010; WHO, 2018a). Breastmilk fosters sensory and cognitive development and supplies an infant with the required nutrients needed in the first 6 months of life (WHO, 2018a). The WHO recommends exclusive breastfeeding for the first 6 months of an infant's life, and then adding in complementary foods with continued breastfeeding for up to 2 years (2016). For HIV-positive mothers in developing countries, the 2016 updated recommendations are the same as those for HIV-negative mothers, with the addition of ART adherence (WHO, 2016). Breastfeeding cessation is recommended only when replacement feeding is acceptable, feasible, affordable, sustainable, and safe (Young et al., 2010; WHO, 2016).

Breastfeeding can be especially important for infant health and nutrition outcomes within the context of low-resource settings. Within Lesotho, the number of

infants aged 6 months or younger, and who are exclusively breastfed, has increased in the last decade to 67 percent in 2014 (Ministry of Health, 2016a). Specifically, in sub-Saharan Africa, a large portion of child mortality is due to respiratory infections or dehydration resulting from diarrhea caused by bacterial or viral infections (Maman et al., 2012). Numerous studies suggest that breast milk protects infants from many infections, specifically respiratory and diarrheal diseases which often lead to death (Maman et al., 2012). Mothers who exclusively breastfeed their infants for the first six months of life not only reduce their infant's mortality risk by providing nutrients and antibodies that reduce infection and inflammation and contribute to immune maturation, but also promote proper organ development and healthy microbial colonization, regardless of HIV status (Nor et al., 2001; Maman et al., 2012; Ballard & Morrow, 2013). The resulting immunological defenses are crucial for infants who may be exposed to infectious diseases.

Despite the many known benefits of breastfeeding in African countries, the most common infant feeding practice in southern Africa is mixed feeding (Mnyani et al., 2017; Buskens et al., 2007). Mixed feeding is when an infant 6 months or younger is given liquid or any type of solid food in addition to breastmilk (WHO, 2016). Women who are dehydrated, suffering from exhaustion, or pain from nursing often embrace the cultural normality of mixed feeding their infant, and may mix feed with anything from unsanitary water to porridge (Nor et al., 2012). Often, mixed feeding in Sub-Saharan Africa introduces infants to infection, and greatly increase the risk of MTCT in areas where neither clean water nor formula are readily available (Buskens et al., 2007). Mixed feeding can cause irritation of an infant's

gastrointestinal tract due to microbes in their food or water, allowing entry of HIV viral particles from the mother's breastmilk into the infant's bloodstream, thereby increasing an infant's risk of contracting HIV (Wudineh & Damtew, 2016; Buskens et al., 2007). In fact, one study found that infants being mixed fed were 42 times more likely to acquire an HIV infection, as compared to infants who were exclusively breastfed (Wudineh & Damtew, 2016).

Cultural norms of mixed feeding encourage Basotho mothers, many of whom also face food insecurity, to supplement their breastmilk with other foods in hopes of avoiding infant malnutrition (Kroeker & Beckwith, 2011). The prevalence of mixed feeding practices in Sub-Saharan Africa can be attributed to factors including perceived breast milk insufficiency, social stigma related to exclusive breastfeeding, and cultural or religious custom (Nor et al., 2012; Maman et al., 2012; Buskens et al., 2007). Breast milk insufficiency occurs when a mother's breast milk does not meet the nutritional needs of her infant whether through quantity or quality (Desai et al., 2014). In southern and eastern Africa, commercial milk substitutes and replacement feeding among non-HIV exposed infants have been found to be associated with increased infant morbidity and mortality rates (WHO, 2016). For a mother, access to sufficient food and water is a strong determinant of a healthy milk supply and exclusive breastfeeding feasibility (Webb-Girard et al., 2012). Food insecurity can also result in perceived breast milk insufficiency and may lead to a mother choosing to mix feed her infant (Webb-Girard et al., 2012). The perception of breast milk insufficiency can be the outcome of inadequate breastfeeding knowledge or

technique, lack of maternal confidence or support in breastfeeding, and/or the availability of formula (Nor et al., 2012; Hazeba, Ncama & Sithole, 2016).

In Lesotho, mixed feeding is a cultural norm, and often, supplementing breastmilk with water is still thought to fall within the definition of exclusive breastfeeding (Kroeker & Beckwith, 2011). According to Kroeker & Beckwith, when a woman is approximately 7 months pregnant, she traditionally moves back to her parents' home, and resides there through the first few months of the infant's life, primarily to acquire infant care knowledge (Kroeker & Beckwith, 2011). This cultural norm reinforces traditional gender inequities and the illusion of exclusive breastfeeding as a woman's "choice", despite a lack of social and structural support to improve the feasibility of successful exclusive breastfeeding (Dinour & Bai, 2016). Even in the case when a Mosotho mother does attempt to exclusively breastfeed her infant, the cultural norms of society deem it inappropriate to contradict elders; thus, not allowing full agency over what other caretakers in the household may feed her infant (Kroeker & Beckwith, 2011).

Clearly, Basotho mothers find themselves in a difficult position when it comes to feeding their infants. They bear the burden of preventing MTCT of HIV in a population with one of the worst HIV epidemics in the world. Global public health organizations promote exclusive breastfeeding among sub-Saharan African women as an effective mechanism for reducing MTCT of HIV. However, this approach largely overlooks the social and cultural realities of being a mother in Lesotho. For many women in this context, exclusive breastfeeding is an unrealistic expectation due to food and clean water insecurity that affect breastmilk production, which creates yet

one more burden for new mothers already marginalized by a society with vast gender inequities.

Gaps in Research

While the promotion of exclusive breastfeeding has shown to be an effective method to reducing MTCT of HIV in developed countries, this western public health approach creates an unrealistic expectation and greater burden for mothers in sub-Saharan Africa. Variability in food and clean water securities, in addition to cultural and sociological customs must be accounted for or addressed in infant feeding recommendations. Previous examinations of infant feeding practices in Lesotho have failed to address region-specific limitations of exclusive breastfeeding. The present study explains the gender inequities related to infant feeding recommendations in sub-Saharan Africa.

Research Question and Hypotheses

This paper asks: Among women in Lesotho with children aged 6 months and younger, what factors are associated with exclusive breastfeeding?

To explore this question, the following two hypotheses are addressed:

H1: Mothers who are HIV-positive in Lesotho will be less likely to exclusively breastfeed their infants than mothers who are HIV-negative.

H2: Other factors such as first-time mother status, marital status, level of education, wealth, access to protected drinking water, and HIV transmission literacy will be positively associated with exclusive breastfeeding in Lesotho.

Methods

Data

The present study employed data from the 2014 Demographic and Health Survey (DHS) in Lesotho. Between September 2014 and December 2014, data were collected by the Lesotho Ministry of Health (MIH) through survey questionnaire. The DHS survey was conducted in two stages; the first in identification of sample clusters and the second in random sampling of households. The survey consisted of three different questionnaires: household, men, and women. Participants for the DHS study included women between the ages of 15 and 49, men between the ages of 15 and 59, and children under the age of 5.

Survey data were collected from women and children of all eligible households, whereas data were collected from men in half of the eligible households. Respondents included 9,402 households: 6,621 women and 2,931 men. The questionnaires had response rates between 94 and 99 percent. Demographic characteristics, children's school attendance, and household characteristics, such as access to improved sanitation and clean drinking water were included in the household survey. The women's questionnaire contained items on demographic characteristics, birth history and child mortality, knowledge of family planning, fertility preferences, maternal health, breastfeeding and infant feeding practices, childhood vaccinations and illnesses, work and empowerment indicators, and knowledge and behavior related to sexually transmitted infections. The men's questionnaire consisted of questions on demographic characteristics, knowledge of

family planning, fertility preferences, employment and gender roles, knowledge on sexually transmitted infection /behavior, and other health issues.

The DHS survey also collected biomarker data that incorporated measures of blood pressure, height and weight, anemia blood results, and HIV status. Biomarker data were collected for half of all surveyed households. Analyses for the present study merged 4 separate datasets to conduct the analyses; these included women's, household member, babies, and biomarker datasets. The analytic samples employed by the present study was limited to female participants of the 2014 DHS study who lived in Lesotho and had given birth within 6 months of enrollment. The sample size was insufficient in achieving the aim of the study, therefore a second analytic sample was created. Sample 1 (N = 616) comprised of only mothers who responded to all survey measures representing the independent variables. Sample 2 (N = 1,883) included mothers who responded to all survey measures representing independent variables, except for HIV transmission literacy, due to a lower response rate for the variable.

Variables

Dependent Variable

The dichotomous outcome variable exclusive breastfeeding was constructed using data from the birth case-level dataset. Birth cases with ages 6 months or younger, alive at the time of interview, and living with the mother were retained in the dataset. There were 11 cases of twins in the data, which were removed. Birth cases in which infants were fed liquids (e.g., water, sugar water, juice, tea or coffee,

soup or clear broth, and other liquids), milk other than breastmilk (e.g., powdered or tinned milk, baby formula, and fresh milk), and solids (e.g., baby cereal, other porridge/gruel, and any other foods specific to Lesotho) were regarded as a “not exclusively breastfed”. These cases also included infants who were mixed fed breastmilk as well as any of the options above. The birth cases that did not receive any of the above food or liquids, were considered “exclusively breastfed”.

Independent Variables

The predictor variable, HIV-positive blood result, was constructed using data from the biomarker dataset. Mothers who were both HIV-positive and HIV-negative were retained in the dataset. Those with HIV-negative blood results were coded as “no HIV-positive blood result”, while those with HIV-positive blood results were coded as “HIV-positive blood result”.

Another predictor variable, previous motherhood, and was created using data from the women’s dataset. Mother cases with 1 or more children were retained in the dataset (except for twins, as noted above). Mothers with 1 child were coded as “no previous motherhood” and mothers with 2 or more children were coded as a “previous motherhood”.

The predictor variables from the household member dataset were married/living together, education, wealth, and access to protected drinking water. For the predictor variable, married/living together, the response choices were either “married/living together”, or “not married/living together” (including responses of widowed and divorced). The education predictor variable had the following categories: no formal education, primary education, secondary education, and higher

education. The Wealth Index Scale predictor variable included categories of poorest, poorer, middle, richer, and richest. “Access to protected drinking water” included the following responses: piped into dwelling, piped to yard or plot, public tap or standpipe, piped to neighbor, tube well or borehole, protected well, protected spring, and rainwater. All other responses were categorized as: “no access to protected drinking water”.

The HIV transmission literacy predictor variable had a lower response rate compared to the other predictor variables and was therefore excluded from sample 2. The response choices were either “received HIV transmission counseling” or “no HIV transmission counseling”.

Analysis

Descriptive statistics were calculated for all variables for sample 1 (N=616) and sample 2 (N=1,883) (see Table 1). Table 1 shows the means and standard deviations of all variables for both samples. Next, a correlation of variables was displayed for sample 1 (Table 2) and sample 2 (Table 3). Bivariate relationships were also examined between HIV transmission literacy and access to protected drinking water and the dependent variable for both samples (Table 4). Results of a t-test analysis are also shown, measuring the difference in means between the level of education and exclusive breastfeeding for both samples (Table 4). The main analysis included a logistic regression, which predicted exclusive breastfeeding including all predictor variables for both analytic samples (Table 5). SAS 9.4 statistical software was used to complete all statistical analyses.

Results

Descriptive statistics in Table 1 show that approximately 11 percent of mothers in sample 1 exclusively breastfed and only 4 percent of mothers in sample 2 exclusively breastfed. In sample 1, 26 percent of mothers were HIV positive and 38 percent of mothers in sample 2 were HIV positive. Mothers with two or more children were 65 percent of sample 1 and 75 percent of sample 2. Seventy one percent of mothers in sample 1 were either married or cohabitating, while sample 2 showed that 62 percent of mothers were married or cohabitating. In both samples, about 80 percent of mothers reported having access to protected drinking water. The variable HIV transmission literacy was only measured in sample 1, which, due to sample size concerns, was excluded for analyses on sample 2. The average level of education for mother in samples 1 and 2 was between primary and secondary education. Descriptive analyses of the Wealth Index Scale showed that, for sample 1, the mean for mothers was poorer/middle wealth, and middle wealth for sample 2.

Results of analyses conducted for all variables in sample 1 showed no noteworthy correlation between the variables (Table 2). Wealth Index Scale was found to be moderately associated with mothers' level of education ($R = 0.503$, $p < 0.01$). Mothers' access to clean drinking water was weakly associated with Wealth Index Scale variable ($R = 0.273$, $p < 0.01$). Results for sample 2 showed similar correlation patterns (see Table 3). Wealth Index Scale was moderately associated with level of education ($R = 0.497$, $p < 0.01$). Mothers' access to protected drinking water was weakly associated with Wealth Index Scale variable ($R = 0.292$, $p < 0.01$).

Table 4 summarizes the results of bivariate analyses (t-tests); neither results for sample 1 or 2 identified any notable patterns. Results found no association between level of education and exclusive breastfeeding in either sample.

Results of the main logistic regression analyses predicting exclusive breastfeeding are displayed in Table 5. Mothers with an HIV-positive blood result were found to be less likely to exclusively breastfeed across samples. However, confidence intervals did not indicate statistically significant associations between HIV-status and exclusive breastfeeding in either sample. Interestingly, in both samples, results showed that mothers were less likely to exclusively breastfeed as their wealth increased (sample 1: OR = 0.91, CI = (0.73-1.15); sample 2: OR = 0.79, CI = (0.65-0.97)).

Discussion

Overall, results did not find the study predictor variables to be associated with the dependent variable, exclusive breastfeeding. Study hypotheses were not supported by the results of these study analyses. Findings also did not support an alternative hypothesis that mothers who are HIV+ are less likely to breastfeed their infants, and therefore, the null hypothesis was accepted. Results did find a marginal association between Wealth Index Scale and exclusive breastfeeding, whereby women of a higher wealth index category were less likely to exclusively breastfeed.

Changes to Measure and Population

One possible barrier that may have impacted the ability of the researcher to identify, with statistical significance, predictors of exclusive breastfeeding is the relatively small population of Lesotho, which may have affected study sample size, as collected by the DHS. Future studies could mitigate this issue by analyzing data of similarly ethnic people from other sub-Saharan African countries. Exploring other data sources, specifically the 2013 Botswana AIDS Impact Survey IV would also potentially provide new opportunities to consider the associations tested in this paper.

Exclusive Breastfeeding

It is also possible that the construction of the dependent variable used in this study was too conservative and should be expanded upon with less restrictive inclusion criteria. The body of literature indicates wide variation in the operationalization of the exclusive breastfeeding variable. Moreover, a number of

studies do not report sufficient detail with regard to researchers' development and operationalization of such measures, which serves to stifle replication efforts and the subsequent development of a standardized measure of exclusive breastfeeding. As an example, while the 2014 DHS Final Report reports an exclusive breastfeeding rate of 67 percent for infants under 6 months, it does not provide adequate detail on how this variable was operationalized or constructed (Ministry of Health, 2016a). The report indicates the rate of exclusive breastfeeding declines, as infant age in months increases (by 6 months of age), the rate drops to about 25 percent (Ministry of Health, 2016a). These rates are considerably higher than the rates estimated by this study, despite both studies having employed the same dataset. While this limitation may have affected the results of the present study, the DHS Final Report summarizes a similar pattern of higher quartiles in Wealth Index associated with lower rates of exclusive breastfeeding (Ministry of Health, 2016a). The only other pattern referenced in the Final DHS report was the duration of breastfeeding, whereby the duration of breastfeeding was longer for rural-dwelling mothers as compared to urban-dwelling mothers (Ministry of Health, 2016a). Another study calculated lower rates of exclusive breastfeeding in southern Africa, with a lower rate in Zimbabwe of 31 percent (Motsa, Ibisomi & Odimegwu, 2016). Swaziland displayed a similar rate of exclusive breastfeeding with a rate of 32 percent (Motsa, Ibisomi & Odimegwu, 2016). Since Motsa, Ibisomi & Odimegwu's study was published in 2016, Zimbabwe's rate of exclusive breastfeeding of infants under 6 months has increased to 48 percent with the most recent survey (Zimbabwe National Statistics Agency, 2016). A 2018 study by Jones and colleagues ruled out the following predictors of

exclusive breastfeeding in HIV-positive mothers: male involvement in antenatal care, HIV stigma, disclosure, and family planning (2018).

There are several minor limitations to the present study which are attributable to the employment of secondary data for the analyses. The construction of the dependent variable also removed variation in degree of mixed feeding activities, whereby all mixed feeding was treated equally. For instance, an infant who was exclusively breastfed, but received a single feeding of water, was coded the same as an infant who was never breastfed. Additionally, survey response choices were constructed in such a way that did not allow the researcher to adjust for differences in frequency. As explained previously, infants in Lesotho are culturally prone to feedings by multiple caregivers in the household, regardless if a mother has decided to exclusively breastfeed (Kroeker & Beckwith, 2011).

HIV Transmission Risk Factors and ART

Currently, there is the need for new data collection efforts related to HIV transmission and biomarker data for infants, particularly for those living in countries with high HIV prevalence and incidence rates. Biomarker data for infants would facilitate new research and better estimates of vertical transmission rates in the first year of life.

An updated approach in the prevention of mother-to-child transmission of HIV is Option B+ which provides lifelong triple antiretrovirals (ARVs) to HIV-infected pregnant women regardless of their CD4 count as early as diagnosed (WHO 2012). Gaps exist in the body of literature regarding the implementation of Option B+ in Lesotho, although, other programs and initiatives are supported by Lesotho's

Ministry of Health through the Elizabeth Glaser Pediatric AIDS Foundation (see Table 6). Future research should aim to assess the efficacy of current and future interventions aimed at reducing vertical transmission of HIV.

Conclusion

Rates of MTCT of HIV and other infections can still be reduced through effective implementation of exclusive breastfeeding practices, even more so when implemented in conjunction with antiretroviral treatments, which will collectively aid in reducing HIV-related infant and adult mortality in southern Africa. This study found that a mother's HIV status has little effect on whether she exclusively breastfeeds her infant for the first 6 months of life. Wealth was the only factor that was found to be associated with exclusive breastfeeding, although, the association was very modest. Other factors such as previous motherhood, marital status, level of education, access to protected drinking water, and HIV transmission literacy were not found to be associated with exclusive breastfeeding. A broader understanding of the cultural norms of infant feeding practices in Lesotho, such as to the commonality of multiple caregivers and importance of respecting one's elders can lessen the burden placed on mothers to reduce the risk of transmission. Further research and subsequent public health programs, such as ART access and adherence initiatives, are needed to address high rates of MTCT, other infections, and mixed feeding in Lesotho, as well as in other southern African countries. Reducing barriers and improving access to ART and the wide-spread use of prophylactic ART can have a greater impact in reducing rates of HIV in the southern African region.

A more sociologically-sound public health approach to reducing MTCT rates in Sub-Saharan Africa could include global public health initiatives focused on increasing uptake of ART for men, women, and infants living in regions with high

rates of HIV transmission. Moreover, the impact of such programs could be maximized by supplementing with health education programs focused on the importance of proper ART adherence and best practices for mixed feeding in the context of food and clean water insecurity.

Appendices

Table 1. Descriptive Statistics

Variable	Sample 1 (n=616)				Sample 2 (n=1883)			
	Mean	Std. dev.	Min.	Max.	Mean	Std. dev.	Min.	Max.
Exclusively breastfed	0.11	0.31	0.00	1.00	0.04	0.19	0.00	1.00
HIV Positive blood result	0.26	0.44	0.00	1.00	0.38	0.49	0.00	1.00
Previous Motherhood	0.65	0.48	0.00	1.00	0.75	0.43	0.00	1.00
Married/Cohabiting	0.71	0.45	0.00	1.00	0.62	0.48	0.00	1.00
Level of education	1.55	0.60	0.00	3.00	1.57	0.62	0.00	3.00
Wealth Index Scale	2.77	1.39	1.00	5.00	3.03	1.40	1.00	5.00
Has access to protected drinking water	0.78	0.41	0.00	1.00	0.82	0.39	0.00	1.00
Received HIV transmission counseling	0.89	0.31	0.00	1.00	-	-	-	-

Table 2. Correlation of Sample 1 Variables (n=616)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) Exclusively breastfed	-							
(2) HIV Positive blood result	- 0.01	-						
(3) Previous motherhood	0.04	0.17**	-					
(4) Married/Cohabiting	- 0.01	- 0.14**	0.13**	-				
(5) Level of education	0.01	- 0.07	- 0.20**	- 0.11**	-			
(6) Wealth Index Scale	- 0.03	0.03	- 0.12**	- 0.12**	0.50	-		
(7) Has access to protected drinking water	0.00	0.07	- 0.05	- 0.08	0.19	0.27	-	
(8) Received HIV transmission counseling	- 0.05	0.00	0.07	0.01	0.08	0.16**	0.06	-

*p<0.05; **p<0.01

Table 3. Correlation of Sample 2 Variables (n=1883)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Exclusively breastfed	-						
(2) HIV Positive blood result	- 0.04	-					
(3) Previous motherhood	- 0.01	0.08**	-				
(4) Married/Cohabiting	0.02	- 0.17**	0.03	-			
(5) Level of education	0.01	- 0.04	- 0.16**	- 0.08**	-		
(6) Wealth Index Scale	- 0.04	0.04	- 0.09**	- 0.05*	0.50**	-	
(7) Has access to protected drinking water	- 0.01	0.08**	- 0.05*	- 0.05*	0.15**	0.30**	-

* p<0.05; ** p<0.01

Table 4. Exclusively Breastfed Bivariate

Sample		Received HIV Transmission Counseling		Has access to protected drinking		Level of Education
		No	Yes	No	Yes	Mean
Sample 1 (n=616)	Exclusively Breastfed					
	No	84.85%	90.00%	89.63%	89.40%	1.54
	Yes	15.15%	10.00%	10.37%	10.60%	1.57
Sample 2 (n=1883)	Exclusively Breastfed					
	No			95.98%	96.29%	1.57
	Yes			4.02%	3.71%	1.60

Table 5. Logistic Regression Predicting Exclusive Breastfeeding

	Sample 1 (n=616)		Sample 2 (n=1883)	
	Odds Ratio	95% CI	Odds Ratio	95% CI
HIV Positive blood result	0.87	0.47-1.62	0.72	0.42-1.22
Previous Motherhood	1.48	0.82-2.66	0.93	0.54-1.61
Married/Cohabiting	0.85	0.47-1.51	1.19	0.71-2.00
Level of education	1.26	0.76-2.10	1.37	0.87-2.14
Wealth Index Scale	0.91	0.73-1.15	0.79	0.65-0.97
Has access to protected drinking water	1.08	0.56-2.08	1.12	0.60-2.10
Received HIV transmission counseling	0.61	0.29-1.29		
AIC	426.97		610.67	
Log Likelihood	410.97		596.67	

Table 6. Projects in Lesotho Aimed at Eliminating Pediatric HIV/AIDS

Project	Timeline	Details
SOAR Project	2014-2019	Project Supporting Operational AIDS Research (SOAR) include leading the Improve Maternal-Child Outcomes (IMPROVE) Study. The prospective study has facilities randomized to receive either the IMPROVE intervention or routine services and assess the interventions.
AIDSFree Cooperative Agreement	2014-2019	Providing technical assistance to civil society organizations develop and improve their capacity for PMTCT and pediatric services at the community level.
Catalyzing Expanded Access to Early Testing, Care and Treatment among HIV-Exposed Infants	2015-2019	Aims to increase access to early diagnosis of HIV in infants and increase testing and ART initiation in infants.
STAR-L Project	2015-2020	Strengthening the TB and AIDS Response in Lesotho (STAR-L) Project. STAR-L is an implementation of a comprehensive HIV services package in 4 districts in Lesotho to reduce HIV transmission, morbidity and mortality.
PUSH Project	2016-2021	Providing Universal Services for HIV/AIDS in Lesotho (PUSH) Project. Implement a comprehensive package of HIV services in 6 districts.

Elizabeth Glaser Pediatric AIDS Foundation, 2019.

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