The Role of Breastfeeding in Mother-to-Child Transmission of HIV/AIDS: A Comparative Case Study of Three Countries

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THE ROLE OF BREASTFEEDING IN MOTHER-TO-CHILD TRANSMISSION OF HIV/AIDS: A COMPARATIVE CASE STUDY OF THREE COUNTRIES

by

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ABSTRACT

The HIV pandemic has affected millions of people around the world both medically and socially, since there is a stigma associated with this disease. Common methods of transmission include sexual intercourse and sharing needles, but there are other lesser known methods through which people can contract this disease. One such way is mother-to-child transmission (MTCT), in which a mother could transmit the virus to her child either during pregnancy, childbirth, or through breastfeeding. This paper focuses on the role of breastfeeding in the transmission of HIV from mother to child. Many studies have investigated how breastfeeding results in the transmission of the virus, and effective common treatment methods have been established. However, the issue of MTCT of HIV still exists even though it can easily be eradicated with the proper techniques. This suggests that there are still factors that contribute to HIV transmission from mother to child that have yet to be eliminated. Thus, this paper reviews the breastfeeding rates and breastfeeding practices of three different countries: South Africa, India, and the United Kingdom. This paper analyzes epidemiological data, studies from medical journals, and studies from anthropology journals to determine what social influences surround breastfeeding practices in each of these countries to see how these may contribute to MTCT of HIV via breastfeeding. While there were no apparent trends between child HIV prevalence rates and breastfeeding rates in these countries, there were some social and cultural factors that were similar across all three nations. This information may be useful in creating more effective treatment plans that are conducive to the social environments in these countries.

DEDICATIONS

To my professors and mentors, for inspiring me and offering invaluable advice through all four years of my college experience. I would not be where I am today without your guidance.

To my family, thank you for all of your love and never-ending support through all of my endeavors.

To my friends, thank you for always being there and lending a helping hand when I needed it. Your kind words of encouragement never fail to motivate me. Seeing your work ethic and integrity has only pushed me to work harder and pursue my own dreams.

To those suffering with HIV/AIDS, especially the children, I hope this research brings you one step closer to leading a healthier life and having a better future.

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LIST OF ACRONYMS

AIDS Acquired Immunodeficiency Syndrome

ART Antiretroviral Therapy

ARV Antiretroviral Drugs

BHIVA British HIV Association

HIV Human Immunodeficiency Virus

MTCT Mother-to-Child Transmission

STD Sexually Transmitted Disease

UNICEF United Nations International Children's Fund

WHO World Health Organization

INTRODUCTION

One of the most prevalent and devastating pandemics faced by the human population today is caused by human immunodeficiency virus (HIV). It is estimated that over seventy million people have been infected with HIV since the onset of the epidemic, and by the end of 2015, there was an estimated total of 36.7 million people living with HIV globally ("HIV/AIDS" 2016). While this condition is mainly concentrated in countries within Sub-Saharan Africa, with almost one in twenty-five adults in this region living with this disease, it still affects populations all around the world, making it a global concern ("HIV/AIDS" 2016). Through the development of modern medicine, the disease is now more manageable and no longer has a death sentence associated with it; however, over one million people died globally in 2015 due to HIV infection, indicating that there are still significant concerns associated with this disease ("HIV/AIDS" 2016). Health concerns due to HIV are mainly concentrated in regions in which little to no treatment or counseling is available, presenting a challenge when it comes to combating the transmission of the virus.

HIV is transmitted from one person to another through bodily fluids, and it leads to the destruction of the immune system of the host ("About HIV/AIDS" 2016). More specifically, the virus attacks the CD4 T cells, which play a role in fighting infections ("About HIV/AIDS" 2016). If left untreated, HIV can lead to significant health problems for an individual. There are three main stages of HIV infection: Stage 1, which signifies an acute HIV infection; Stage 2, also known as clinical latency; and Stage 3, which is acquired immunodeficiency syndrome (AIDS) ("About HIV/AIDS" 2016). The first stage of HIV is characterized by an illness that resembles the flu, which is the body's natural response to an infection ("About HIV/AIDS" 2016). This

generally occurs anywhere between two to four weeks after infection ("About HIV/AIDS" 2016). During the second stage of HIV infection, HIV is still present in the host; however, it does not reproduce as much as it did in the first stage ("About HIV/AIDS" 2016). As a result, there may be very few symptoms, if there are any at all, during Stage 2 ("About HIV/AIDS" 2016). This period can last for many years; the end of this stage is signified by an increase in the virus load and a decrease in the CD4 T cell count ("About HIV/AIDS" 2016). This leads to AIDS, the final stage of HIV infection. At this point, the CD4 T cells are severely depleted, which can lead to opportunistic infections or cancers ("About HIV/AIDS" 2016). Without treatment, the expected length of time for survival is approximately three years; however, with the development of new treatments, patients are able to survive much longer and live relatively normal lives ("About HIV/AIDS" 2016).

One of the foremost concerns associated with this disease is educating the population to prevent it from spreading. However, due to the severity and the methods of transmission of this disease, HIV has implications beyond its medical impact. In many areas, HIV has a stigma associated with it. Specifically, stigma can be defined as "negative beliefs, feelings, and attitudes" toward those infected with HIV or groups associated with HIV-positive people, such as the families of those who are affected (*Reduction of HIV-Related Stigma* 2014). This stigma can then lead to HIV-related discrimination, which is the act of "unfair or unjust treatment" toward individuals that are perceived to have HIV (*Reduction of HIV-Related Stigma* 2014). HIV is a sexually transmitted disease (STD), which is one of the primary reasons for the social stigma associated with it in many cultures, presenting a barrier when it comes to developing educational programs to inform people about this disease. It can also be transmitted through drug injection

and sharing needles, which is another reason for the stigmatization of this disease ("HIV Transmission" 2016). However, this disease can also be transferred in other less common ways, one of which includes transmission from a mother to a child either during the late stages of pregnancy, childbirth, or through breastfeeding ("HIV Transmission" 2016). This is especially a cause for concern because at one point, mother-to-child transmission (MTCT) of HIV was the leading source of HIV infection among children below the age of fifteen (*Prevention of HIV Transmission* 1999). While the number of children under fifteen years of age with new HIV infections has decreased by fifty-eight percent between 2002 and 2013, this is still a prevailing global problem, as seen by the fact that there were still 1.8 million children living with HIV by the end of 2015 ("Children, HIV and AIDS" 2016; "Global HIV/AIDS" 2016).

The majority of HIV cases in young children are attributed to transmission of this virus from mother to child (Adebimpe 2013). Such is the case in Sub-Saharan Africa, where it was estimated in 2007 that over ninety percent of the HIV-infected children worldwide reside (Sellen and Hadley 2011). There are just under two million children living with an HIV infection, and more than ninety percent of these cases were contracted due to MTCT (Sellen and Hadley 2011). These infections are preventable; yet, they are still ongoing due to the fact that many women are unable to get tested and do not have access to the appropriate treatments (Sellen and Hadley 2011). On the other hand, in countries such as the United States where medical resources are abundant and readily available for patients, fewer than two hundred babies are born with HIV each year ("Preventing Mother-to-Child" 2016). This suggests that MTCT of HIV presents more of a problem in countries where there is little to no education about this disease or an insufficient amount of resources to combat the spread of the virus.

Even though various social, political, and economic issues in some of these nations prevent HIV-infected women and children from receiving the treatment that they need, there have still been many treatments developed to prevent the spread of HIV from mother to child, many of which have been successful. One such treatment that has proven to be especially effective is the antiretroviral treatment (ART). ART, which is recommended for any individual infected with HIV regardless of the stage of infection they may be in, involves giving the patient three or more antiretroviral drugs (ARVs), which aid in slowing down the growth of the virus and, therefore, also slow the onset of the disease (Thompson et al. 2012). ART programs instated in various regions have helped prevent as many as 350,000 new HIV infections in children (Govender and Coovadia 2014). The ART programs help reduce the risk of MTCT of HIV by reducing the viral load in the mother (Myer et al. 2017). Maternal viral load is a major factor in determining the risk of transmission; in fact, the viral load in the mother and transmission are proportional to one another (Myer et al. 2017). Thus, implementation of ART programs can help reduce the transmission of HIV from mother to child. However, since this disease is also influenced by social and cultural factors, drugs alone do not provide sufficient treatment.

Another indirect method to treat MTCT is to offer counseling services to the mother in an attempt to potentially prevent postnatal transmission of HIV. Generally, infant feeding counseling has not been given priority when it comes to treatment of HIV in children largely due to the lack of time, human resources, and financial resources (Chopra 2009). However, exclusion of infant feeding counseling from programs with an aim to prevent MTCT leads to widespread misunderstanding of the risks that breastfeeding poses on the transmission of HIV (Chopra 2009). Thus, counseling plays a significant role in preventing the transmission of this disease.

Despite this, studies have shown that certain countries, especially Kenya, Malawi, and Zambia, have increased resources toward providing infant feeding counseling for mothers infected with HIV, and these countries have also changed their policies regarding infant feeding (Chopra 2009). Thus, there is no one solution to combating MTCT of HIV; administering only drugs will not completely eradicate the disease. Rather, multiple strategies, including, but not limited to, promoting advocacy within the HIV community, providing counseling programs for mothers, and increasing resources for HIV testing and treatment, must be integrated to effectively combat this disease.

In this investigation, one of the three methods involved in MTCT of HIV, breastfeeding, will be studied. There have been many individual case studies that analyze the role of breastfeeding in the transmission of HIV from mother to child; however, there have been limited studies comparing this across different countries. Furthermore, there are few studies that look into breastfeeding rates of the countries and discuss the correlation, or lack thereof, between these rates and the HIV rates of children in these countries. Social and cultural factors affecting breastfeeding are also not considered in the MTCT of HIV. To delve more into these relations and to further understand the links between breastfeeding and the transmission of HIV from mother to child, data from various medical journals and medical anthropology journals as well as epidemiological data will be analyzed.

Three specific countries have been strategically chosen for this study: South Africa, India, and the United Kingdom. South Africa and India were selected for this analysis because these countries have some of the highest rates of HIV in the world and are from different regions of the world. On the other hand, in the United Kingdom, the HIV rates are much lower.

Additionally, South Africa, India, and the United Kingdom all have varying breastfeeding rates, which will allow for the comparison between these countries since each of these nations will likely have different factors that contribute to their respective breastfeeding rates. The hypothesis is that there will be some type of correlation, whether positive or negative, between the breastfeeding rates and the child HIV prevalence in these nations. Additionally, the diverse locations of these three countries means that there are many social and cultural differences amongst them. Because HIV is a disease that has social implications as well as medical consequences, the distinct environments of each of these countries can help shed some light as to how to prevent the transmission of HIV from mother to child via breastfeeding. Thus, the differences in breastfeeding rates, along with the social factors that influence the breastfeeding practices in these countries, can be studied to help determine the role that breastfeeding plays in the transmission of HIV.

Another reason for choosing these specific countries is that South Africa is located in Africa, where there has long since been a prevailing problem with HIV/AIDS, India is located in Asia, where HIV infection is now on the rise, and the United Kingdom is in Europe, where there is a lower rate of HIV infected populations. Each of these countries has varying access to resources and different cultural influences, all of which can be considered when conducting this comparative analysis. With their varying locations and social settings, these three countries will allow for a thorough analysis of the role that breastfeeding plays in the transmission of HIV from a mother to a child.

MECHANISM OF MTCT OF HIV VIA BREASTFEEDING

The following section will discuss the how breastfeeding can lead to MTCT of HIV. Before studying the factors associated with breastfeeding and methods used to treat for HIV, it is important to have an understanding of exactly how breastfeeding can lead to a child contracting the virus. Thus, this section will focus on the method through which transmission of HIV can occur via breastfeeding.

There are three different ways in which MTCT of HIV can occur, which can be during late stages of pregnancy, childbirth, or through breastfeeding ("HIV Transmission" 2016). Of these three methods, breastfeeding is the only way in which the virus can be transmitted even after the mother has already given birth. It is common knowledge that feeding newborns breast milk that is infected with HIV is one method of MTCT. However, there are a great many factors that affect the spread of HIV, and more than just the maternal viral load must be taken into account when considering this issue (Bulterys and Lepage 1999). To further illustrate this point, it has been shown that while breastfeeding is a method of HIV transmission, breast milk also has components, such as antibodies, that protect the baby from infection (Shen et al. 2015). In fact, in a study done in Kampala, Uganda, it was seen that only eight to fifteen percent of nursing infants who were exposed to HIV-1 present in infected breast milk became infected after birth (Shen et al. 2015). This is only a minority of the population sample, showing that breast milk has many different roles in the transmission of HIV from mother to child. Furthermore, infants who were exclusively breastfed had a lower risk of infection as opposed to newborns who were given a mix of breast milk and formula (Coovadia et al. 2007). This could be due to the fact that the regions most affected by HIV tend to have a dearth of resources, including limited access to

clean water. Thus, using this contaminated water with formula milk could potentially lead to additional infections rather than protecting against HIV. Infants who were breastfed and were given solids were also at a higher risk of contracting HIV (Coovadia et al. 2007). Newborns who are not breastfed at all are not totally exempt from the risks of transmission, however. Even without breastfeeding, HIV transmission rates can range from fifteen to thirty percent, suggesting that there are other mechanisms through which an infant can become infected (Van Hollen 2011).

Biomedical research has found that for MTCT of HIV to occur via breastfeeding, the virus from the breast milk must be taken up by the epithelial cells and then transported via dendritic cells as the initial step (Shen et al. 2015). Breast milk contains antibodies as well as innate factors that function to inhibit this uptake of the virus, which is why a mixed diet of breast milk and formula has a higher risk for infection than a diet of breast milk alone (Shen et al. 2015). With a mixed diet, the infant obtains fewer antibodies from the mother's milk, leading to a greater chance of contracting the virus. Furthermore, formula milk can cause inflammation of the mucosal membranes of the baby, allowing HIV to be more readily taken up if mixed feeding is used (Guaraldi and Salvatori 2012). Studies suggest that some breast milk is more effective in neutralizing the virus; however, more studies must be conducted to determine which of the components of the breast milk make it more effective in preventing the transmission of the virus (Shen et al. 2015).

BREASTFEEDING RATES AND HIV PREVALENCE IN CHILDREN

This section will investigate the breastfeeding rates of the three countries to be studied. It will also look into the HIV rates among children in these countries to determine whether there is a potential correlation between the breastfeeding rates and the number of children infected with HIV at birth. This will help determine whether breastfeeding practices affect the number of children that suffer from MTCT of HIV.

South Africa

South Africa has one of the highest HIV prevalence rates in the world, with an estimated 19.2 percent of adults between ages fifteen and forty-nine living with HIV in this country ("South Africa" 2016). According to the Department of Health in South Africa, approximately 29.7 percent of the pregnant women were suffering from HIV nationally as of 2013 (*The 2013 National Antenatal Sentinel* 2015). Moreover, the transmission rate of HIV from mother to child was found to be anywhere between twelve and twenty percent in 2009 (Villar-Loubet et al. 2013). This is a significantly high percentage considering that MTCT of HIV can be prevented if the proper methods and treatments are employed. In 2012, the HIV prevalence in children from zero to fourteen years of age was 2.4 percent, and the HIV prevalence in the age group from fifteen to twenty-four years of age was 7.1 percent (Shisana et al. 2014). By the end of 2015, it was estimated that 1.8 million children were living with HIV globally ("Global HIV/AIDS" 2016). This means that the global prevalence of HIV for children is much less than one percent; specifically, the child HIV prevalence is approximately 0.02 percent with the assumption that the world population was approximately 7.3 billion at the end of 2015 ("2015 World Population"

2015). Yet, South Africa has a child HIV prevalence rate over two percent, indicating that there is indeed a problem when it comes to children with HIV in this nation.

Table 1 and Figure 1 depict the infant feeding practices in South Africa. The data for these representations come from the UNICEF global database ("Global Database" 2016).

Table 1: Infant Feeding Practices and Rates in South Africa

Infant Feeding Practices	Rate
Early Initiation of Breastfeeding (<1 hour)	61.10%
Exclusive Breastfeeding (<6 months)	8.30%
Introduction to Solid, Semi-Solid, or Soft Foods (6-8 Months)	Unavailable
Breastfeeding at 1 Year (12-15 Months)	66.10%
Breastfeeding at Age 2 (20-23 Months)	30.60%

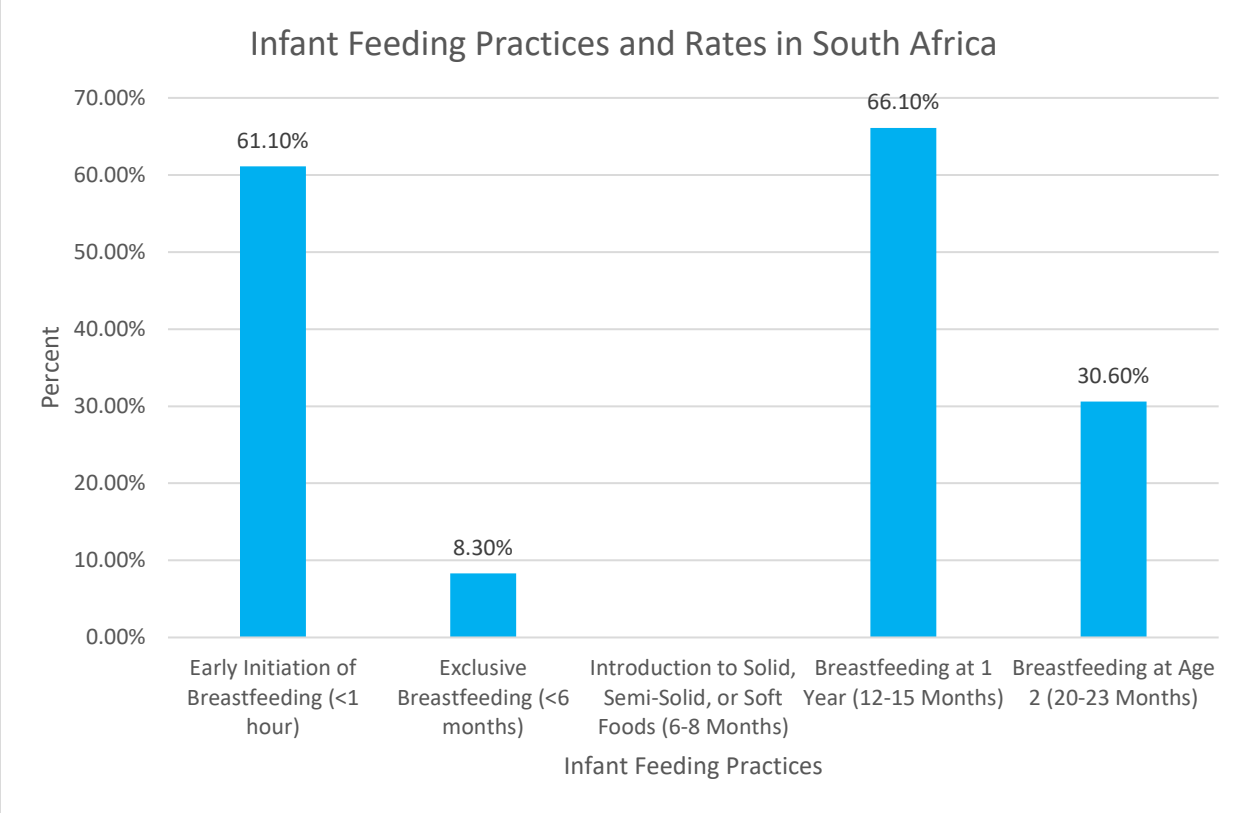

Figure 1: Infant Feeding Practices and Rates in South Africa

Eastern and Southern Africa have an exclusive breastfeeding rate of fifty-seven percent, which means that in these regions, fifty-seven percent of infants between zero to five months of age were exclusively breastfed ("Infant and Young Child" 2016). However, despite the fact that South Africa falls into this region, South Africa actually has one of the lowest breastfeeding rates in the world with an exclusive breastfeeding rate for less than six months of 8.3 percent (see Table 1 and Figure 1) ("Global Database" 2016). When compared to the global average breastfeeding rate of forty-three percent, it can be seen that South Africa has a breastfeeding rate that is indeed much lower than the global average ("Infant and Young Child" 2016). This low breastfeeding rate can be attributed to rising fears concerning HIV transmission from mother to

child in this nation ("UNICEF & WHO" 2012). Additionally, many of the mothers are not educated about the benefits of breastfeeding their babies and, as a result, many of the infants in South Africa are not exclusively breastfed ("UNICEF & WHO" 2012). This is further exemplified by the idea of AIDS denialism in South Africa (*Viral Mothers* 14). This concept refers to the belief that HIV does not cause AIDS, which has led to significant impacts on the public health policy approach to combating HIV in South Africa (*Viral Mothers* 14). This in turn has led to breastfeeding advocates claiming that "too many AIDS researchers are blind to–in denial of–the crucial contributions that breastfeeding makes to health" (*Viral Mothers* 14). Once again, this demonstrates a lack of knowledge on the benefits of breastfeeding, which could potentially be contributing to the low breastfeeding rates in this nation.

Although the overall breastfeeding rates in South Africa are very low, one study found that in a sample size of 1,372 infants who were born to infected mothers, 1,132 were exclusively breastfed from the start, which is approximately eighty-three percent of the infants (Coovadia et al. 2007). This investigation only studied clinics in KwaZulu Natal, South Africa, so it may not be representative of the entire pregnant women population of South Africa (Coovadia et al. 2007). However, the study did investigate seven rural clinics, one semi-urban clinic, and one urban clinic (Coovadia et al. 2007). Thus, while the results of this study should not be extrapolated to fit the entire nation, it does take into consideration the rural population by researching the breastfeeding practices of women who visit rural clinics, suggesting that there may be a correlation between high breastfeeding rates and the location in which the pregnant women live.

While the overall exclusive breastfeeding rate in South Africa is extremely low compared to other countries, its HIV prevalence in children is still high, especially compared to the global prevalence of HIV in children. Therefore, there does not appear to be an association between the breastfeeding rate and the child HIV rates in this country. However, there are other factors that could affect MTCT of HIV, some of which will be studied later in this investigation. Moreover, it was indicated that the one of the reasons for such low rates of breastfeeding was due to the possibility of transmitting HIV to a newborn. This suggests that infant feeding does indeed play a significant role in MTCT of HIV, especially if breastfeeding has been specifically discouraged by health workers in South Africa to help prevent the transmission of this disease. Thus, while the HIV prevalence in children and breastfeeding rates do not appear to be correlated with one another, one of the reasons that they do not correlate is due to the public's awareness of the fact that breastfeeding could cause potential health complications for newborns if they breastfeed from a mother who is infected.

India

India has an adult HIV rate of 0.43 percent ("HIV/AIDS in India" 2012). While this may not seem like a high prevalence rate, the population of India is so high that even 0.43 percent of the population amounts to 2.4 million Indians ("HIV/AIDS in India" 2012). Moreover, women account for thirty-nine percent of these infections and children account for approximately three percent of the infections in the nation ("HIV/AIDS in India" 2012). Once again, the prevalence of HIV in children in this nation is much higher than the global estimate, indicating that there is a problem that needs to be addressed to prevent further incidences of child HIV from occurring. Additionally, of the women affected with HIV, approximately 22,000 to 61,000 of them were

pregnant in 2009 (“Countdown to Zero” n.d.). This wide range in the number of pregnant women affected by HIV could be because many women do not go get tested and, therefore, are unaware of their HIV status. Overall, while the percentages in India may seem low, the large population of this nation makes it a concern and action must be taken to educate the population so that HIV incidences are lowered.

The following table and figure illustrate the infant feeding practices in India. The data for this table and graph come from the UNICEF global database (“Global Database” 2016).

Table 2: Infant Feeding Practices and Rates in India

Infant Feeding Practices	Rate
Early Initiation of Breastfeeding (<1 hour)	44.60%
Exclusive Breastfeeding (<6 months)	64.90%
Introduction to Solid, Semi-Solid, or Soft Foods (6-8 Months)	51.70%
Breastfeeding at 1 Year (12-15 Months)	84.80%
Breastfeeding at Age 2 (20-23 Months)	67.50%

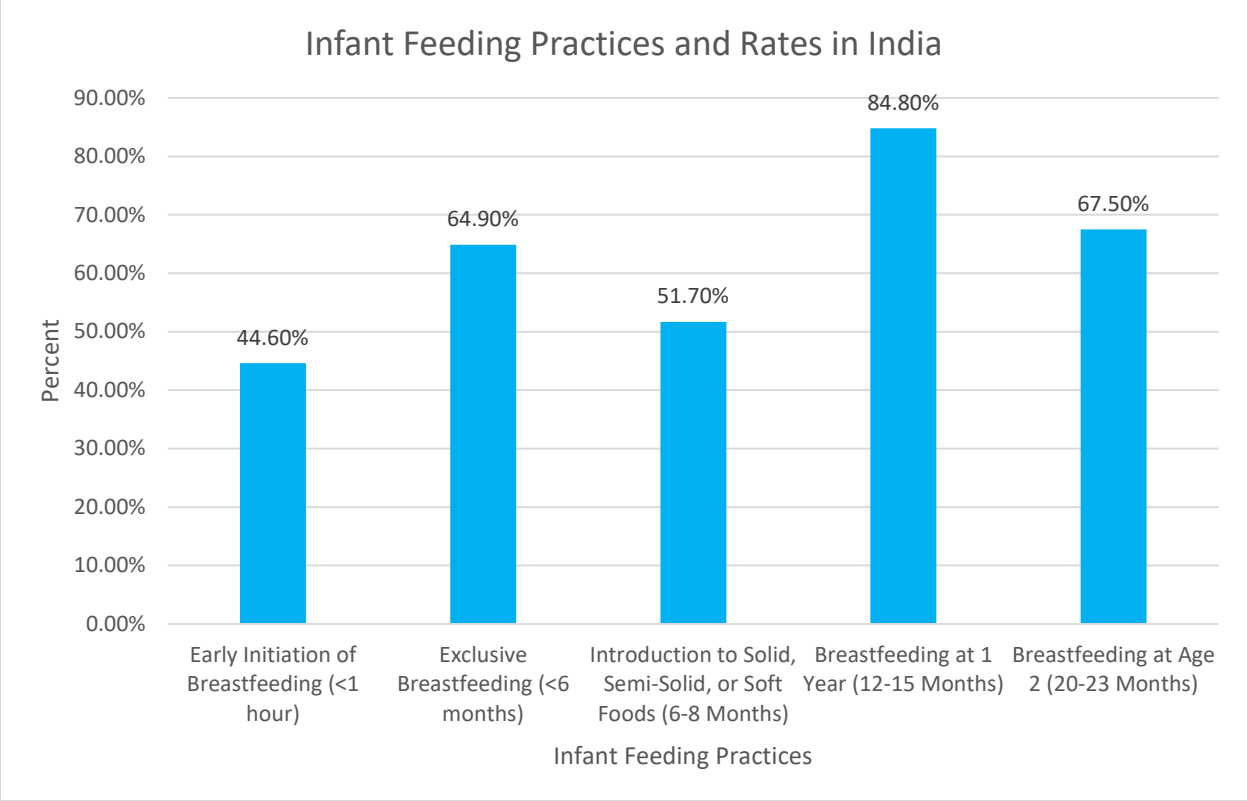

Figure 2: Infant Feeding Practices and Rates in India

South Asia, where India is located, has an approximate exclusive breastfeeding rate of fifty-nine percent, meaning that fifty-nine percent of the infants in South Asia are exclusively breastfed ("Infant and Young Child" 2016). As of 2015, India itself specifically had an exclusive breastfeeding rate for less than six months of 64.9 percent (see Table 2 and Figure 2) ("Global Database" 2016). This is much higher than both the average exclusive breastfeeding rates in South Asia and around the world. Furthermore, as seen in Figure 2 and Table 2, the breastfeeding rates at both one and two years of age continue to remain high. It is evident that the child HIV rates, HIV rates in pregnant women, and the breastfeeding rates are all significantly

high in India and, therefore, the breastfeeding practices in India can be further investigated to determine whether there is an actual correlation between all three of these factors.

United Kingdom

In the United Kingdom, there were approximately 101,200 people living with HIV in 2015 ("HIV and AIDS" 2017). The adult HIV prevalence is less than one percent; specifically, it is 0.16 percent ("HIV and AIDS" 2017). Of those with an HIV diagnosis in the United Kingdom, only 0.35 percent of them are children ("HIV in the UK" 2017). Thus, it is already evident that the United Kingdom has lower HIV rates than the previous two countries. Based on patients who received care in 2015, 1,383 infants, or less than two percent of them, were exposed HIV prior to or immediately after birth ("HIV in the UK" 2017). In 2015, 860 women infected with HIV gave birth, and only one of those children is known to have contracted the virus from the mother ("HIV and AIDS" 2017). In addition, only twenty-three children received a new diagnosis of HIV in 2015 and of these twenty-three children, seventeen of them came from abroad (HIV and AIDS" 2017). Fewer and fewer children are acquiring this disease from MTCT of HIV in the United Kingdom, suggesting that the nation has taken the appropriate prevention methods to combat the spread of the virus.

The table and figure below show the infant feeding practices in the United Kingdom. The data for this table and figure is discussed in the following paragraph.

Table 3: Breastfeeding Rates in the United Kingdom

Time of Breastfeeding	Rate
Initial Breastfeeding Rate	81.00%
Exclusive Breastfeeding Rate at 3 Months	17.00%
Exclusive Breastfeeding Rate at 4 Months	12.00%
Exclusive Breastfeeding Rate at 6 Months	1.00%
Breastfeeding Rate at 1 Year	0.50%

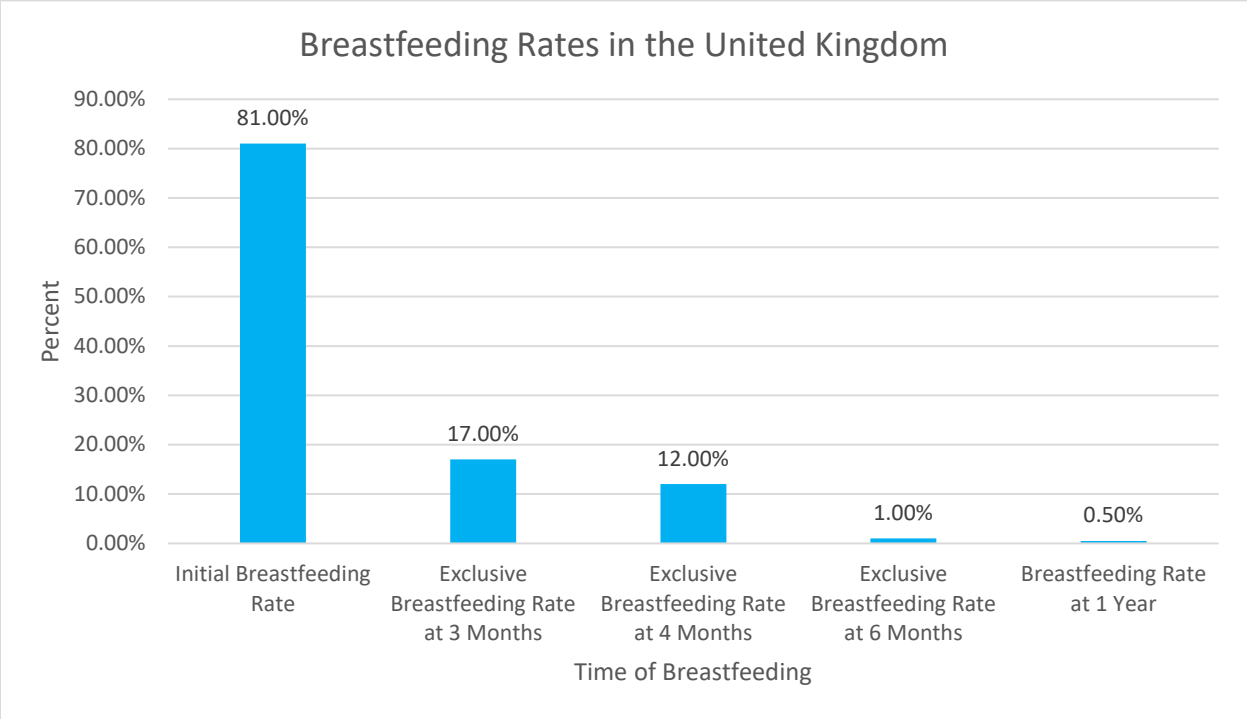

Figure 3: Breastfeeding Rates in the United Kingdom

There is limited data on infant feeding practices in Western Europe. In most European regions, it is estimated that twenty-five percent of infants are exclusively breastfed by their mothers, which is lower than the global average of forty-three percent ("Infant and Young Child" 2016). However, as shown in Table 3 and Figure 3 above, the exclusive breastfeeding rates in the

United Kingdom are even lower than the average for the European regions. The initial breastfeeding rates in the United Kingdom are high, with the breastfeeding rate being eighty-one percent in 2010 when mothers first initiate breastfeeding ("Incidence, Prevalence, and Duration" 2012). However, the exclusive breastfeeding rate in this nation at three months went down to seventeen percent in 2010 ("Breastfeeding Rates" n.d.). This percentage decreased to twelve percent for mothers exclusively breastfeeding at four months and was around one percent for mothers exclusively breastfeeding at six months ("Breastfeeding Rates" n.d.). At one year of age, the breastfeeding rate was 0.5 percent (Victoria et al. 2016). All of this data has been depicted in the table and figure above. Thus, when compared to the other nations' exclusive breastfeeding rates at six months or less, the United Kingdom's breastfeeding rates are also low. Thus, both the breastfeeding rates and HIV prevalence in children in this country are low. However, it cannot be known whether the low HIV prevalence rates are a result of the naturally lower breastfeeding rates in this nation or whether it is because there are other factors involved, such as the implementation of certain treatment methods.

Comparison of the Three Countries

All three countries have unique breastfeeding rates and different HIV prevalence rates in children. Furthermore, the women living in these nations have varying access to the treatments for HIV. Table 4 and Figure 4, shown below, are a visual representation of the aforementioned statistics for the three nations. This table and graph both illustrate the differences between the exclusive breastfeeding rates and the HIV prevalence in children in each of the countries and globally. There is no visible trend among the three countries; South Africa has a high child HIV prevalence and a low breastfeeding rate while India has both a high child HIV prevalence and

high breastfeeding rate. The percentage of pregnant women accessing ART in these countries is also included, which was obtained from UNICEF statistical data ("Great Progress" 2016). While the percentage of pregnant women receiving ART is high in South Africa, with over ninety-five percent of the women receiving treatment, the child HIV prevalence is still similar to that of India's, where only thirty-eight percent of the women are receiving ART ("Great Progress" 2016). This indicates that breastfeeding may not be the only factor that drives HIV rates in children in these countries. Even when so many pregnant mothers with HIV have access to treatment in South Africa, there is still a high child HIV prevalence. This could be a possible indication of noncompliance in the mothers receiving treatments for HIV; this inability to comply with the treatment regimens could be due to a number of different factors including social influences, inability to afford treatment for extended periods, or even the AIDS denialism mentality that was discussed previously. Furthermore, the data for the number of pregnant women receiving ART in the United Kingdom was unavailable; however, due to the universal health care system in this nation, it is possible that many of the mothers do have access to the care they need to prevent MTCT from occurring.

Table 4: Exclusive Breastfeeding Rates, HIV Prevalence in Children, and Pregnant Women Accessing ART in South Africa, India, the United Kingdom, and the World

Country	Exclusive Breastfeeding Rates (<6 months)	HIV Prevalence in Children	Pregnant Women Accessing ART
South Africa	8.30%	2.40%	>95.00%
India	64.90%	3.00%	38.00%
United Kingdom	12.00%	0.35%	
World	43.00%	0.02%	70.00%

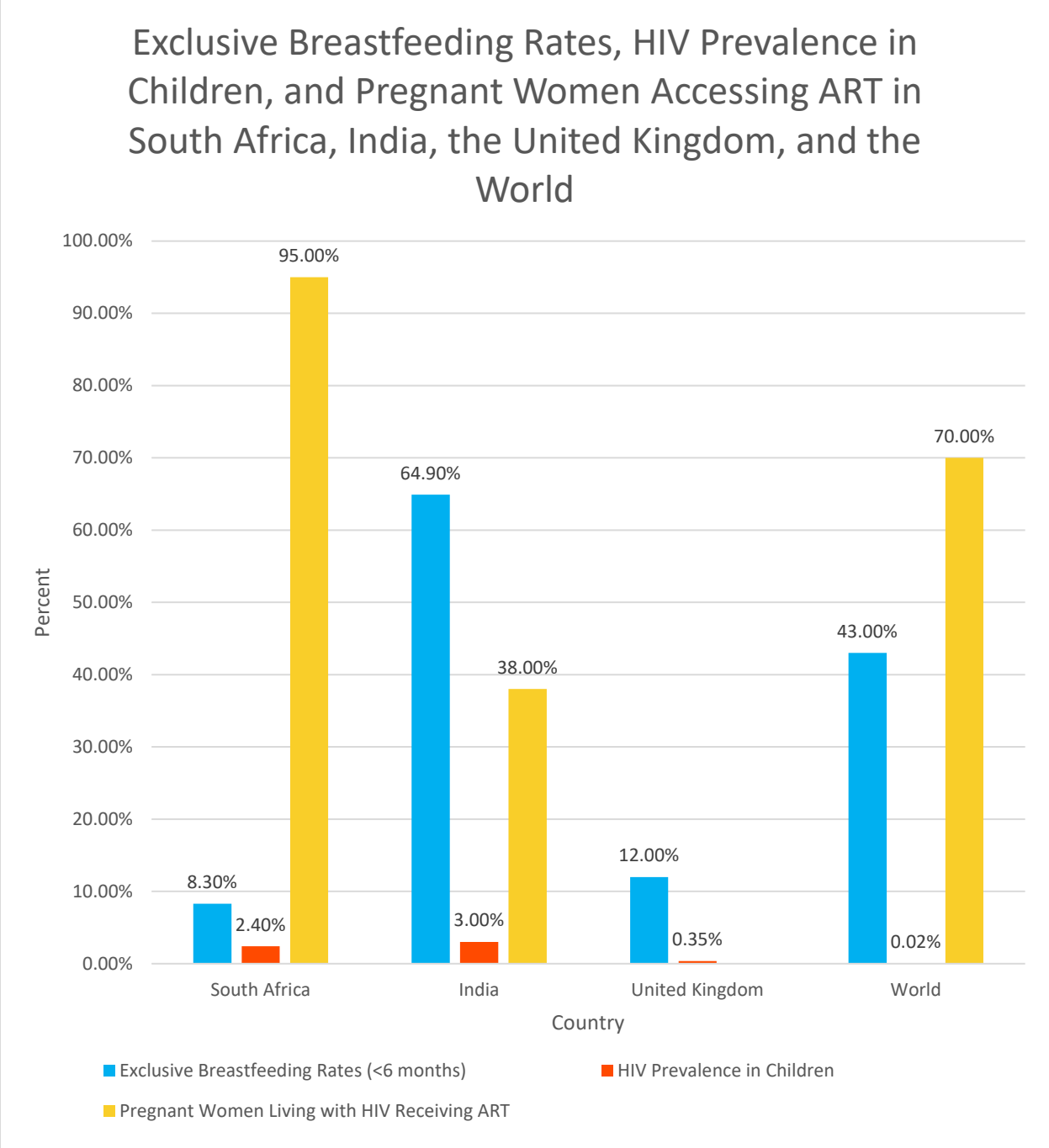

Figure 4: Exclusive Breastfeeding Rates, HIV Prevalence in Children, and Pregnant Women Accessing ART in South Africa, India, the United Kingdom, and the World

Figure 5, shown below, illustrates the different infant feeding practices in all three countries in one graph; some of the data for the United Kingdom and South Africa was not available, but the figure still shows the stark contrast in breastfeeding practices between the three nations. These dissimilarities in the breastfeeding rates, infant feeding practices, and child HIV prevalence can be attributed to a number of various factors, including but not limited to, cultural influences, socioeconomic factors, and availability of resources in the country itself. As previously mentioned, it is unknown as to exactly which factors contribute to the lower rates of child HIV in the United Kingdom and the higher rates found in South Africa. Thus, these factors will be further investigated throughout the course of this paper, and any similarities among the countries will be noted as well.

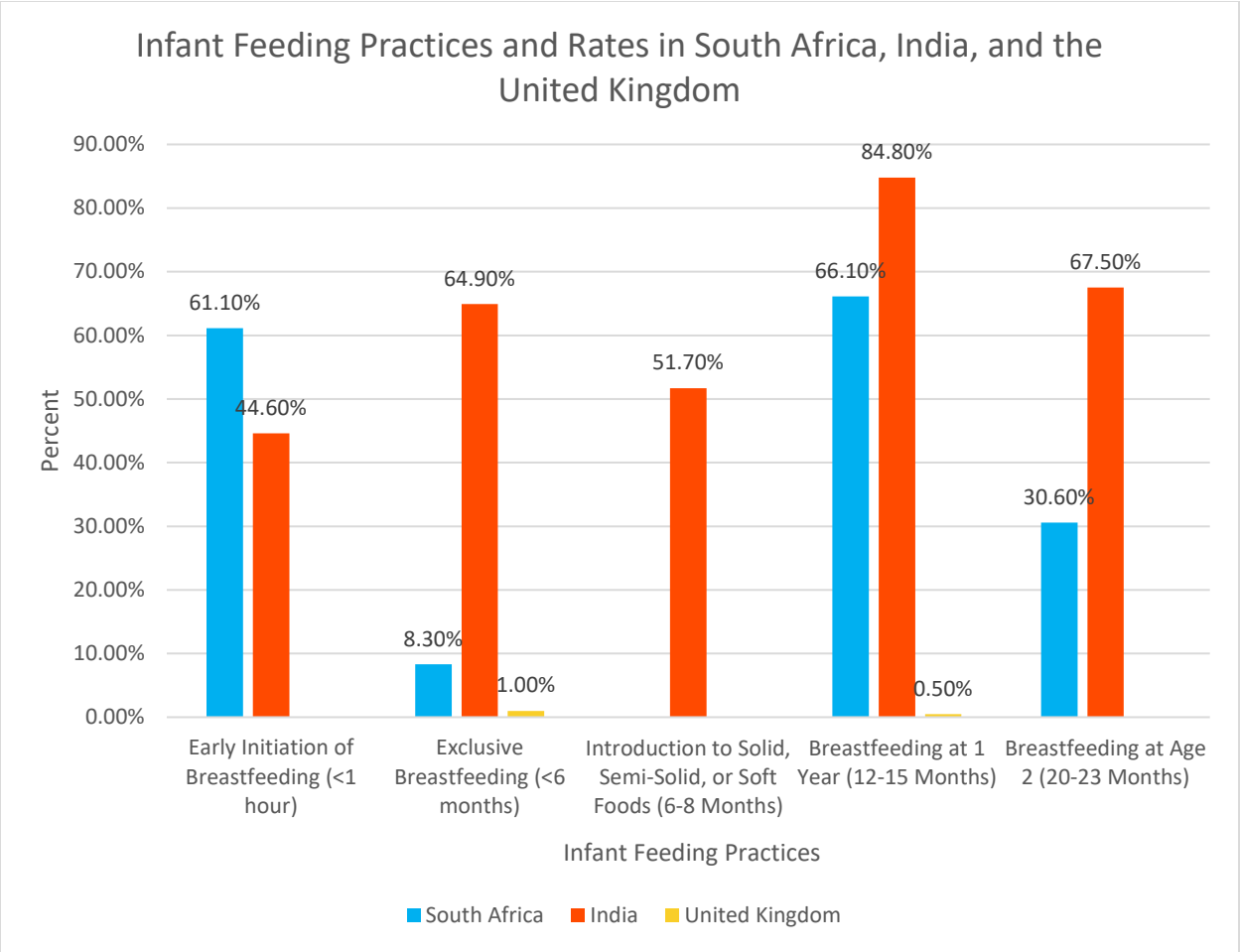

Figure 5: Breastfeeding Practices and Rates in South Africa, India, and the United Kingdom

SOCIAL AND CULTURAL FACTORS AFFECTING BREASTFEEDING PRACTICES

This section will focus on determining how various social and cultural practices can affect the breastfeeding practices in the three countries. While there was no apparent correlation between the breastfeeding rates in the countries and the number of children infected with HIV at birth, this section can still help expand on exactly what practices are leading to the respective breastfeeding rates. Because breastfeeding has been proven to be a method of MTCT of HIV, this information could then be potentially used to create treatment and counseling programs to assist HIV infected mothers prevent the virus from being transmitted to their children.

South Africa

In South Africa, the status of the woman could affect how she chooses to feed her child. In one study performed in the Mpumalanga Province of South Africa in communities with few resources, researchers investigated how the extended families of women could affect the feeding practices of the mothers (Mphego et al. 2014). This study specifically focused on HIV-positive women who were receiving treatment for MTCT of HIV (Mphego et al. 2014). Many of the women were unemployed, single, and living in households with their extended families and, as a result, there was added pressure from the family on how to feed the baby (Mphego et al. 2014). The family tended to interfere with the mother's care of the child, insisting that she should feed her child formula, solid foods, and other water-based fluids (Mphego et al. 2014). If these pressures are also present in other households outside of this province, it could potentially explain the lower breastfeeding rates in South Africa. If the families are uneducated, they may believe that a mixed diet or avoiding breastfeeding altogether could reduce the chance of HIV

transmission from the mother to the child, leading to fewer mothers exclusively breastfeeding their children. However, international guidelines state that in resource-poor regions, mothers should exclusively breastfeed to reduce the risk of transmission, presenting a problem when mothers do not adhere to these recommendations (*Guidelines on Infant Feeding* 2010).

Along with the familial intervention on how to feed the infant, cultural factors also affected the infant feeding practices by these mothers (Mphego et al. 2014). The extended family exerted pressure on the mother to partake in cultural practices, some of which involved giving the baby traditional medicine as an alternative treatment for the disease (Mphego et al. 2014). However, despite all of these pressures, it was found that many women did not listen to these suggestions and instead adhered to the prevention methods suggested by health professionals and continued to exclusively breastfeed their children (Mphego et al. 2014). Thus, these women were more concerned about the wellbeing of their children and did not succumb to the cultural and social pressures presented by their extended families. While these women were able to overcome these pressures, the fact that the extended families were intervening poses a risk because it is possible that some women would follow the family's suggestions, leading to health risks for the baby. In fact, one study showed that some women do struggle with autonomy regarding infant feeding in households (Doherty et al. 2006). Therefore, family members and other community members should be included in HIV counseling so that they are aware of the risks at hand and can support the mother through the prevention process (Mphego et al. 2014).

Other factors that affect breastfeeding practices are mainly socioeconomic. Women who work or attend school experience difficulties in being able to exclusively breastfeed, leading to lower rates of breastfeeding (Frans et al. 2015). Health issues have also prevented mothers from

exclusively breastfeeding their children (Frans et al. 2015). While sometimes health issues cannot be avoided, there is also a possibility that depending on the socioeconomic status of some women, they may not be able to obtain the proper care they need. Thus, this is another indirect way in which the status of a women could affect breastfeeding rates. Moreover, it was discovered that family pressures are not restricted to only HIV-positive women; women all over South Africa must deal with interventions by family members when it comes to infant feeding practices (Frans et al. 2015). Once again, these family members pressure the mothers to feed the baby other alternatives to breast milk, leading to the lower breastfeeding rates found in the nation. Overall, the lack of education regarding the health benefits of breastfeeding children causes families and mothers to mistakenly assume that alternative sources to breast milk may be better nutritional options for the infants. Thus, the social status of women can play a major role in infant feeding practices in South Africa.

India

Breastfeeding rates in India can vary depending upon location and other socioeconomic factors. In one study, it was discovered that the exclusive breastfeeding rates could vary depending on whether the woman was in a rural setting or in an urban setting (Oommen et al. 2009). In India, ninety-eight percent of the children are breastfed; however, mothers in urban areas tended to use a mixed diet because formula is more easily accessible and because there are a larger number of cesarean sections in these areas, making it more difficult for mothers to exclusively breastfeed (Alvarez-Uria et al. 2012; Oommen et al. 2009). Generally, mothers who have had a cesarean section experience a delay in breastfeeding with their infants at the beginning when compared to mothers who give birth vaginally (Rowe-Murray and Fisher 2002).

This presents a problem since a mixed diet for newborns with HIV-infected mothers leads to a higher risk of transmission of HIV from the mother to the child via the breast milk (Alvarez-Uria et al. 2012). Thus, this study shows another more specific way in which social factors, which in this case were the locations in which the patients lived, can influence MTCT of HIV.

Another study investigated the determinants of breastfeeding in rural India. Specifically, the researchers determined how maternal autonomy could affect breastfeeding practices (Shroff et al. 2011). Factors such as financial autonomy, ability to make decisions, freedom of movement, and domestic violence acceptance were all considered in this study (Shroff et al. 2011). Results showed that mothers who had more financial autonomy were more likely to exclusively breastfeed their infants between three and five months of age, regardless of the other factors that affect maternal autonomy (Shroff et al. 2011). This could be due to the fact that women who had more financial autonomy were more likely to seek antenatal care and, therefore, were able to receive advice about breastfeeding to which other women living in rural India may not have access (Mistry et al. 2009). This could also be applied to pregnant women living with HIV in rural India as well; if an HIV-positive woman has financial autonomy and is able to seek care while pregnant, there is a higher chance that she will be more aware of HIV transmission risks to her child. Thus, receiving antenatal care means that she would be advised about the risks associated with infant feeding and HIV transmission, potentially reducing the likelihood that the woman would make a decision that is detrimental to her baby's health and lowering the chance that MTCT of HIV would occur.

Factors other than location can affect breastfeeding in India. One study found that women from low-income backgrounds and high-income backgrounds were more likely to breastfeed

their children for a longer period of time than women coming from middle-income backgrounds (Mehta et al. 2017). This could potentially be due to the fact that women from middle-income backgrounds generally go to work and, as a result, this may hamper the mother's ability to breastfeed the infant (Mehta et al. 2017). To further add to this, it was found that more traditional women, or women who live in rural areas, get married at a young age, and generally do not work, tended to have extended breastfeeding periods (Mehta et al. 2017). Because these women do not have to work and are married at a young age, they have more time to spend with their infants and, therefore, they are able to breastfeed them for longer periods of time. On the other hand, women from the middle class tended to breastfeed less, potentially because once again, they live in more urban areas where they must work (Mehta et al. 2017). Thus, socioeconomic factors also affect breastfeeding practices, which contribute to the high breastfeeding rates in India.

United Kingdom

In the United Kingdom, one factor that affects breastfeeding practices for mothers is the stigmatization surrounding the idea of breastfeeding. Breastfeeding is promoted in this country, leading to high initiation rates; however, after a certain period of time, it is not considered socially acceptable to continue breastfeeding (Tomori et al. 2016). More specifically, it is rare for mothers to breastfeed for longer than six months and it is even more uncommon after one year of age (Tomori et al. 2016). This is due to the fact that beyond this age, if mothers continue to breastfeed their children, they are looked down upon and face judgment from their peers (Tomori et al. 2016). This judgment is exemplified by opposition to breastfeeding in public when breastfeeding mothers are told to leave public areas such as restaurants and stores (Faircloth 48).

In fact, women who breastfeed beyond six months or one year of age are told that the practice is "odd," "disgusting," or even "unnatural" (Tomori et al. 2016). To avoid this judgment, mothers maintain secrecy and avoid those who may judge them for continuing to breastfeed even past the socially acceptable age (Tomori et al. 2016). The stigmatization that mothers may face while breastfeeding may lead them to perceive that despite "whatever others profess, they do not really 'accept' [the mothers] and are not ready to make contact with them on 'equal grounds'" (Goffman 16). This perception, along with evasion from their peers to avoid judgement, can often lead to feelings of social isolation for the breastfeeding mothers (Tomori et al. 2016). To add to this, mothers in the United Kingdom tend to feel that long-term breastfeeding is not supported by health professionals (Tomori et al. 2016). This also leads to mothers avoiding certain health professionals for fear of being judged, which would potentially lead to mothers not receiving the health information they need regarding breastfeeding (Tomori et al. 2016).

An increasing number of mothers turn to formula feeding in the United Kingdom to avoid these social consequences of breastfeeding for too long. Because formula is more readily available, it is the more normative method in which to feed infants (Tomori et al. 2016). Furthermore, it does not have any cultural or social implications associated with it and, therefore, it is more readily used by mothers (Tomori et al. 2016). As a result, formula feeding has a high prevalence in this nation (Tomori et al. 2016). These social stigmatizations surrounding breastfeeding could be one of the reasons why the United Kingdom has a lower breastfeeding rate when compared to the global average. Moreover, since mothers have access to formula, this could lead to fewer mothers to exclusively breastfeed in this nation since they have an alternate source. This could also be one of the ways in which breastfeeding practices lead to lower rates of

MTCT of HIV in the United Kingdom. Since many women already turn to formula as an alternate source for breastfeeding due to social implications and since formula is obtainable, it is potentially easier for mothers in this country to avoid breastfeeding if it poses a health risk to the child. This, combined with the resources available in the nation and the fact that mothers have access to treatment, could all theoretically lead to a lower risk of HIV transmission from mother to child through breastfeeding.

Portrayal of bottle-feeding by the media can also influence breastfeeding practices in the United Kingdom. In many television shows, such as soap operas, the actresses are commonly seen bottle-feeding their infants (Faircloth 48). This can also be seen in advertisements, even those that do not specifically have anything to do with infant feeding (Faircloth 48). Moreover, the baby bottle serves as a symbol to represent a baby changing room in public areas (Faircloth 48). Baby bottles also make appearances on maternity cards as well as with dolls or with pictures of babies (Faircloth 48). The prominence of baby bottles in this society can potentially lead mothers to turn to formula feeding rather than breastfeeding merely because bottle-feeding is so commonly portrayed in the media and in public. While the placement of baby bottles in the media may not be intentional, it could still possibly influence mothers to provide their infants with formula feed rather than breast milk. Because the media is a prominent entity in developed countries such as the United Kingdom, it is important to consider this as a possible factor that contributes to the low breastfeeding rates in this nation.

Socioeconomic factors also play a role in breastfeeding practices in the United Kingdom, just as they did in both South Africa and India. Breastfeeding rates in this country, including both initiation and duration of breastfeeding, were lowest among women who were living in areas

with scarce resources, had lower levels of education, and were of a lower socioeconomic status (Renfrew et al. 2012). Additionally, lower breastfeeding rates were also seen among younger mothers and women who had a white ethnicity (Renfrew et al. 2012). This is mainly due to the fact that there is a higher chance that women will follow the breastfeeding practices of their mothers (Renfrew et al. 2012). In certain low-income communities, breastfeeding is a rare occurrence and formula is used instead, leading to the lower breastfeeding rates that are seen in this nation (Renfrew et al. 2012). Many of the women who are not properly educated are unaware of the fact that there are health benefits to breastfeeding infants and, as a result, they tend to forgo breastfeeding. Additionally, when health professionals suggest other alternatives for breast milk, these women may believe that it is a better option than actually breastfeeding (Renfrew et al. 2012). In fact, both health professionals and consumers often assume that breastfeeding and bottle-feeding are equivalent to one another, even though both methods of feeding are very different from each other and have different effects on the baby (Van Esterik 188). Thus, these mistaken assumptions can lead to lower breastfeeding rates. Furthermore, it is possible that women from areas where there is a lack of resources and who have a lower socioeconomic status work longer hours, reducing the time that they have to breastfeed their children. Thus, social factors over which there may be no control can also influence breastfeeding rates, further contributing to the overall low breastfeeding rates in the United Kingdom.

TREATMENT METHODS FOR MTCT OF HIV AND THEIR EFFECTIVENESS

There is a large assortment of treatment methods for MTCT of HIV, ranging from administration of medicine to counseling programs designed to advise the affected mother. First, the section will discuss the recommended treatment guidelines. It will then focus on the treatment methods employed in the three nations and will analyze research articles that study the effectiveness of these treatment methods in the respective countries. These treatments have served a major function in the fight to eradicate MTCT of HIV and, as a result, this is an important aspect to consider when determining the role of breastfeeding in the spread of HIV.

Recommended Guidelines Set by the World Health Organization

The World Health Organization (WHO) has set forth many guidelines with the goal of eliminating the transmission of HIV from mother to child. They cover the preferred treatment methods for mothers suffering from HIV. These guidelines include recommendations regarding breastfeeding for mothers with HIV as well. Figure 6, shown below, summarizes the proposed approach to help combat MTCT of HIV. As shown by the highlighted portion of this chart, the treatment given to both the mother and infant during the postpartum period is modified depending on the infant feeding method of choice. This indicates that the method of feeding is significant enough that the treatment must be altered according to which feeding practice is used. Furthermore, the recommendations in the chart address breastfeeding only practices and replacement feeding only practices. Since mixed feeding is not suggested for mothers with HIV, it is not even taken into consideration in this algorithm.

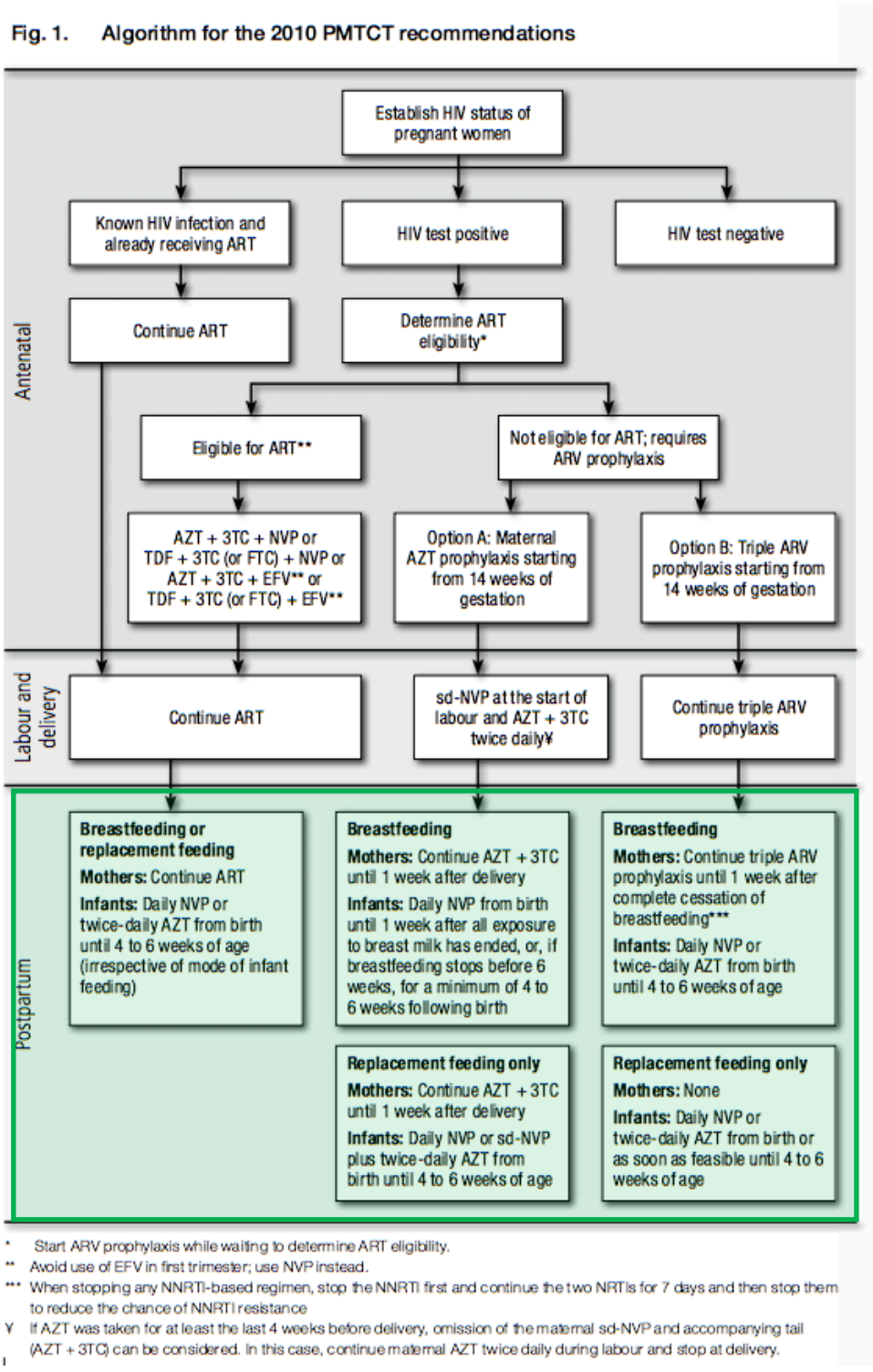

Figure 6: Algorithm for the 2010 Prevention of MTCT Recommendations (Source: *Antiretroviral Drugs for Treating Pregnant Women and Preventing HIV Infection in Infants*)

Over the years, the WHO guidelines have changed as more research has been conducted regarding the transmission of HIV from mother to child. One major change to the 2010 guidelines can be seen in the following recommendation made in 2013:

> ART should be initiated in all pregnant women and breastfeeding women living with HIV regardless of WHO clinical stage and at any CD4 cell count and continued lifelong (strong recommendation, moderate-quality evidence) (*Consolidated Guidelines* 2016).

The algorithm shown in Figure 6 shows that there was an eligibility requirement for patients to receive ART according to the 2010 guidelines. The eligibility status of the pregnant mother depended upon the CD4 T cell count and the stage of clinical infection present in the mother (*Consolidated Guidelines* 2013). However, with the new recommendation instated in 2013, eligibility is no longer a determinant in whether a mother can receive the appropriate treatment and, therefore, it is recommended that anyone who has received an HIV diagnosis should opt for treatment (*Consolidated Guidelines* 2013). The change made to these guidelines can be seen in Table 5, shown below, with "Option B+," which is the treatment option that involves initiating ART in all pregnant women. Furthermore, it can be seen in this table that the treatment for the HIV-exposed infant is still similar to the treatment that was recommended in the 2010 algorithm, showing that these guidelines were not changed over the years, and mixed feeding diets are still not recommended for infants with HIV-positive mothers.

Table 7.3 Programme options for ART for PMTCT

<table>
<tr><th>National PMTCT programme option</th><th colspan="2">Pregnant and breastfeeding women with HIV</th><th colspan="2">HIV-exposed infant</th></tr>
<tr><td rowspan="2">Use lifelong ART for all pregnant and breastfeeding women ("Option B+")</td><td colspan="2">Regardless of WHO clinical stage or CD4 cell count</td><td>Breastfeeding</td><td>Replacement feeding</td></tr>
<tr><td colspan="2">Initiate ART and maintain after delivery and cessation of breastfeeding</td><td rowspan="3">6 weeks of infant prophylaxis with once-daily NVP</td><td rowspan="3">4–6 weeks of infant prophylaxis with once-daily NVP (or twice-daily AZT)</td></tr>
<tr><td rowspan="2">Use lifelong ART only for pregnant and breastfeeding women eligible for treatment ("Option B")</td><td>Eligible for treatment[a]</td><td>Not eligible for treatment[a]</td></tr>
<tr><td>Initiate ART and maintain after delivery and cessation of breastfeeding [b]</td><td>Initiate ART and stop after delivery and cessation of breastfeeding [b,c]</td></tr>
</table>

[a] CD4 count ≤500 cells/mm³ or clinical stage 3 or 4 disease at the time of ART initiation or in accordance with national guidelines.
[b] Patients who develop clinical or laboratory criteria indicating failure during pregnancy or the breastfeeding period should be assessed for second-line therapy.
[c] In the case of breastfeeding stop ART one week after breastfeeding ends. In the case of replacement feeding stop ART after delivery.

Table 5: Program Options for ART for Prevention of MTCT (Source: *Consolidated Guidelines on the Use of Antiretroviral Drugs for Treating and Preventing HIV Infection*, 2013)

The recommendations for breastfeeding practices also depend on the individual circumstances of the mother. In general, HIV-positive mothers are advised to avoid all breastfeeding if it is possible for her to provide the adequate nutrition to the infant in another way (*Guidelines on HIV* 2010). However, if the mother is not able to provide her infant safe alternative sources to breast milk, then it is recommended that she exclusively breastfeed her baby for six months (*Guidelines on HIV* 2010). As previously mentioned, mixed diets present a

higher risk for the infant and, therefore, this is not recommended. It was also found that government authorities in countries that have access to resources recommend avoiding all breastfeeding (*Guidelines on HIV* 2010). This can be attributed to the fact that women living in resource-rich nations have access to safe alternative sources to breast milk, allowing them to provide a healthy lifestyle for the baby even without breastfeeding. Furthermore, some of the leaders in these countries went so far as taking away infants from their mothers if the HIV-positive mothers chose to breastfeed (*Guidelines on HIV* 2010). The rationale behind this is that pursuing breastfeeding even when aware of the risks that it presents for infants can constitute as neglect or abuse (*Guidelines on HIV* 2010). An example of this can be seen with Kathleen Tyson, an HIV-positive woman mother who stopped ART during pregnancy and made the decision to breastfeed her newborn son in the late 1990s (*Mother's Milk* 236). This woman lost custody of her child to the state government of Oregon in the United States (*Mother's Milk* 236). This is not an isolated incidence in the United States, and it has also been an issue in other countries as well, showing exactly how much of a concern breastfeeding is in the transmission of HIV from mother to child.

South Africa

The prevention efforts of MTCT of HIV in South Africa are comprehensive and include HIV testing, antiretroviral prophylaxis, and counseling; therefore, there are many different methods in which transmission of HIV can be combated (Villar-Loubet et al. 2013). One study conducted in Cape Town, South Africa looked into the viral load of mothers affected with HIV and the effect that the treatment regimen recommended by the WHO had on the viral loads. The guidelines recommended by the WHO included initiating ART in pregnant women, which is the

routine treatment (Myer et al. 2016). As mentioned in the previous section, prior to June 2013, there were local limitations as to who was eligible for ART; this eligibility was dependent on the patient's CD4 T cell count, which was based on a 2010 WHO recommendation (Myer et al. 2016). However, from July 2013 onwards, this eligibility requirement was modified to include any mother infected with HIV, regardless of her disease status or CD4 T cell count (Myer et al. 2016). This was changed based on the WHO recommendation that was released in 2013 (Myer et al. 2016).

Furthermore, in this study, the ART given to the mother included tenofovir, which is an ARV used to slow down the progression of HIV (Myer et al. 2016). It was found that routine prevention methods for MTCT of HIV lead to large declines in the maternal viral load, which in turn reduces the risk of the virus being passed on to the child (Myer et al. 2016). In fact, with the initiation of this treatment regimen during pregnancy, the early MTCT risk was as low as 1.3 percent, which is comparable to transmission rates in North America or Europe (Myer et al. 2016). Thus, the recommended WHO guidelines that are implemented locally in Cape Town are effective in preventing MTCT of HIV, and these methods should continue to be used for mothers suffering from HIV to combat the spread of this disease from mother to child. However, despite the fact that these methods have been proven to be effective in this study, these treatments are not available for everyone and, therefore, resources must be more readily available to both encourage women to receive treatment as well as actually provide the necessary treatment.

Beyond direct medical treatment, other treatment methods that take social influences into consideration have also been studied in South Africa. One study in particular discovered that there is a link between preventing MTCT of HIV and intimate partner violence that takes place

in households. This study, which focused on thirty-two pregnant women affected with HIV from Johannesburg, found that intimate partner violence could lead to potential challenges for the mothers to follow the treatment regimen that was set up for them (Hatcher et al. 2016). If the mother finds it difficult to follow the proper treatment plan, it presents a health hazard to both the mother and the infant since the mother is not properly taking care of herself as she should be. Moreover, South African guidelines discuss the importance of disclosing HIV information with partners and encourage health workers to promote communication between partners (Hatcher et al. 2016). However, these guidelines fail to take into consideration the effects this may have if a violent partner is involved (Hatcher et al. 2016). There is little evidence to indicate that health workers in these regions understand the gravity of these situations and these guidelines must therefore be modified to account for intimate partner violence (Hatcher et al. 2016).

Perhaps one of the most notable aspects of this study was the inclusion of the testimonies of these affected women who had experienced domestic violence with their partners. Many expressed concern over forgetting to take medication because they were overwhelmed by the immediate stress caused by experiencing violence from their partner (Hatcher et al. 2016). Because these women had more the more pressing concern of dealing with the violence, they tended to forgo HIV care since it did not seem as important at the time and, therefore, did not take priority (Hatcher et al. 2016). In fact, one woman by the name of Ayanda admitted that "what worries [her] is that [she] will default when [she is] breastfeeding the child" in regards to taking her medication consistently (Hatcher et al. 2016). If these women do not properly follow the treatment regimen and forgo taking the medicine, there is a higher risk of the virus being transmitted from mother to child through breastfeeding, indicating that domestic partner violence

can play a critical role in halting the prevention of HIV transmission to a child. Additionally, this indirectly links partner violence with breastfeeding as a method of MTCT of HIV since infected mothers who do not undergo treatment and then breastfeed run the risk of transmitting the virus to the infant.

Although this study only interviewed thirty-two women, which is a limited sample size, other studies have shown that relationships with partners play an essential role when it comes to obtaining the appropriate treatment in developing countries such as South Africa (Medley et al. 2004). Thus, it is imperative that health workers and policy makers establish guidelines that take into consideration the environment that some of these women may live in due to intimate partner violence (Hatcher et al. 2016). By doing so, these women may be able to gain more confidence and can be encouraged to put their own health first rather than being violently condemned by their partners for seeking care for HIV. This in turn will prevent MTCT of HIV since the mothers will be taking care of themselves, leading to a lower risk of transmission postpartum, such as when they are breastfeeding their infants. While it may not be known exactly how many women risk transmitting HIV to their children through breastfeeding due to intimate partner violence, it is clear that these issues must be addressed so as to prevent further occurrences. Thus, social factors must also be taken into consideration when establishing treatment guidelines for those infected with HIV in countries such as South Africa, where familial partnerships do play such a large role in the daily lives of women and can go so far as to influence the quality of the treatment they receive.

India

In India, prevention methods for MTCT of HIV are mainly incorporated into the public health systems by State AIDS Control Societies (Gupta et al. 2015). These organizations advocate for integrated counseling centers and testing centers in the private hospitals (Gupta et al. 2015). However, the private hospitals in Delhi do not integrate any such methods into their treatments to prevent the transmission of HIV from mother to child (Gupta et al. 2015). Moreover, ninety-four percent of the physicians at the private hospital were aware of the necessary protocol for breastfeeding for infants at risk of contracting HIV from their mothers (Gupta et al. 2015). While this is a significant number of physicians who do know the protocol, there are still doctors who are not aware and, therefore, there are still some HIV infected patients that may not receive the proper treatment they need. To add to this, the pediatricians were not aware of the national protocol that is used to diagnose infants early with HIV (Gupta et al. 2015). Thus, it is evident that the physicians in Delhi are not necessarily knowledgeable about the information they need to properly be able to treat mothers and children with HIV. Installation of integrated counseling centers and testing centers in private hospitals in Delhi, as they have been implemented in other private hospitals throughout the nation, would help educate the physicians of the national protocols in place to prevent MTCT of HIV. Moreover, the counseling services would help inform affected mothers about the risks of breastfeeding, which would in turn be effective in combating MTCT of HIV in India.

Another study executed in Delhi analyzed the counseling services for MTCT of HIV that are provided by tertiary care hospitals. These counseling services were developed under the overall national program to prevent parent-to-child transmission of HIV (Kumar et al. 2015). It

was found that while the services were readily provided to parents expecting children, there were still many issues with these programs, making them ineffective in combating MTCT of HIV (Kumar et al. 2015). These issues include lack of confidentiality, discrimination towards HIV-positive patients, and poor communication skills between the counselors and the patients, among other factors (Kumar et al 2015). When it came to discussing the issue of breastfeeding when the mother is HIV-positive, 73.3 percent of the women were advised about it (Kumar et al. 2015). However, in the presence of the husband, this percent went up to eighty-seven percent, suggesting that there may be a discrepancy in the counseling that women receive depending upon whether or not their partners are present for the session (Kumar et al. 2015). Furthermore, these percentages, while high, show that not every woman is being advised about the risk that breastfeeding may have for an infant if the mother is infected with HIV.

To further illustrate the ineffectiveness of treatment approaches in India, another study discovered that there is a serious lack of promotion of programs to increase awareness of the dangers of transmitting the virus from mother to child. In this study, the researchers investigated how much pregnant women know about HIV transmission from mother to child at an antenatal clinic in Bhopal, India (Parmar et al. 2016). Of those who responded to the surveys, it was found that sixty-six percent of the women were aware that an unborn child could contract the virus from the mother (Parmar et al. 2016). What is more is that only twelve percent of these women knew that the virus could be transmitted to the infant while breastfeeding (Parmar et al. 2016). Sixty-four percent of the women believed that it is possible to prevent the transmission of HIV from mother to child and 27.7 percent of the women were aware that avoiding breastfeeding could help prevent the transmission of the virus (Parmar et al. 2016). Although this study was

only conducted in one clinic in one city, this lack of knowledge amongst women suggests that there are insufficient programs that aim to educate the general public about the concerns of MTCT of HIV. Moreover, many women were not even aware of ART as a treatment method for combating HIV, which is considered to be a critical treatment option for those affected with HIV (Parmar et al. 2016). However, all of these problems could be solved simply by implementing an education program for mothers infected with HIV and by promoting advocacy in the HIV community to help battle the stigma associated with the disease.

The studies done in India show that measures have indeed been taken to prevent the transmission of HIV from mother to child. There is a national program in place that encourages the implementation of counseling centers as well as testing centers for mothers affected by the disease. However, it is clear that these measures are not very effective due to social factors associated with HIV, such as the stigmatization of the disease itself that leads to discrimination by the counselors and health professionals. Moreover, while breastfeeding is addressed in some of the counseling sessions, not every woman is aware that breastfeeding can lead to the transmission of HIV, further exacerbating the problem at hand. Without the proper counseling or provision of treatment, it is impossible to prevent MTCT of HIV even though this method of transmission is easily preventable. Therefore, the government of India must put forth more of an effort to provide efficient treatment services to affected mothers and children so that this is no longer an issue in this nation.

United Kingdom

In countries in which resources are readily available, such as the United Kingdom, highly active antiretroviral therapy (HAART) is considered to be the standard of care for patients

affected with HIV (Townsend et al. 2008). In this, three or more ARVs are administered to the patient to treat HIV (Townsend et al. 2008). According to guidelines set by the British HIV Association (BHIVA), zidovudine monotherapy, which is a type of ARV, along with a planned cesarean section can be used as an alternative to HAART for women who have a higher CD4 T cell count and a lower viral load (Townsend et al. 2008). The cesarean section would reduce the risk of HIV transmission from mother to child since a mother would not be giving birth vaginally, which is one of the ways in which the virus can be transmitted to the child. In a study conducted in the United Kingdom and Ireland, it was found that the MTCT of HIV rate in these countries was 1.2 percent (Townsend et al. 2008). This rate was further reduced to 0.8 percent in women who received ART for at least fourteen days (Townsend et al. 2008). This suggests that the treatment options offered in the United Kingdom are utilized effectively, as shown by the low transmission rates.

Moreover, it was found that the British guidelines were indeed successful in lowering rates of HIV transmission from mother to child. Specifically, when combinations of treatments recommended by the British guidelines were followed, the transmission rate was 0.7 percent for women who received HAART and had a planned cesarean section as well as for women who received HAART and had a planned vaginal birth (Townsend et al. 2008). It was also found that women who had the recommended alternative treatment of zidovudine monotherapy and a planned cesarean section had a transmission rate of zero (Townsend et al. 2008). These rates were even lower than the overall transmission rate of 1.2 percent, which is already significantly lower than those in other countries. This data suggests that in the United Kingdom, with the proper medical treatment and procedures, MTCT of HIV can be eliminated greatly. In addition,

the availability of resources for women in this nation also contributes to the low transmission rates of HIV; the mothers can seek care and have alternative sources to breastfeeding, such as formula. Moreover, the exclusive breastfeeding rates in the United Kingdom are already generally low, so this also falls into the standard of care regimen in this nation since it is recommended that mothers do not breastfeed if they are infected with HIV.

The effectiveness of the guidelines set by the BHIVA is further illustrated by the fact that in 2010 and 2011, the MTCT rate was reduced to from the original 1.5 percent between 2000 and 2006 to five children in one thousand, or 0.5 percent, which was an all-time low in the United Kingdom (Townsend et al. 2014). This reduction in transmission rates was due to continuing implementation of ART for mothers and due to earlier administration of this treatment (Townsend et al. 2014). The earlier the treatment was started, the more effective it was in preventing HIV transmission from mother to child (Townsend et al. 2014). Thus, the methods and guidelines set by the BHIVA are effective in preventing perinatal transmission of HIV, and the most common treatment methods in the United Kingdom have been shown to be effective and continue to be successful in the attempt to eradicate the transmission of HIV from mother to child.

It was shown in the previous studies that the recommendations made by the BHIVA were effective in eliminating MTCT of HIV in the United Kingdom and Ireland. Yet another recommendation by this organization is for infected mothers to avoid exclusively breastfeeding their infants (De Ruiter et al. 2008). A study showed that transmission rates of HIV were reduced from between fifteen and twenty percent for mothers who were given zidovudine monotherapy and breastfed their infants to between six and eight percent for mothers who were given

zidovudine monotherapy and did not breastfeed (De Ruiter et al. 2008). Although these transmission rates are from countries other than the United Kingdom, this study does illustrate the critical role that breastfeeding plays in the MTCT of HIV. By addressing the issue through the BHIVA's guidelines, the standard of care for mothers affected by HIV in the United Kingdom is for them to not breastfeed and to use formula instead. Thus, this treatment suggestion highlights the role that breastfeeding can play in the transmission of HIV from mother to child.

Since there are limited studies on HIV transmission rates from mother to child for women who are breastfeeding versus women who are not breastfeeding in the United Kingdom, it cannot be determined exactly how large of a role breastfeeding plays in HIV transmission in this country. However, there appears to be a correlation between the standard of care in this nation and the low transmission rates due to the availability of resources. While addressing the breastfeeding issue as a general guideline certainly reduces the risk of HIV transmission from mother to child, there are other factors, such as method of childbirth and types of medication, that also contribute to the low rates of transmission in the United Kingdom. Therefore, it is impossible to pinpoint which factor has the greatest impact on the lowered transmission rates in this country. Further studies must be undertaken and more research must be done in order to determine the role that breastfeeding plays in MTCT of HIV when it comes to establishing treatment plans for the mothers.

CONCLUSION

Breastfeeding is the one way in which HIV can be transmitted from mother to child postpartum. Fears of MTCT of HIV have driven down exclusive breastfeeding rates in South Africa even though it has been shown that there is a lower chance of transmission with exclusive breastfeeding when compared with other feeding practices. Breastfeeding rates in India remain high and the rates in the United Kingdom are low. While the breastfeeding rates and child HIV prevalence in these countries did not necessarily correlate with one another, there was a possible link between HIV transmission fears and the lower breastfeeding rates in South Africa. The pregnant women's access to treatment also did not appear to correlate with child HIV rates, indicating that while the women may be able to access the treatment in some countries, there are factors that are preventing the treatments from being fully utilized. In addition, only three countries were studied in this paper, limiting the conclusions that can be drawn from the data collected in this investigation. More countries must be studied to determine whether there is actually a correlation between breastfeeding rates and HIV prevalence in children.

It was seen that certain factors affecting breastfeeding practices were consistent across all three countries. Socioeconomic factors such as income status, location, and education level have all been shown to affect infant feeding practices in all three nations. Thus, despite the very different social environments in which the citizens of each country live, the same social factors contribute to breastfeeding practices in countries across the world. These factors were not the only ones contributing to breastfeeding practices, however. In South Africa, there are added pressures that affect breastfeeding, which come with living with extended family members. Additionally, in the United Kingdom, stigmatization and the media were found to influence

breastfeeding practices. Thus, all of these factors should be taken into consideration when creating treatment programs to prevent the transmission of HIV from mother to child via breastfeeding. The importance of including family in counseling sessions was also found to be especially important in both India and South Africa, which means that these treatment plans should also be tailored to educate people other than just the affected mothers.

All three of the nations had national protocols for combating HIV transmission from mother to child; the country either had its own national organization set treatment plans, such as in India and the United Kingdom, or it followed international guidelines, as was the case in South Africa. Many, if not all, of the treatment methods set by both national and international organizations include guidelines that discourage breastfeeding in some manner to prevent MTCT of HIV from occurring in this way. Data found from multiple studies show that eliminating breastfeeding or giving mothers ART in order to reduce the viral load in breast milk both effectively work to combat MTCT of HIV. This suggests that breastfeeding plays a large enough role in transmitting the virus from mother to child to be considered for treatment plans. However, it was not clear how big of a role eliminating breastfeeding had on the prevention of HIV transmission. In other words, it could not be quantified how much eliminating breastfeeding or reducing the viral load of the breast milk actually reduced the risk of transmitting the virus to the child.

Despite this, it is evident from the many previous studies that the most effective methods in which to combat MTCT of HIV through breastfeeding are through administration of ART along with counseling services. However, the bigger barrier that must be overcome is providing access to these treatments for the mothers who need them in countries such as India and South

Africa. These resources are more readily available in urban areas where there are established hospitals, trained physicians, and other medical resources; yet, in rural areas, these resources are scarce and the people are uneducated, leading to more health concerns in these regions. Even more of a problem is the social stigma associated with the disease, which potentially prevents mothers from receiving the treatments they need because they are afraid to disclose their HIV status to their partners or other significant people in their lives. When women do not receive the treatments that they need to take care of their own health, it poses a greater risk to the infant, which also leads to more health concerns. In India especially, there have been multiple studies showing that there are treatment programs and counseling services available for affected mothers; yet, these services are not effective due to lack of proper execution of the programs. Moreover, in both India and South Africa, it was seen that partner involvement can play a significant role in whether or not the mother is properly advised and receives treatment for her condition. Therefore, while the best way to combat MTCT of HIV via breastfeeding is known and various treatment programs have been created and proven to be effective, as seen in the United Kingdom, it is still a problem because of the economic and social barriers many mothers face in developing countries.

Further studies can be conducted to investigate other aspects involved in the MTCT of HIV. Approximately ninety percent of pregnant women in Eastern and Southern Africa access antiretroviral medications to prevent the transmission of HIV from mother to child ("Fact Sheet" 2016). This is comparable with the percentage of pregnant women in Central and Western Europe and North America accessing treatment, which is ninety-two percent ("Fact Sheet" 2016). These numbers change drastically when investigating the percentages of children living

with HIV in these regions who have access to treatment. In East and South Africa, only sixty-three percent of children between the ages of zero and fourteen have access to treatment while in Central and West Europe and North America, over ninety-five percent of these children have access treatment ("Fact Sheet" 2016). Of course, there are far fewer infected children in Western and Central Europe and North America than there are in African regions; however, these discrepancies in access to treatment for children could be investigated in future studies. In other African regions, such as Western and Central Africa, only forty-eight percent of the pregnant women infected with HIV and twenty percent of the children living with HIV have access to therapy ("Fact Sheet" 2016). Therefore, more studies should be done to investigate MTCT of HIV in these specific African regions and the role that breastfeeding may have in these countries. In Asia and the Pacific, thirty-nine percent of pregnant women access treatment to prevent MTCT of HIV and forty-one percent of the children have access to treatment ("Fact Sheet" 2016). Thus, in all of these regions, factors involved in accessibility of treatment should be studied in order to develop a better understanding of how to potentially eliminate the transmission of HIV from mother to child.

Overall, factors affecting breastfeeding practices in three countries were elucidated in this investigation, and these could provide information for health care professionals to establish more effective treatment plans in those regions where there is a lack of resources. The challenge for these workers will be to create a plan that will take into consideration the social and cultural influences in these regions so that the mothers will be able to follow the treatment plan without having to overcome many obstacles to receive the proper care. While HIV no longer has a death sentence attached to it, it is still a debilitating disease that can affect people beyond the medical

aspect. Stigmatization and other negative social influences could severely affect a person's ability to lead a normal life, further calling for the need to combat this disease. The fact that MTCT of HIV can be easily avoided and yet still exists in developing nations shows that there is a discrepancy between these nations and the developed ones, which is cause for concern. Until these gaps are filled between the countries, mothers and children will continue to suffer from the HIV pandemic as they have done since the onset of this disease.

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