

# Factors associated with the practice of exclusive breastfeeding for six months among mothers on antiretroviral therapy in the Eastern Cape, South Africa

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## Research

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# Abstract

**Background:** Exclusive breast feeding (EBF) is associated with reduction of post-natal HIV transmission and optimal infant growth. Given that the factors influencing EBF are multi-factorial and context-specific, we examined the prevalence and factors associated with EBF practice in the first six months among mothers on antiretroviral therapy (ART) in the Eastern Cape, South Africa.

**Methods:** This was a prospective cross-sectional study conducted between January – May 2018 on 469 parturient women enlisted in the prevention of mother-to-child HIV transmission cohort study in the Eastern Cape. EBF was defined as infant feeding with breast milk only. We collected relevant socio-demographic, lifestyle and maternal information by interview. Bivariate and multivariate logistic regression analyses were fitted to determine the factors associated with EBF practice.

**Results:** EBF for six months was practised by a few women (32.0%). The prevalence of EBF was significantly higher among married women (36.8%), unemployed women (36.6%), non-smokers (32.7%) and those who never drank alcohol (37.0%). Unemployed women (AOR = 1.66, 95% CI: 1.08-2.56) and those with grade 12 or less level of education (AOR = 2.76, 95% CI: 1.02-7.49) had a higher likelihood of practising EBF for six months while mothers who consumed alcohol (AOR = 0.54, 95% CI: 0.34-0.85) were less likely to practice EBF for six months.

**Conclusions:** Sub-optimal rate of EBF in this study is comparable with the national (31.6%), sub-Saharan Africa (36%) and WHO global (35%) rates. Advocacy campaign on EBF must target alcohol cessation and the creation of a favourable workplace environment for lactating mothers.

## Background

Exclusive breastfeeding (EBF) could save the lives of infants and prevent mother-to-child transmission (PMTCT) of HIV infection [1,2], especially in a high burdened setting like South Africa [3, 4]. Between 2010 and 2015, South Africa has made policy changes in infant feeding practices and PMTCT guidelines. The policy changes resulted in the replacement of free infant formula for EBF for six months policy. Mothers are counselled to practice EBF in the first six months, continue to breastfeed beyond six months whilst introducing complementary feeding. Also, the new policy recommended the adoption of WHO Option B+ (lifelong ART strategy) for all HIV-infected pregnant and postpartum women, irrespective of their immune suppression status or infant feeding choice [1, 5, 6].

Established global evidence has shown that exclusive breastfeeding prevents both the incidence of and mortality from diarrhoea, which is commonly associated with mixed feeding practices and formula feeding practices [7]. Overall, EBF confers the benefits of essential nutrients and strong immune systems, reduction in the risk of malnutrition and diarrheal associated-illnesses, which are the leading causes of infant mortality in developing nations [1, 8-10]. Worryingly, even with available data demonstrating unequivocal benefits of EBF, mothers often do not abide by the recommended six months of EBF [11-13]; thus, putting infants at high risk of death. The low EBF prevalence is underpinned by several factors, thus

suggesting that there is more to learn and understand regarding the prevailing reasons for the reluctance of mothers to breastfeed their infants exclusively. Previous studies conducted in South Africa have indicated contradictory infant feeding messages from older relatives, such as grandmothers, and health care workers, poor socio-economic indicators and the fear of transmitting HIV to the infant as among the reasons for mixed-feeding practices [10, 14].

EBF rates are reportedly low in many countries, despite the manifold benefits accruable from breastfeeding [15-17]. As reported by Victoria et al. (16) study, only 37% of children are exclusively breastfed in developing countries. In sub-Saharan Africa, the prevalence of EBF is 36% [17], which is very low compared with the global EBF target rate set at 50% by 2025 [18]. In South Africa, the government effort has yielded some modest improvement in EBF rates by mothers living with HIV over the years [19], but with an estimation of 31.6% EBF rate, the country still remains below global targets [15, 20, 21]. The fear of HIV transmission and status disclosure are among the reasons for the low prevalence of EBF [22, 23].

Considering the high HIV epidemic in South Africa, with approximately 7.7 million people with HIV [24], understanding the factors associated with EBF is essential in crafting strategies to support and sustain appropriate breastfeeding practices to increase the prevalence of EBF. Even though previous studies have examined the prevalence of EBF among lactating mothers living with HIV in South Africa [10, 15, 17, 20, 25-28], scanty information exists in the Eastern Cape, a province with a twin burden of HIV epidemic and poverty. Given that factors affecting EBF practices vary among countries and even within the sub-groups of populations [29], contextual information on the prevalence and determinants of EBF is vital to inform context-specific interventions. Hence, this study seeks to examine the prevalence and the factors influencing EBF practices among mothers on antiretroviral therapy in the Eastern Cape Province, South Africa.

## Methods

### Study Design, Settings, population and sample

This prospective cross-sectional study was conducted between January to May 2018 and forms part of a larger project to assess maternal and infant outcomes for the prevention of mother-to-child transmission programme in the Eastern Cape, South Africa. Aspects of the methodology have been previously published elsewhere [30, 31]. Briefly, the target population were parturient women on ART and their infants attending maternity health facilities at Frere, Cecilia Makiwane and Bisho hospitals. The baseline study was carried out between September 2015 and May 2016 in the Eastern Cape, South Africa. At the time of the data collection, the infant ages range from 18 – 29 months.

All the parturient women on ART gave consent to be contacted for the follow-up study. A sample size of 469 participants was estimated from a total population of 1709 participants for the follow up study. This sample size was estimated by using the Cochran's formula; at a precision level of +/-4%, confidence level of 95% and 10% possible attrition. Participants were eligible for the follow up study if they had live

infants. Participants who had died, relocated from the region or were inaccessible via telephone, were excluded from the study.

The Research Ethics Committee of the Walter Sisulu University approved the research protocol. The nature and scope of the study were explained to the participants, who all gave informed consent before data collection.

### **Data Collection Procedure**

Participants were contacted telephonically to participate in this study. Each participant was provided with an option to either visit the nearest hospital for a face-to-face interview or they consented to a telephonic interview. Two research assistants were trained to complete the interviewer-guided interview using a pre-designed and validated questionnaire. They were trained mainly on the data collection instruments and the sensitivity of the topic under study.

Participants for telephonic interviews were asked to provide a convenient time for the interview. Research assistants could fluently speak and write English and the local language—*IsiXhosa*. A structured questionnaire was designed to obtain information on socio-demographic variables (age, employment, marital status and level of education), postpartum adherence to ART, and behavioural lifestyles (smoking and alcohol intake).

### **Outcome variable**

The primary outcome of interest was EBF practice in the first six months. EBF is defined in accordance with WHO as “nothing but breast milk” [2]. This was measured by asking mothers if they initiated EBF for their baby and if yes, to state the duration of EBF in months.

### **Independent variables**

The independent variables included in this study were socio-demographic factors, such as age, employment, marital status, level of education, postpartum adherence to ART, and behavioural lifestyle factors such as smoking and alcohol intake. Our variable selection was based on our review of the literature. Age was measured by asking respondents to state their age at their last birthday. Employment was measured by asking if respondents had worked for wages or salary in the past 12 months or not. Also, we asked participants to indicate if they were single, married, cohabiting or divorced. We also asked respondents to indicate the highest level of education they attained.

We defined postpartum adherence to ART as any episode of missed doses of ART since the birth of the index baby. Mothers who had missed taking their ART were classified as non-adherent, and those who reported no missed episode of ART were classified as adherent. Also, we asked respondents to indicate if they had ever used alcohol and if they smoke tobacco products. Responses were classified as “yes” or “no”.

## Statistical Analysis

We estimated mean, standard deviation and proportions for all continuous and categorical variables. Inferential statistics (crude and adjusted logistic regression models) were used to examine factors influencing EBF practices among mothers on antiretroviral therapy. All statistical analyses were carried out using the Statistical Package for Social Sciences (SPSS) for Windows version 24.0 (SPSS, Chicago, IL, USA).

## Results

The participants mean age was  $33 \pm 5.7$  years. Majority of the participants were 30 years and above (69.3%), single (66.3%), had grade 12 level of education (87.4%), unemployed (61.8%), and were on government social grant (94.5%). Only a few participants smoked (8.1%) or drank alcohol (35.4%) (Table 1).

### Prevalence of Exclusive Breastfeeding

The prevalence of six-month EBF was 32.0%. The prevalence of EBF was significantly higher among married women (36.8%;  $p < 0.001$ ), unemployed women (36.6%;  $p < 0.026$ ), non-smokers (32.7%), and those who never drank alcohol (37.0%;  $p < 0.001$ ) (Table 2).

### Factors associated with six-month exclusive breastfeeding practices (Multivariate Logistic Regression Analysis)

The results of the unadjusted logistic regression analysis indicates that being unemployed (COR = 1.77, 95% CI: 1.17-2.68) and having attained grade 12 or less education (COR = 2.79, 95% CI: 1.06-7.38) were significantly associated with a higher odds of practising EBF for the first six months by the participants (Table 3). However, alcohol use was associated with lower odds of practising EBF among the study participants (COR = 0.51, 95% CI: 0.33 - 0.78). The clinical parameters: duration of disease, disclosure of serostatus and adherence to the current ART had no significant association with EBF practice among the mothers. Similarly, in the adjusted model, being unemployed (AOR = 1.66, 95% CI: 1.08-2.56;  $p < 0.05$ ) and having grade 12 or less level of education (AOR = 2.76, 95% CI: 1.02-7.49;  $p < 0.05$ ) were significantly associated with a higher likelihood of exclusive breastfeeding, while alcohol use was significantly associated with lower odds of six-month exclusive breastfeeding (AOR = 0.54, 95% CI: 0.34-0.85;  $p < 0.05$ ). The magnitude and the direction of effect persist after adjusting for important demographic, clinical and behavioural covariates (Table 3).

## Discussion

Our study aimed to examine the prevalence and factors influencing six-month EBF practice among mothers on ART in the Eastern Cape Province, South Africa. Although many policies and programmes on six months infant breastfeeding have been promulgated in South Africa, the rate of EBF is low. In this

study, the prevalence of six-month EBF of 32.0% was sub-optimal. However, direct comparison of EBF rate in this study with many other studies on EBF practice is a difficult task, given the variations in the definitions of EBF in different studies, the timing, duration of recall, methods of analysis and sample biases [32]. Notwithstanding, the EBF rate obtained in this study is comparable to the 31.6% among infants aged under six months in Malawi [33].

Generally, the low prevalence rates of EBF in South Africa is worrying and suggests concerted interventions to promote, support and protect breastfeeding, beyond policy and programme formulations are needed. Some studies have reported higher EBF rates of 43.2% among HIV-positive mothers in Merafong sub-district, Gauteng [34], and 35.6% in Gert Sibande district in Mpumalanga [35] in other provinces in South Africa. An earlier study by Siziba et al. [25] reported a summative low prevalence rate of 12.0% in North-West, Gauteng, Free State and Eastern Cape. Also, 18.0%, 6.0%, 13.0%, 7.6%, and 6.7% of mothers practiced EBF up to six months in Kwa-Zulu Natal, Western Cape, Limpopo and Gauteng provinces, respectively [36-40]. Compared with other settings elsewhere, the EBF rate in our study is almost at par with rates reported in Ethiopia (30.6%, 31.0%) [41, 42], Bangladesh (35.0%) [43] and India (34.0%) [44], but higher than the EBF prevalence reported in Kaiyuan Yunnan, Southwest China (27.34%) [45], Saudi Arabia (24.4%) [46], USA (16.8%) [47], Egypt (9.7%) [48] and Nigeria (14.8%) [49]. Yet, other studies have reported higher EBF prevalence rates in Ethiopia (88.8%, 75.2%; 77.3%) [28, 50, 51], Kenya (71.4%; 52.3%) [52, 53], Western India (61.5%) [54] and Tanzania (55.5%) [55]. The differences in EBF rates reported across various countries or regions in the literature could be explained in the light of geographic variations in the interplay of cultural, economic and socio-demographic factors affecting EBF.

Notwithstanding the many advantages of breastfeeding and the strategies to promote it, EBF uptake still, remains low in many developing countries [16, 56]. Worryingly, worldwide, only 35% of the infants are exclusively breastfed [57]. Exclusive breastfeeding is associated with reduction in child mortality in low-income countries [58, 59]; thus, interventions on EBF should be accorded top priority. In this regard, there is a need to sensitise the community on the benefits and inherent problems associated with mixed feeding [47]. In the South African context, one of the pragmatic approach to promote women's awareness of EBF, outside of health facility channels, could be to utilise and promote the Ward-Based-Outreach-Teams (WBOT) in the community or women's groups to increase the duration of EBF. One of the cardinal objectives of WBOT is to promote and create awareness on various health issues affecting the community, as part of the government efforts of improving the primary healthcare re-engineering agenda. This is advisable because community beliefs could have considerable influence on EBF practice.

Our findings demonstrated that being unemployed and having a low level of education (secondary or less) was significantly associated with a higher likelihood of EBF, while alcohol use was significantly associated with lower odds of six-month exclusive breastfeeding practice. Previous studies have linked maternal employment with lower rates of EBF and earlier cessation of breastfeeding [60, 61]. In this study, consistent with studies conducted in Bangladesh [43], Saudi Arabia [46], Ethiopia [62-64], Tanzania [65], Canada [66], and Guatemala [67], unemployed mothers are likely to practise EBF as compared to those who are employed. It is plausible that mothers who are not employed, do have enough opportunity while

at home to breastfeed their infants. Contrastingly, employed mothers, perhaps due to the nature of their work, –the challenge to return early to work after giving birth, work shifts, and maternal fatigue, may collectively hinder them from having frequent contact with their infant to provide exclusive breastfeeding. In South Africa, working mothers are granted only four months maternity leave, which may begin at any time from at least four weeks before the birth of the baby; and there are no available workplace facilities for mothers to breastfeed children. This suggests that policies about maternity leave in South Africa warrant scrutiny to encourage EBF practice. This is very crucial in the context of achieving comprehensive PMTCT.

In this study, mothers with a low level of education are more inclined to practise EBF. Previous studies have reported similar findings [43, 68-71]. However, Mango et al. [16] study in Tanzania, found the level of education had no association with EBF practice. Other studies conducted in Ethiopia and Bangladesh reported similar findings [72, 73]. The association of a lower level of education with EBF could be explained by the higher rate of unemployment in this population. As such, strategies aimed at strengthening EBF practice in this population should also address the needs of women with higher levels of education. Specifically, the concerns and fears of educated women need to be addressed during counselling sessions at ante-natal and postnatal clinics.

This study revealed that alcohol use was significantly associated with lower odds of six-month exclusive breastfeeding practice. About 22.9% of mothers drink alcohol. A study conducted in the Kilimanjaro region, Tanzania, showed that mothers' alcohol intake was associated with EBF up to 6 months [71]. Other studies have reported similar findings elsewhere [68-70, 74]. However, Mgongo et al. [56] reported a contrary result. Previous studies have linked alcohol intake with HIV and poor child immunisation [75, 76]. A recent study has reported high binge drinking (10.8%) among women in South Africa [77]. Alcohol consumption is widely practised in South Africa [77], at various events or celebrations such as weddings, burials, and other social events, work or community engagements. Advocacy programmes on the effects of alcohol intake during pregnancy and on lactating women is crucial. Alcohol use during pregnancy or whilst breastfeeding have negative effects on newborns, EBF, and general infant growth [78,79].

## Limitations

Though, the measure of EBF (nothing but breast milk) and its duration was clearly explained to the mothers, we could not ascertain if there was any confusion between maternal definitions of EBF and the EBF definition in this study. Often, retrospective data collection tend to exaggerate the rate and duration of EBF practice in general [32]. Hence, the extent of recall bias and social desirability bias cannot be ascertained, given that this follow up study occurred between 18 – 29 months after the delivery of the index infants. Also, telephonic survey with its inherent challenges might have impacted the responses of the parturient women. Regardless of these limitations, our study provides useful information for future comparative studies on the factors influencing infant-feeding practices by mothers on antiretroviral therapy in the Eastern Cape Province, South Africa. Such information would be relevant in shaping maternal and child health interventions in the context of paediatric HIV infection, at least in this setting. A

qualitative study would provide better insight and understanding of the reasons why the majority of the women did not practise EBF in the region.

## **Conclusion**

Sub-optimal rate of EBF in this study (32%) is comparable with the national (31.6%), sub-Saharan Africa (36%) and WHO global (35%) rates. Interventions aimed at promoting, supporting and protecting breastfeeding, beyond policy and programme formulations are urgently needed in the region. The factors affecting EBF of HIV positive mothers in this study include employment, low levels of education and alcohol consumption. A general advocacy campaign on exclusive breastfeeding must target alcohol cessation and the creation of a favourable workplace environment for lactating mothers.

## **Abbreviations**

AOR: Adjusted Odds Ratio, ART: Anti-Retroviral Therapy, COR: Crude Odds Ratio, CI: Confidence Interval, EBF: Exclusive Breastfeeding, PMTCT: Prevention of Mother-to-Child Transmission, WBOT: Ward-Based-Outreach-Teams, WHO: World Health Organization

## **Declarations**

### **Ethics approval and consent to participate**

The Research Ethics Committee of the Walter Sisulu University approved the research protocol [(Reference: 085/2017)]. Permission to implement the study protocol was granted by the Eastern Cape Department of Health and the clinical governance of the hospital. The nature and scope of the study were explained to the participants, who all gave informed consent before data collection.

### **Consent for Publication**

Participants gave consent for sharing of the findings of the study. All authors agreed to the publication of this article.

### **Availability of data and material**

Data included in this study are available upon reasonable request from the corresponding author.

### **Competing interests**

The authors declare that they have no conflicts of interest.

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### **Authors' contributions**

All authors were actively involved in the conception, design and implementation of the study protocol. DTG, OVA and AIA drafted the manuscript while AIA performed the statistical analysis. All authors have read and approved the final draft for submission.

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## Tables

**Table 1: Socio-demographic characteristics of participants**

Variables	Frequency	Percentage
<b>Age</b>		
24 years and less	33	7.0
25-29 years	111	23.7
30-34 years	137	29.2
35-39 years	121	25.8
40 years and above	67	14.3
<b>Marital status</b>		
Single	311	66.3
Married	125	26.7
Cohabiting	25	5.3
Previously married	8	1.7
<b>Education level</b>		
Grade 7 and less	27	5.8
Grade 8-12	410	87.4
Higher education	32	6.8
<b>Employed in a salary paying job</b>		
Yes	151	32.2
No	318	67.8
<b>Occupation in last 12 months</b>		
Government employee	15	3.2
Non-government employee	112	23.9
Self employed	29	6.2
Student	23	4.9
Unemployed	290	61.8
<b>Receives government social grant</b>		
Yes	443	94.5
No	26	5.5
<b>Smoking</b>		
Yes	38	8.1
No	431	91.9
<b>Drank alcohol in the last year</b>		
Yes	166	35.4
No	303	64.6

**Table 2. Correlates of six months exclusive breastfeeding**

<b>Variables</b>	<b>Breastfed exclusively for six months n (%)</b>	<b>Did not breastfeed exclusively for six months n (%)</b>	<b>p-value</b>
<b>Age</b>			
24 years and less	11 (33.3)	22 (66.7)	0.864
25-29 years	38 (34.2)	73 (65.8)	
30-34 years	41 (29.9)	96 (70.1)	
35-39 years	36 (29.8)	85 (70.2)	
40 years and above	24 (35.8)	43 (64.2)	
<b>Marital status</b>			
Single	92 (29.6)	219 (70.4)	0.001
Married	46 (36.8)	79 (63.2)	
Cohabiting	9 (36.8)	16 (64.0)	
Previously married	3 (37.5)	5 (37.5)	
<b>*Education level</b>			
Grade 7 and less	9 (33.3)	18 (66.7)	0.170
Grade 8-12	136 (33.3)	237 (66.7)	
Higher education	5 (16.7)	25 (83.3)	
<b>Employed in a salary paying job</b>			
Yes	45 (29.8)	106 (70.2)	0.278
No	105 (33.0)	213 (67.0)	
<b>Occupation in last 12 months</b>			
Government employee	2 (13.3)	13 (86.7)	0.026
Non-government employee	33 (29.5)	79 (70.5)	
Self employed	4 (13.8)	25 (86.2)	
Student	5 (21.7)	18 (78.3)	
Unemployed	106 (36.6)	184 (63.4)	
<b>Smoking</b>			
Yes	9 (23.7)	29 (76.3)	0.168
No	141 (32.7)	290 (67.3)	
<b>Drank alcohol in the last year</b>			
Yes	38 (22.9)	128 (77.1)	0.001
No	112 (37.0)	191 (63.0)	

\*Some participants did not provide responses on feeding practices (n=39)

**Table 3. Crude and adjusted binary logistic regression analysis showing factors associated with six months of exclusive breastfeeding**



Variables	COR (95% CI)	AOR (95% CI)
Age		
24 years and less	0.90 (0.37-2.16)	1.12 (0.43-2.92)
25-29 years	0.93 (0.49-1.76)	1.02 (0.51-2.01)
30-34 years	0.77 (0.41-1.42)	0.73 (0.39-1.40)
35-39 years	0.76 (0.40-1.43)	0.68 (0.36-1.32)
40 years and above	1	1
Marital status		
Single	0.72 (0.48-1.09)	0.74 (0.48-1.14)
Married, cohabiting/divorce	1	1
Education level		
Grade 12 and less	2.79 (1.06-7.38)*	2.76 (1.02-7.49)*
Higher education	1	1
Occupation in past 12 months		
Unemployed	1.77 (1.17-2.68)*	1.66 (1.08-2.56)*
Employed	1	1
Smoking		
Yes	0.64 (0.29-1.39)	0.89 (0.39-2.03)
No	1	1
Drank alcohol in the past year		
Yes	0.51 (0.33-0.78)*	0.54 (0.34-0.85)*
No	1	1
Adherence to ART		
No	0.75 (0.49-1.13)	0.80 (0.52-1.25)
Yes	1	1
Disclosure of status to partner		
No	0.68 (0.39-1.16)	0.80 (0.45-1.40)
Yes	1	1
Duration of disease (Years)		
5 years and less	1.02 (0.69-1.50)	1.03 (0.66-1.62)
Above 5	1	1

\*p<0.05, COR: Crude Odds Ratio, AOR: Adjusted Odds Ratio, CI: Confidence Interval