

DETERMINANTS OF ADHERENCE TO NATIONAL INFANT FEEDING GUIDELINES BY BLACK MOTHERS LIVING WITH HIV

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Objective: Worldwide, 160,000 children were newly infected with HIV in 2018; half of these were infected through breastfeeding. Infant feeding guidelines are distinct depending on each country's resources and national or sub-national guidelines. Because of divergent guidelines, the best infant feeding approach to prevent mother-to-child transmission can become unclear. The purpose of this study was to examine the sociocultural and psychosocial factors related to adherence to infant feeding guidelines through a city-level, North-South comparison of Black mothers living with HIV in Nigeria, Canada, and the United States.

Design: Using a cross-sectional multi-country survey, a convenience sample of 690 mothers were recruited from June 2016 - December 2019. Socio-cultural and psychosocial factors influencing infant feeding practices were measured.

Results: Using binary logistic regression, infant feeding attitudes (OR = 1.10), motherhood experiences (OR = 1.08), low hyper-vigilance score (OR = .93), paternal support (OR = 1.10) and perception that the health care provider supported adherence to infant feeding guidelines (OR = 2.43) were associated with guideline adherence. Mothers who had cultural beliefs that were inconsistent with infant feeding guidelines and mothers with low incomes (OR = 2.62) were less likely adherent with their country's guidelines.

Conclusion: City-level factors were not found to influence adherence to infant feeding guidelines; however, socio-cultural and psychosocial factors at community, family and individual levels were significant. Policy formulation and targeted interventions must be cognizant of cultural expectations of motherhood and mindful of psycho-

INTRODUCTION

Antiretroviral therapy (ART) has “the potential to virtually eliminate the risk of vertical HIV transmission for pregnant and breastfeeding mothers.”¹ Worldwide, 160,000 children were newly infected with HIV in 2018, approximately half of them through breastfeeding.² Mothers throughout the world are often told that breastfeeding is ‘best,’ ‘the perfect food,’ ‘the gold standard,’ and ‘higher intelligence food’—messages used worldwide to promote exclusive breastfeeding (breastfeeding/breast milk only [EBF]) for infants. For mothers living with HIV, however, these messages and other HIV-related challenges may influence their adherence to the World Health

Organization (WHO) or national infant feeding guidelines for mothers living with HIV. Infant feeding guidelines are distinct depending on each country's resources and national or sub-national guidelines. Because of divergent infant feeding guidelines, the best infant feeding approach to prevent vertical HIV transmission (prevention of mother-to-child transmission) can become unclear.³ Conflicting cultural expectations and national guidelines implementation create tension especially for Black women because of the significant influence of cultural norms on mothering. HIV positive Black women living in Canada and the United States may be caught between the pressure to adhere to guidelines that promote formula feeding and the cultural

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pressures to breastfeed because it is a symbol of being a good mother and the natural way to feed a baby.

While ART is recommended for all HIV positive persons and especially for breastfeeding mothers to prevent vertical transmission of HIV, breastfeeding guidelines remain inconsistent. In resource-limited regions, such as Nigeria, where disease and malnutrition are major causes of infant

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mortality and access to replacement feeding is not feasible, WHO guidelines recommend breastfeeding until aged 12 months when the mother is ART adherent and the infant is on antiretroviral (ARV) prophylaxis.^{3,4}

In contrast, high resource countries, such as Canada and the United States, where mothers have access to clean water and affordable replacement feeding (infant formula), moth-

ers living with HIV are advised not to breastfeed and use exclusive formula feeding (EFF), regardless of ART adherence and maternal viral load.^{5,6} Although, mothers face challenges adhering to this guideline because of societal, family or others' pressures to breastfeed; they often resort to mixed feedings. Mixed feeding (MF, breast milk and formula or other fluids and/or semi-solid foods) with infants aged <6 months is not recommended because it is associated with increased vertical HIV transmission.⁷

In making decisions on infant feeding guidelines, mothers living with HIV are influenced by socioeconomic,^{3,8-10} sociocultural,^{3,8,11,12} and psychosocial factors.^{1,3,8,9,11-13} Familial, cultural, and health worker perspectives can have divergent and significant influences on infant feeding choices and guideline adherence.^{3,8-10} Lack of consistent information, low literacy levels, poverty, lack of resources for EFF, and familial support influence guideline adherence.^{1,8,9,11} Stigma and fear of HIV status disclosure also influence adherence to infant feeding guidelines globally.^{13,14} Despite recommendations, some mothers living with HIV question or ignore guidelines for socio-cultural or psychosocial reasons.^{3,8,12-14} In high-resource countries, studies examining infants' outcomes from breastfeeding mothers living with HIV are limited because breastfeeding is discouraged.

Some studies have observed increased HIV transmission rates among breastfed infants; however, many mothers in those studies were diagnosed late prenatally, were not on ART, and had a detectable viral load before breastfeeding.^{13,15-20} This

knowledge gap may mask vertical HIV transmission rates and limits possibilities for early ART intervention and engagement in care that would benefit infants and mothers.⁹

Few studies have documented socio-cultural and psychosocial factors that influence adherence to infant feeding guidelines. The purpose of our community-based research was to examine social determinants of adherence to infant feeding guidelines through a city-level, North-South comparison of Black mothers living with HIV in Nigeria, Canada, and the United States.

METHODS

Participants

This 3-year multi-country mixed method community-based research study was conducted between June 2016 and December 2019. Using venue-based sampling, Black mothers living with HIV (N = 690) were recruited from community HIV support groups, community health centers, health fairs, posted flyers and word-of-mouth. Mothers from Ottawa, Canada (n = 89), Miami, United States (n = 201) and Port Harcourt, Nigeria (n = 400) who self-identified as HIV positive anonymously filled out a one-time survey after meeting the inclusion criteria. Black mothers were recruited into the study if they had given birth while they were living with HIV. All mothers had at least one child after the policy on infant feeding by mothers living with HIV came into effect in 2010. The disproportionate number of participants from the three sites is indica-

tive of the difficulty recruiting for this study because many participants were reluctant to self-identify. This may be partially explained by the fact that women eligible to participate in this study in Ottawa are part of a racialized group who face stigma and racial/ethnic discrimination that can be compounded by their HIV serostatus. Moreover, the Port Harcourt population and prevalence of HIV rates remain greater than in Ottawa where Black people are a small fraction of the population, making recruitment a greater challenge.

Study procedures were explained to participants who provided voluntary informed consent. The study was approved by institutional review boards (IRB) at University of Ottawa, University of Port Harcourt, and Florida International University. All procedures followed were in accordance with the ethical standards of the IRBs and the Helsinki Declaration of 1975, as revised in 2000. Mothers received an honorarium for participating in the study.

Questionnaires

Participants completed a one-time survey that included a demographic questionnaire, infant feeding practices and instruments measuring socio-cultural and psychosocial factors that influenced their infant feeding practices (ie, EBF, MF, EFF). The psychosocial factors measured included the mothers' infant feeding attitudes,²¹ perceptions of motherhood experiences,²² hyper-vigilance,^{23,24} discrimination,²⁵ and stress.²⁶ The survey was distributed in English using Qualtrics, an online platform participants could use to answer the

survey. Participants also had the option of using a paper survey and completing it by hand. For all question items, mothers were given the option "I choose not to respond" as an indicator that they were not missing values rather than mothers chose "not to answer." The following components were included in the questionnaire.

Demographic Information

We asked participants their age, educational completion status, marital status, employment status, income source, insurance status, number of years since HIV diagnosis, number of children, and number of children born after HIV diagnosis and the ages of those children.

Infant Feeding Practices

To determine adherence to guidelines, mothers were asked what infant feeding practices they used during the first year of their infant's life: 1) EBF, 2) MF, 3) EFF. Mothers were considered adherent to guidelines in Nigeria if they reported EBF and ART adherence and in Canada and the United States if they reported EFF. Mothers were assigned 1 if they were adherent and 0 if they were not.

Social Cultural Factors Influencing Infant Feeding Measures

To assess the extent that socio-cultural factors influenced infant feeding, we asked questions about: participant's awareness of the infant feeding guidelines; whether their infant feeding was within the national guidelines for their country; opinions of their spouse or infant's father, family members, and health

care providers about the infant feeding guidelines. The mothers were also asked if their cultural beliefs contradicted the infant feeding guidelines.

Psychosocial Measures

We used the following psychosocial measures to assess factors that influenced infant feeding.

INFANT FEEDING ATTITUDES

We measured mothers' infant feeding attitudes using the Iowa Infant Feeding Attitude Scale (IIFAS).²¹ This 17-item validated scale measures the mother's attitudes toward infant feeding methods (eg, breast-feeding, formula-feeding, mixed feeding). The scale has various dimensions of infant feeding including costs of infant feeding (eg, "Formula feeding is more expensive than breast-feeding"), nutrition (eg, "Breast milk is the ideal food for babies"), convenience (eg, "Breast-feeding interferes with a couple's sexual relationship"), and infant bonding (eg, "Breast-feeding increases mother-infant bonding"). Participants were asked to choose the degree to which they agreed with each statement, on a five-point Likert scale ranging from "strongly disagree" to "strongly agree."²¹

MOTHERHOOD EXPERIENCES

We used the Being a Mother Scale (BaM-13),²² a valid and reliable scale to assess a woman's motherhood experiences. Domains assessed include social isolation, regret, sense of confidence, relationship with the child, satisfaction with support, coping, and guilt. Lower scores indicate mothers are possibly experiencing high levels of distress.²²

STRESS

To measure the participants' stress, we used the Perceived Stress Scale (PSS) a widely used validated and reliable 10-item scale measuring perceptions of stress.²⁶ Items were designed to evaluate how unpredictable, uncontrollable, and overloaded respondents find their lives. Participants were asked about feelings and thoughts during the last month and how often they felt a certain way. Higher scores indicate higher levels of stress.

DISCRIMINATION

We used the Everyday Discrimination Scale (EDS) to identify the impact of discrimination and the effects of guideline adherence.²⁵ This 10-item validated and reliable scale measures chronic and routine unfair treatment in everyday life. Participants were asked how often they experienced unfair treatment in their day-to-day life on a 5-point Likert-type scale. Response categories ranged from 1 (never) to 5 (experience discrimination almost every day), with higher scores indicating greater perceived discrimination. We included a question asking participants their perceptions about what they thought was a contributing factor for their discrimination experiences (eg, race, gender, culture).²⁵

HYPER-VIGILANCE

The Racism-Related Vigilance measure is a validated and reliable instrument based on ethnographic research describing how participants anticipated and prepared for racial discrimination.^{23,24} We used the 3-item abbreviated version of this instrument to assess how often in their

daily lives participants tried to prepare for possible insults from other people before leaving home; felt they always have to be very careful about their appearance to get good service or avoid being harassed; and tried to avoid certain social situations and places. Responses were on a Likert-type scale of 1 (at least once a week) to 5 (never).

Data Analysis

All study data were entered, cleaned, checked for double entry errors and any duplicated entries. Data were analyzed using SPSS. After the quantitative data from all three study sites were entered in SPSS, they were aggregated in a single file for analysis. Completed paper surveys were double entered in SPSS to prevent any inaccuracies. Univariate and bivariate descriptive statistics were used to characterize the overall study sample and site-specific sub-samples and to facilitate comparisons across study sites. Logistic regression modeling was used to estimate associations between socio-cultural factors (sociodemographic characteristics; to whom mothers disclosed their HIV status; and the influence of cultural beliefs or traditions), psychosocial factors (ie, infant feeding attitude, motherhood experience, hyper-vigilance, discrimination, perceived stress), and as a proxy for guideline adherence, infant feeding practiced (EBF, MF, EFF). Statistical significance was accepted at $P < .05$.

Ethical Considerations

Research ethics boards at all sites approved the study. Permission was obtained from each community partner site where participants were recruited. Participants were informed

that: potential risks were associated with study participation; they would have limited direct benefit from participation; they could withdraw from the study at any time without any adverse effects; and questionnaire completion signified their informed consent to participate.

RESULTS

Demographic Characteristics

Sample demographic characteristics are presented in Table 1. The mothers ranged in age from 18 to 49 years ($M = 34.3$, $SD = 5.9$) with 1 to 5 children post HIV positive diagnosis. The children's average age was 4.98 years old ($SD = 3.93$). The youngest mothers were in Miami (32.4 ± 5.8) and oldest were in Ottawa (36.6 ± 6.4). Mothers had been living with HIV for 8.1 ± 5.6 years, with shortest time since HIV diagnosis in Port Harcourt (6.3 ± 3.5) and longest in Ottawa (12.7 ± 6.4).

Most mothers had either completed secondary (high school, vocational or technical school) education ($n = 415$, 61.4%), or tertiary (college or university) education (218, 32.2%). Relationship status varied across study sites. Most mothers in Miami ($n = 121$, 60.8%) and Port Harcourt ($n = 340$, 85.2%) were married and most mothers in Ottawa ($n = 57$, 66.5%) were not married. Most mothers in Ottawa ($n = 51$, 57.3%) and Port Harcourt ($n = 320$, 87.9%) were employed; most mothers ($n = 134$, 67.3%) in Miami were unemployed receiving government assistance. Nearly one third of the mothers ($n = 183$, 30.7%) re-

Table 1. Selected sociodemographic characteristics of study participants

Characteristics	Ottawa n (%)	Miami (%)	Port Harcourt (%)	All Sites n (%)
Number of participants (N)	89	201	400	690
Mother's age, yrs, M(SD)	36.6 ± 6.4	32.4 ± 5.8	34.7 ± 5.7	34.3 ± 5.9
Number of persons in household, median (R)	4 (1-7)	3(1-8)	4 (1-11)	4 (1-11)
HIV-related information				
Number of children born after HIV+, median (R)	2 (1-3)	1 (1-3)	2 (1-5)	1 (1-5)
Number of yrs since HIV+, M (SD)	12.7 ± 6.4	10.9 ± 7.3	6.3 ± 3.5	8.1 ± 5.6
Education				
Primary school	1 (1.2)	0 (.0)	42 (10.6)	43 (6.4)
High school, technical or vocational school	34 (40.0)	131 (65.8)	250 (63.5)	415 (61.4)
College or university	50 (58.8)	66 (33.2)	102 (25.9)	218 (32.2)
Relationship status				
Single/separated/divorced/widowed	57 (66.5)	61 (35.7)	57 (14.3)	185 (27.0)
Married	29 (33.3)	121 (60.8)	340(85.2)	490 (71.5)
Employment status				
Employed (full time or part time)	51 (57.3)	65 (32.7)	320 (87.9)	436 (66.9)
Unemployed	38 (42.7)	134 (67.3)	44 (12.1)	216 (33.1)
Main income source				
Salary or wages	40 (52.6)	75 (39.5)	68 (20.6)	183 (30.7)
Other sources	36 (47.4)	115 (60.5)	262 (79.4)	413 (69.3)

Numbers reported do not add up to 100%, because of missing data or participants who responded "I chose not to answer" for some items.

ported salary and wages as income source; more than half of mothers in Ottawa (n = 40, 52.6%) and approximately one fifth in Port Harcourt (n = 68, 20.6%) reported salary and wages as their income source.

Sociocultural Factors Influencing Adherence to Guidelines

The mothers' awareness of national guidelines, adherence to the guidelines, and socio-cultural factors that influenced adherence are summarized in Table 2. Most mothers were aware of the national infant feeding guidelines (n = 560, 88.3%) and adhered to them (n = 453, 76%). In Port Harcourt, most mothers (n= 210, 66.7%) practiced EBF. Most mothers in Miami (n = 146, 75.6%) and Ottawa (n = 79, 90.8%) practiced EFF. Most mothers (n = 343, 72.7%) reported that their infant

feeding practices were influenced by the baby's father's perspective about infant feeding. In addition, 241 (51.7%) mothers reported that other family members' perspectives influenced their infant feeding practices and 509 (86.7%) of the mothers reported that their health worker's endorsement of infant feeding guidelines influenced their adherence to guidelines. Few mothers (n = 96, 28.6%) perceived that cultural beliefs influenced infant feeding practices.

Psychosocial Factors Influencing Adherence to Guidelines

Scores and reliability estimates (Cronbach's α) for infant feeding attitudes, motherhood experience, hyper-vigilance, discrimination, and perceived stress are provided in Table 3. Cronbach's α was accept-

able for all instruments except the Iowa infant feeding attitude scale, which had an unacceptable Cronbach's α of .46. This suggests that the instrument was not able to measure intended constructs among mothers living with HIV. Mothers were most satisfied with their motherhood experiences in Ottawa (42.99 ± 7.02) and least satisfied in Port Harcourt (28.58 ± 6.73). Mothers reported moderate hyper-vigilance, which was highest in Ottawa (12.70 ± 4.98), followed by Port Harcourt (10.21 ± 5.18) and lowest in Miami (7.57 ± 5.28). Mothers reported moderate discrimination, which was highest in Ottawa (24.84 ± 15.95) and lowest in Miami (15.55 ± 14.36). Mothers' perceived stress was moderate (20.74 ± 5.94) in Miami, with highest perceived stress in Port Harcourt (22.10 ± 4.17) and lowest in Ottawa (15.20 ± 6.50).

Table 2. Statistics of the sociocultural characteristics of the mothers in relation to their national policies on infant feeding

Characteristics	Ottawa n (%)	Miami n (%)	Port Harcourt n (%)	Overall n (%)
Infant feeding practices in line with national policy guideline (Ottawa/Miami=EFF, Port Harcourt=EBF)	79 (90.8)	146 (75.6)	210 (66.7)	435 (76.0)
Infant feeding practices not according to the national policy guideline				
EFF			57 (18.1)	137 (24.0)
EBF	5 (5.7)	10 (5.2)		
MF	3 (3.3)	14 (7.3)	48 (15.2)	
Aware of the correct policy guideline on infant feeding	76 (91.6)	157 (86.3)	327 (88.6)	560 (88.3)
Opinion on infant feeding of baby's father/mother's spouse is in line with the guideline	56 (80.0)	106 (77.9)	81 (68.0)	343 (72.7)
Other family members' opinions align with infant feeding guideline	13 (16.7)	114 (74.5)	114 (48.5)	241 (51.7)
Health worker's opinion aligns with infant feeding guideline	78 (90.7)	162 (89.0)	269 (84.3)	509 (86.7)
Cultural beliefs contradict infant feeding guideline	29 (36.3)	59 (30.6)	8 (12.7)	96 (28.6)

EFF, exclusive formula feeding; EBF, exclusive breastfeeding while on antiretroviral treatment; MF, mixed feeding

Determinants of Adherence to Guidelines

Mothers who were employed and/or earning a salary were 2.6 times more likely to be adherent to the infant feeding guidelines (OR = 2.62, $P < .01$) than those not earning salaries or wages. Also, mothers were more likely to adhere to guidelines if they perceived their baby's father (OR = 1.10, $P = 0.03$) and their health

worker (OR = 2.43, $P < .01$) supported the guidelines. Unexpectedly, there was no statistically significant association between the mothers' cultural beliefs (OR = .93, $P = .06$) and adherence to guidelines (Table 4).

Positive psychosocial determinants included positive infant feeding attitudes (OR = 1.10, $P < .01$) and positive motherhood experiences (OR = 1.08, $P < .01$) both of which

significantly increased the likelihood of mothers' adherence to guidelines. Negative psychosocial determinants included hyper-vigilance (OR = .93, $P < .01$) and increased perceived stress (OR = .96, $P = .08$), both of which decreased the likelihood of mothers' adherence to guidelines. However, the association between perceived stress and the likelihood of guideline adherence was not statisti-

Table 3. Descriptive statistics of psychosocial characteristics of the HIV+ Black mothers

Construct measured	Cronbach's α	Ottawa, M \pm SD	Miami, M \pm SD	Port Harcourt, M \pm SD	Overall, M \pm SD	Maximum attainable score
Infant feeding attitude	.457	59.10 \pm 6.98	52.59 \pm 6.97	55.72 \pm 6.05	55.20 \pm 6.85	85
Motherhood experience	.891	42.99 \pm 7.02	36.66 \pm 10.69	28.58 \pm 6.73	32.81 \pm 9.68	52
Hyper-vigilance	.680	12.70 \pm 4.98	7.57 \pm 5.28	10.21 \pm 5.18	9.76 \pm 5.38	20
Discrimination	.957	24.84 \pm 15.95	15.55 \pm 14.36	7.28 \pm 9.45	11.95 \pm 13.49	50
Perceived stress	.741	15.20 \pm 6.50	21.09 \pm 6.91	22.10 \pm 4.17	20.74 \pm 5.94	40

Reliability criterion: Cronbach's $\alpha > .7$ (acceptable), $< .6$ (questionable).

Table 4. Determinants of adherence to national guidelines from a binary logistic regression model

Independent variables (Xs)	Odds ratio	P(Z)	Marginal effect (dY/dX)
Demographic variables			
1. Country of residence (1 = Canada or USA, 0 = Nigeria)	1.76	.26	.04
2. Employment status (1 = employed, 0 = unemployed)	1.86	.18	.06
3. Source of income (1 = salary or wages, 0 = otherwise)	2.62	<.00	.07
4. Average age of children born after being diagnosed HIV+ (Sum of the children ages/number of children)	.99	.44	>-.01
Sociocultural variables			
5. Baby's father's opinion in line with national guideline (1 = in favor, 0 = against)	1.10	.03	.01
6. Cultural beliefs in line with guideline (1 = in favor, 0 = against)	.93	.06	>-.01
7. Health provider's opinion in line with guideline (1 = in favor, 0 = against)	2.43	<.01	.07
8. Aware of the correct national policy guideline (1 = yes, 0 = no)	.89	.02	-.01
Psychosocial variables			
9. Infant feeding attitude	1.10	<.01	.01
10. Discrimination	1.03	.10	<.01
11. Hyper-vigilance	.93	.01	-.01
12. Motherhood experience	1.08	<.01	.01
13. Perceived stress	.96	.08	>-.01
Constant	<.01	<.01	
Model summary			
Number of observations: 526		Log likelihood: -205.26	
LR Chi-square: 134.22		Probability (Chi-square): <.01	
Pseudo R-square: 0.25			

Dependent variable (Y): National infant feeding guideline adherence (1 = in line with national guideline, 0 = otherwise)

cally significant. Two of the explanatory variables: guideline awareness and discrimination did not meet the *a priori* expectations of positive and negative association, respectively.

DISCUSSION

This study among mothers living with HIV examined the determinants of adherence to infant feeding guidelines. Although we found that adherence to infant feeding guidelines was much greater in the North American cities, this could not be attributed to city-level factors as the association between adherence to the guideline and the city-level variable, north-south (Ottawa-Miami vs Port Harcourt) was not statistically signifi-

cant. Therefore, it was not necessary to focus on city-level or clustering effects. Instead, we analyzed the community, family, and individual level determinants of adherence to infant feeding guidelines. The determinants of adherence to infant feeding guidelines were broadly categorized as socio-cultural and psychosocial factors. Socio-cultural determinants included: awareness or knowledge of infant feeding guidelines, socioeconomic status proxy (income source), familial influences (baby's father, mother's spouse and other family members), health worker influences, and cultural beliefs and traditions. Psychosocial determinants included: infant feeding attitudes,²¹ motherhood experiences,²² hyper-vigilance,^{23,24} discrimination,²⁵ and perceived stress.²⁶

Sociocultural Determinants of Adherence to Infant Feeding Guidelines

An overwhelming majority of mothers had awareness and the correct knowledge of the infant feeding guidelines where they lived. The mothers' correct guideline knowledge was associated with adherence. However, the odds ratio (.89) was less than 1, making it difficult to interpret the magnitude of the association, which suggests the model inadequately captured the complexity of the relationship between awareness and adherence to guidelines. The relationships between guideline awareness and strategies for the prevention of mother-to-child transmission underscores the importance of maternal education about ART.^{3,12} A better understanding of this relationship and

how it influences other determinants of adherence are critical for elimination of vertical HIV transmission.^{1,6}

Mothers living with HIV whose income source was salary or wages were 2.6 times more likely to adhere to national infant feeding guidelines than those who did not. Mothers who earn salary or wages may have assets that facilitate adherence to guidelines including increased maternal education, access to affordable and hygienic formula replacements,^{3,8} and work-

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place policies that support mothers' infant feeding practices.⁸ In previous research, maternal education and work influenced infant feeding choices and retention in postpartum HIV care.^{3,9,27}

Familial influence on infant feeding practices is well-established and includes the perspectives of the baby's father^{3,10} and other family members.^{3,8,10} In this study, the infants' fathers supported adherence to the guidelines, which is promising given that other research has documented how women often have limited autonomy in infant feeding choices and decisions on

whether to engage in efforts to prevent vertical HIV transmission including taking ART.^{3,8,10} The involvement of male partners in infant feeding decisions influenced the acceptability of formula use by mothers living with HIV.²⁸ Key to further reductions in HIV transmission during perinatal and postpartum periods may center on efforts to increase family members' awareness of the critical role of adherence to the infant feeding guidelines and ART for women living with HIV.^{3,10} In addition, key family members (fathers, grandmothers) who may be dominant in family decisions are rarely included in counseling sessions.

The mothers' perceptions that their health care providers endorsed infant feeding guidelines was a determinant of adherence to the guidelines. This is consistent with other research highlighting the substantial influence health care providers have in infant feeding choices and other health decisions of mothers living with HIV.^{3,8,9,12,14} Socio-cultural and structural challenges remain and have the potential to limit efforts to eliminate vertical HIV transmission.^{3,12} These challenges include the lack of available trained health care providers, long clinic wait times, access to ART, infant formula³ and the desire for EBF among mothers living with HIV in the US¹² and in other high-resource settings. The desire for EBF among mothers living with HIV makes it necessary to explore alternative approaches to the current regime of infant feeding guidelines that differentiate feeding approach based on socioeconomic and geopolitical lines.

While our study results revealed that alignment of the national guidelines with cultural beliefs did not have

a statistically significant relationship with the mothers' adherence to the national guidelines, mothers whose cultural beliefs were congruent with their national infant feeding guideline had a more positive motherhood experience when compared with those whose cultural beliefs/practices were not in line with the guideline. The results of this study and the qualitative data (reported elsewhere) showed that cultural norms and pressures influenced motherhood and infant feeding decisions; however, the fear of HIV mother-to-child transmission with their infants despite being on ART superseded the influence of cultural pressures on adherence to guidelines. Instead, cultural norms and pressures often led to stigma and hyper-vigilance, which had a negative impact on their motherhood experience. Beyond being socially acceptable, breastfeeding is a cultural norm among Black mothers²⁹ and cultural values or beliefs influence infant feeding choices within African cultures.¹³ Mothers living with HIV have reported socio-cultural challenges that prompted non-adherence to guidelines.³⁰ Nigerian mothers living with HIV have reported feeling pressured to engage in cultural practices (eg, administration of water and herbal "teas" or medications in addition to EBF).^{30,31}

Psychosocial Determinants of Infant Feeding Guideline

Positive psychosocial factors such as positive infant feeding attitudes and favorable motherhood experiences are associated with adherence to guidelines among mothers living with HIV.¹³ In this study, infant feeding attitudes were associated with adherence to guidelines; however, this finding is

difficult to interpret because of unacceptable instrument reliability with this sample. To our knowledge, this is the first time the instrument has been used with mothers living with HIV and there may need to be a specific instrument developed for these mothers. In this study, a favorable motherhood experience had a significant positive association with adherence to guidelines. Among mothers living with HIV, adherence to both infant feeding guidelines and ART may be driven primarily by concerns for the baby's health and may be influenced by competing concerns, including cultural expectations of motherhood.^{3,9} Additionally, infant feeding choices may carry risks including social exclusion, stigma, discrimination, and damage to marital and family relationships.^{3,12}

Negative psychosocial factors such as hyper-vigilance and discrimination (including its precursor stigma) influenced adherence to the guidelines.¹³ Hyper-vigilance was associated with adherence to the guidelines. This finding may be partially explained by women living with HIV being overly protective of their children and the fear that they could potentially infect them, despite a low likelihood of transmission occurring in the presence of ART.^{3,8} Such undue fears negatively influence infant feeding choices and sustained neural hyper-reactivity may be a risk factor for anxiety and depression during the postpartum period.³² The hyper-vigilance associated with maternal anxiety may contribute to impaired infant regulatory development,³³ often beginning from compromised infant care and feeding related to maternal anxiety and hyper-vigilance. Anxious mothers

exhibiting both hyper-vigilance and reduced emotionality toward their infants portray a pattern of behavior that may reduce maternal arousal while allowing her to maintain attention and responsiveness to her child's needs.³⁴

Study Limitations

The study population, Black mothers living with HIV were hard-to-reach given their HIV status and their relatively smaller population size. To improve recruitment, we applied venue-based sampling making it difficult to fully generalize the result of the study to all Black mothers living with HIV. However, the samples were dispersed to as many of those venue as there are to reduce the sampling bias associated with venue-based sampling. Also, because the analyses are cross sectional, we cannot make causal inferences. Our discussions were limited to the association of variables. The psychometric tools employed in this study have not been used for this specific population. Hence, there were no comparative reliability scores, although all scores except one were within acceptable values of reliability.

CONCLUSIONS

This article started with a quote about the potential of ART in the elimination of vertical HIV transmission for pregnant and breastfeeding mothers.¹ For this potential to be realized, we need to take concerted efforts to develop interventions and guidelines for women living with HIV and their families and communities.^{15-20,35} These efforts should be grounded in participatory approaches that consider cultural lifeways of mothers and their

communities. Human rights-based or decolonizing approaches to intervention and guideline development in partnership with mothers living with HIV and their families, when combined with technological advantages of ART, optimize the potential for elimination of vertical HIV transmission for pregnant and breastfeeding mothers.

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CONFLICT OF INTEREST

No conflicts of interest to report.

AUTHOR CONTRIBUTIONS

Research concept and design: Hannan, E Etowa, J Etowa, Babatunde, Galarza, Phillips; Acquisition of data: Hannan, J Etowa, Babatunde, Barfield, Galarza, Alharbi, Reid, Phillips; Data analysis and interpretation: E Etowa, J Etowa, Alharbi, Reid, Phillips; Manuscript draft: E Etowa, Babatunde, Alharbi, Phillips; Statistical expertise: E Etowa, Phillips; Acquisition of funding: J Etowa, Babatunde, Phillips; Administrative: Hannan, E Etowa, J Etowa, Barfield, Galarza, Alharbi, Reid, Phillips; Supervision: Hannan, J Etowa, Galarza, Phillips

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Factors Affecting Adherence to Infant Feeding Guidelines - Hannan et al

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