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Research Article

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Structural Determinants of Exclusive Breastfeeding among Migrant Head Porters (Kayayei) in Urban Ghana: A Mixed-Methods Health Systems Analysis

Rehana Ama Obosu* and Buor Daniel

Department of Geography and Rural Development, Kwame Nkrumah University of Science and Technology, Ghana

***Corresponding Author**
Rehana Ama Obosu, Department of Geography and Rural Development, Kwame Nkrumah University of Science and Technology, Ghana.

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Abstract

Background: *Despite Ghana's established breastfeeding promotion infrastructure, exclusive breastfeeding (EBF) for the WHO-recommended six months remains critically low among migrant female head porters (kayayei). This study examines the structural, interpersonal, and organisational determinants of EBF among this group and identifies a targeting and delivery failure within Ghana's maternal and child health system, specifically the absence of operational mechanisms within existing maternal health programmes to reach informal migrant populations.*

Methods: *An explanatory sequential mixed-methods design was employed. Interviewer-administered questionnaires were completed by 398 kayayei mothers at four major Kumasi market sites. Binary logistic regression across three hierarchical models identified predictors of six-month EBF adherence; Firth penalised likelihood regression was applied where separation occurred. Ten key informant interviews (KIIs) and two focus group discussions (FGDs; n=20) were analysed thematically. Qualitative components follow COREQ guidance; overall mixed-methods reporting follows GRAMMS criteria.*

Results: *Although 95.5% reported practising EBF, only 12.1% met the WHO six-month criterion (mean duration: 2.86 months, SD=1.70). Strong negative predictors included being outside a union and perceiving EBF as incompatible with work (both identified via Firth penalised regression due to near-complete separation), lack of antenatal care, and not seeking professional breastfeeding help — confirmed qualitatively as the dominant barrier. Daily expenditure (OR=1.39, 95% CI 1.15–1.67, p=0.001) and secondary/higher education were protective (secondary/higher education OR=71.96 [95% CI: 3.07–1685.46], p=0.009; noting the wide CI due to sparse data). The final model explained 68.6% of the variance (Nagelkerke R^2=0.686). No institutional actor identified any policy specifically addressing EBF among kayayei.*

Conclusions: *EBF disparities among kayayei reflect a structural policy implementation gap, not maternal non-compliance. Improving outcomes requires labour-sensitive outreach, market-based care infrastructure, social protection, and formal designation of migrant informal workers as a maternal health priority within Ghana's health system.*

Keywords: Informal Labour, Migrant Women, Policy Implementation Gap, Ecological Models, Exclusive Breastfeeding, Kayayei, Health Systems, Structural Determinants, Ghana

Key Messages

- **What is already known:** EBF for six months is a highly cost-effective child survival intervention. Ghana's national EBF rate (53%) falls below the WHO 90% target, with substantial disparities by employment type, education, and geography. Globally, women in informal labour face recognised breastfeeding challenges, including in comparable LMIC contexts such as South Asian garment workers and Latin

American market vendors. However, migrant market workers in West Africa remain largely unstudied.

- **New findings:** The gap between self-reported EBF (95.5%) and WHO-consistent six-month adherence (12.1%) among *kayayei* is not attributable to low awareness or intent, but to the structural conditions of informal market labour: 12.95-hour working days, constant physical mobility, 89.9% food insecurity, and the complete absence of targeted institutional support. Hierarchical logistic regression (Nagelkerke R^2=0.686) confirms that organisational and structural factors explain the majority of variance. No institutional actor at KMA, district, or national level identified any policy specifically addressing EBF among kayayei. Ghana's 2025 EBF target of 62% elapsed without being achieved, underscoring the urgency of addressing this population.
- **Policy and practice implications:** Ghana's national nutrition policy must formally designate migrant informal workers as a maternal health priority, consistent with Scaling Up Nutrition Movement commitments. The CHPS programme should be extended into market environments and delivered through market queen networks. Social protection mechanisms — including work-pause subsidies and nutritional support — are necessary to translate awareness into sustained practice.

1. Introduction

1.1. Background

Exclusive breastfeeding (EBF) providing infants with only breast milk, alongside permitted vitamins, minerals, oral rehydration salts, and medications, for the first six months of life is one of the most effective interventions for reducing infant mortality and improving child development outcomes in low- and middle-income countries [1,2]. Global evidence suggests that optimal breastfeeding practices could prevent over 800,000 child deaths annually, with the greatest potential gains in sub-Saharan Africa [3]. Despite this, fewer than 40% of infants globally under six months are exclusively breastfed [2]. This structural mismatch is not unique to Ghana. Evidence from South Asian garment workers, Latin American informal market traders, and sub-Saharan African petty vendors consistently shows that piece-rate income structures, mobility demands, and childcare deficits form a compound barrier to EBF that awareness-based interventions cannot resolve [4,5].

Yet migrant market workers in West Africa and in Ghana specifically remain largely outside this international literature. More than three-quarters of employment in Ghana is informal, with women disproportionately concentrated in the lowest-income segments [6]. Among the most marginalised groups of informal female workers are kayayei migrant female head porters who travel predominantly from Ghana's northern regions to urban commercial centres, carrying goods on their heads for daily, negotiated fees. Estimated at over 100,000 nationally, kayayei face an extreme convergence of disadvantage: physically demanding working hours (mean 12.95 hours/day), income barely above the international poverty line (mean GHC 47.70/day), group housing with limited privacy, very low food security (89.9%), restricted healthcare access, and social isolation from family support networks (health access and nutrition outcomes; NHIS enrolment but EBF as a specific site of health inequality among this population remains unexamined) [7-11].

In Ghana, the 2022 Demographic and Health Survey reports a national EBF rate of 53%, below the WHO's 90% target and below the government's own 2025 commitment of 62%, which elapsed without being achieved [12]. Ghana's breastfeeding promotion infrastructure anchored by the Ghana Health Service's Maternal, Infant and Young Child Nutrition Strategic Framework and supported through antenatal counselling, the Baby-Friendly Hospital Initiative, and community health outreach has succeeded in generating awareness [13]. Yet sustained EBF is shaped less by awareness than by the structural conditions in which mothers live and work [14-18].

The gap between policy aspiration and population-level adherence is most acute among sub-populations whose structural conditions are furthest from the assumptions embedded in existing frameworks. Among kayayei, the labour conditions of head porterage's continuous mobility, piece-rate income loss for any pause, and the absence of any caregiving infrastructure make the temporal and physical requirements of EBF structurally incompatible with the working day. This study addresses that gap. It examines structural, interpersonal, and organisational determinants of EBF among kayayei in Kumasi through an explanatory sequential mixed-methods design, guided by an integrated Social Ecological Model (SEM) and health systems implementation framework (Figure 1).

Three objectives guided the study

1. To determine EBF prevalence relative to WHO six-month adherence;
2. To identify multi-level predictors through hierarchical logistic regression; and
3. To explain the health systems mechanisms associated with the observed policy implementation gap.

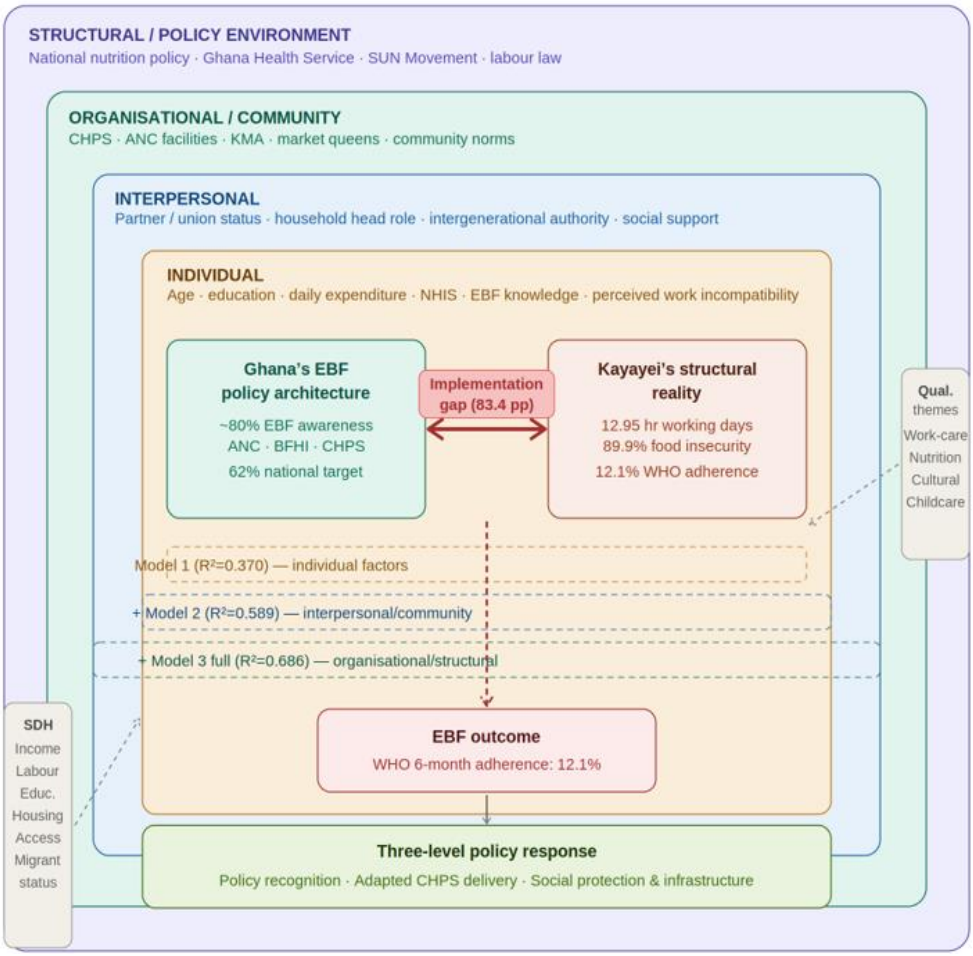

Figure 1: Integrated analytical framework combining the Social Ecological Model and Health Systems Implementation Theory applied to EBF among kayayei in Kumasi, Ghana. SDH = Social Determinants of Health [19-21]

2. Analytical Framework

The study applies an integrated framework combining the Social Ecological Model (SEM) with health systems implementation theory and the social determinants of health (SDH) framework (Figure 1) [19-21]. The SEM holds that health behaviour is shaped by the simultaneous interaction of individual, interpersonal, community, and structural factors [19]. Applied to breastfeeding, this moves analysis beyond individual knowledge and intent to encompass the labour conditions, household compositions, healthcare access structures, and policy environments that determine whether sustained EBF is materially feasible.

Three hierarchical regression models, structured across the SEM's four levels, test the relative explanatory contribution of each

- Model 1 captures individual-level factors
- Model 2 adds interpersonal and community-level factors; and
- Model 3 adds organisational and structural-level factors.

Health systems implementation theory conceptualises the policy implementation gap as the disconnect between what health policy prescribes and what the conditions of service users' lives permit [20]. Peters et al., argue that implementation failure typically reflects structural misalignment between policy assumptions and the social realities of target populations and not inadequate policy design purse [20]. In this study, the policy implementation gap is operationalised as the measurable distance between Ghana's EBF promotion architecture (which generates approximately 80% EBF awareness among kayayei, per Table 1) and the WHO-consistent 12.1% six-month adherence rate. The SDH framework contextualises both by foregrounding income, labour, education, housing, and institutional access as the upstream mechanisms through which structural inequality is associated with health disparity [21].

3. Methods

3.1. Design and Setting

An explanatory sequential mixed-methods design was employed, in which quantitative analysis established the prevalence and structural predictors of EBF, followed by a qualitative phase designed to explain and contextualise findings [22]. Data were collected across the four major market sites Kejetia, Adum, Asafo, and Bantama—within the KMA (Figure 2), which collectively represent the primary labour zones for *kayayei* and reflect the range of market environments in which they operate.

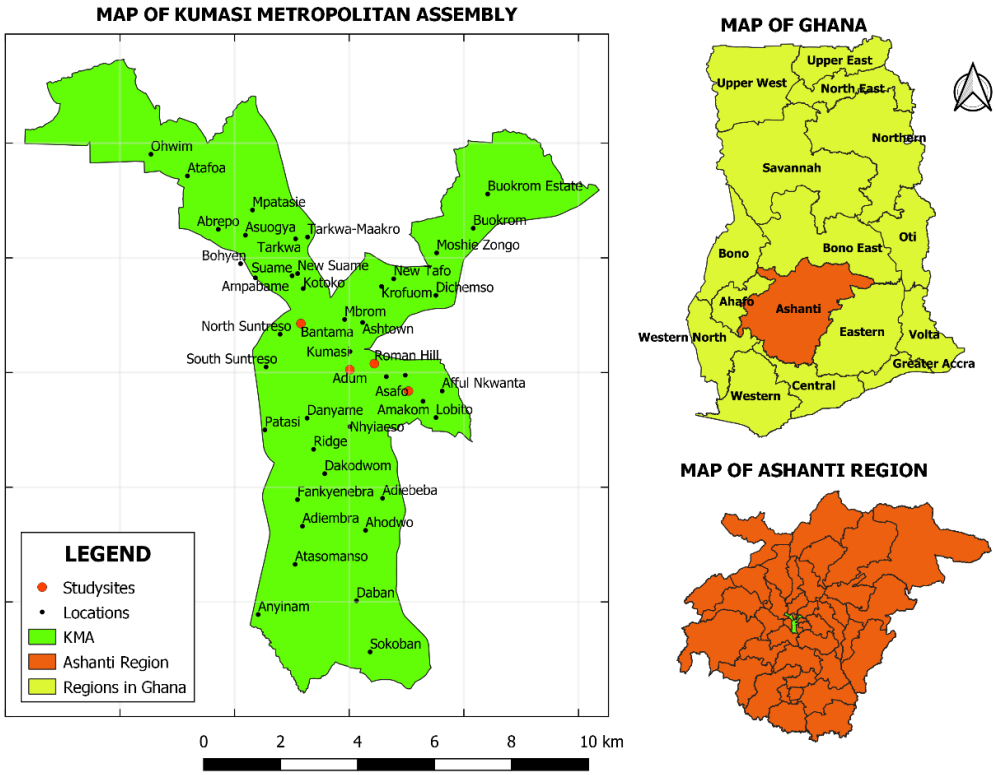

Figure 2: Map of the Kumasi Metropolitan Assembly (KMA) showing the four study sites (red dots): Kejetia, Adum, Asafo, and Bantama. Inset maps show the location of the Ashanti Region within Ghana and KMA within the Ashanti Region. Source: Adapted from Ghana Statistical Service (2020) [23]

3.2. Quantitative Phase: Sampling and Data Collection

The target population was migrant female head porters aged 15-49 with at least one child aged 0–24 months, actively engaged in kayayei work at the four study sites. A minimum sample size of 383 was calculated using Cochran's formula for an estimated population proportion of 50% (a conservative estimate given the absence of prior prevalence data), a 95% confidence level, and a 5% margin of error, inflated to 398 to account for anticipated non-response [24]. Because kayayei are a highly mobile population with no established sampling frame, a location-based convenience sampling strategy was employed. Participants were recruited across multiple sessions on different days to reduce systematic exclusion. This approach is appropriate for mobile informal worker populations but introduces selection bias: women in the most transient or precarious circumstances may be underrepresented, and findings should be interpreted accordingly [10]. Structured questionnaires were administered by trained bilingual female enumerators in Hausa, Dagbani and Twi the dominant first languages of kayayei from northern Ghana. The primary dependent variable was binary: meeting the WHO criterion of exclusive breastfeeding for six continuous months.

3.3. Quantitative Analysis

Binary logistic regression was structured across three hierarchical models:

- Model 1 (individual-level factors),
- Model 2 (adding interpersonal and communal factors), and
- Model 3 (full model with organisational and structural factors), following the SEM structure.

Multicollinearity diagnostics confirmed all variables met acceptable tolerance thresholds. Model fit was assessed using Nagelkerke R^2 and classification accuracy. Odds ratios (OR) and 95% confidence intervals (CI) are reported; $p<0.05$ is considered statistically significant. Two predictors perceived EBF-work incompatibility and being outside a union produced near-zero odds ratios consistent with near-complete separation, a condition in which one category of a predictor near-perfectly predicts the outcome, causing the maximum likelihood estimator to push coefficients toward negative infinity [25]. Under these conditions, Firth penalised likelihood logistic regression is the appropriate estimator; these predictors were reanalysed using Firth's method, implemented via the legists package (version 1.10) in R [26]. Firth-corrected ORs are reported for these two variables in Table 1; all other predictors were estimated by standard maximum likelihood. It should be noted that the high Nagelkerke R^2 in Model 3 (0.686) is partly an artefact of the large Firth-corrected coefficients for these two near-separation predictors; the direction of findings is more informative than the absolute magnitude. A Hosmer-Lemeshow goodness-of-fit test confirmed acceptable model fit ($\chi^2=9.34$, df=8, $p=0.315$).

Variable	Model 1 OR [95% CI]	p	Model 2 OR [95% CI]	p	Model 3 OR [95% CI]	p
INDIVIDUAL LEVEL						
Age	0.84 [0.75–0.95]	0.004**	0.92 [0.78–1.10]	0.366	0.86 [0.70–1.06]	0.158
Not in union (ref: in union) (b)	0.34 [0.07–1.76]	0.200	0.04 [0.00–0.55]	0.016*	0.04 [0.01–0.22] (b)	0.001**
Basic education (ref: none)	2.94 [1.28–6.74]	0.011*	6.38 [1.46–27.99]	0.014**	5.45 [0.82–36.14]	0.079
SHS+ education (ref: none) (a)	3.17 [0.65–15.56]	0.155	9.31 [0.94–92.53]	0.057	71.96 [3.07–1685.46] (a)	0.008**
Daily expenditure	1.12 [1.07–1.17]	<0.001***	1.21 [1.10–1.33]	<0.001***	1.39 [1.15–1.67]	0.001**
Active NHIS (ref: no NHIS)	2.73 [1.11–6.72]	0.029*	3.67 [1.08–12.43]	0.037*	3.82 [0.92–15.84]	0.065
INTERPERSONAL/COMMUNAL LEVEL						
Not household head	—	—	0.17 [0.03–0.96]	0.045*	0.05 [0.00–0.72]	0.027*
No ANC (ref: received ANC)	—	—	0.10 [0.02–0.59]	0.010*	0.07 [0.01–0.51]	0.009**
Mamprusi ethnicity (ref: other)	—	—	0.14 [0.03–0.72]	0.019*	0.30 [0.04–2.50]	0.268
Frafra ethnicity	—	—	5.01 [0.67–37.31]	0.116	26.92 [1.64–442.35]	0.021*
Dagomba ethnicity	—	—	2.77 [0.44–17.45]	0.278	33.20 [1.34–822.62]	0.032*
ORGANISATIONAL/STRUCTURAL LEVEL						
Did not seek professional help	—	—	—	—	0.10 [0.02–0.67]	0.017*
EBF perceived incompatible with work (b)	—	—	—	—	0.03 [0.01–0.09] (b)	<0.001***
MODEL FIT						
Nagelkerke R^2	0.370		0.589		0.686	
Classification accuracy (%)	89.9		91.1		95.2	
Hosmer-Lemeshow test	—		—		χ^2=9.34, df=8	0.315

Significance: Important: Variables marked (b) in this table used Firth penalised likelihood regression due to near-complete separation — their ORs should be interpreted directionally, not literally. See Section 3.3. *p<0.05; **p<0.01; ***p<0.001. Annotations: (a) Wide CI — direction is reliable; magnitude should be interpreted cautiously (SHS+ subgroup: n=22). (b) Firth penalised likelihood logistic regression applied due to near-complete separation; OR and CI are penalised estimates. OR = odds ratio. CI = confidence interval. ANC = antenatal care. NHIS = National Health Insurance Scheme. — = not included in this model.

Table 1: Hierarchical Logistic Regression Predicting WHO Six-Month EBF Adherence (N=398)

3.4. Qualitative Phase

Ten KIIs were conducted with: two assemblymen with market area responsibility; one district assembly representative; two market queens serving as informal governance intermediaries; one Ministry of Gender, Children and Social Protection representative; and four midwives providing frontline maternal care in the KMA together capturing governance and frontline implementation perspectives. Two FGDs were conducted: FGD 1 (n=12, younger women, mean age 27) and FGD 2 (n=8, older women, mean age 42), enabling comparison across age cohorts with different breastfeeding experiences and cultural exposures. Interviews and FGDs were conducted in Twi, the dominant market lingua franca used by *kayayei* in Kumasi commercial settings, even among women whose first language is Hausa or Dagbani. *Kayayei* in this setting routinely conduct business, negotiate, and engage with local authorities in Twi. Sessions were audio-recorded with consent and supported by field notes. Thematic analysis followed Braun and Clarke's six-phase framework [27]. Analysis was conducted independently by two coders applying both deductive codes derived from the SEM and inductive codes emerging from the data. Initial coding disagreements were resolved through discussion until consensus was reached; inter-coder agreement exceeded 85% before consensus discussion. Themes were member-checked with FGD participants to confirm interpretive accuracy. Participant quotes are identified by age and FGD group (for FGD participants) or by role and participant ID (for KII participants), applied consistently throughout.

3.5. Integration and Reflexivity

- **Integration:** Quantitative and qualitative findings were

integrated using a joint display approach, in which statistical predictors from the regression models were systematically mapped alongside qualitative themes in a matrix. Convergence was defined as qualitative accounts independently confirming or elaborating the direction of a statistically significant predictor; divergence was noted where qualitative data introduced explanations not captured by quantitative variables. The completed integration matrix is provided as Supplementary Table, enabling readers to verify convergence and divergence claims against primary data. A GRAMMS reporting checklist is provided as Supplementary File.

- **Reflexivity:** The lead researcher is a Ghanaian PhD student with familiarity with the *kayayei* communities and market governance in Kumasi. This facilitated access and Twi-language interaction, while requiring deliberate reflexive attention to the risk of privileging institutional or professional framings over women's own accounts. This was managed through analytic separation of women's framings from researcher interpretation, member-checking of qualitative themes, and maintenance of a reflexive field journal throughout data collection. Variable selection drew on the researcher's familiarity with *kayayei* conditions, which may have shaped which structural domains were operationalised. The supervisory author brings comparative LMIC health systems expertise. Both authors recognise that proximity to the setting shapes what is noticed and what is naturalised; interpretive claims in this paper have been tested against the raw data and member-checked outputs accordingly.

3.6. Ethical Approval

Ethical approval was granted by the Humanities and Social Sciences Research Ethics Committee of Kwame Nkrumah University of Science and Technology (Ref: HuSSREC/AP/14/VOL.3).

4. Results

4.1. Participant Characteristics

The study surveyed 398 kayayei across the four market sites. Participants ranged in age from 16 to 40 years (mean 26.15, SD=4.83), with 98% born in northern Ghana and 95.5% relying exclusively on *kayayei* as their primary occupation. Key characteristics are presented in Table 2.

Variable	Category	n (%) or Mean (SD)	Range
Region of birth	Northern Ghana (5 regions)	390 (98.0%)	—
Age (years)	—	26.15 (4.83)	16–40
Marital status	Married	243 (61.1%)	—
	Cohabiting	74 (18.6%)	—
	Not in union	81 (20.4%)	—
Household composition	Couple with child(ren)	174 (44.0%)	—
	Single mother	112 (28.1%)	—
	Extended family	108 (27.1%)	—
Education	No formal education	228 (57.3%)	—
	Basic school	148 (37.2%)	—
	SHS / higher	22 (5.5%)	—
Ethnicity	Dagomba	190 (47.8%)	—
	Mamprusi	98 (24.6%)	—
	Frafra	48 (12.1%)	—
Religion	Islam	294 (73.9%)	—
Daily working hours	—	12.95 (2.07)	5–20
Daily break (minutes)	—	1.91 (15.46)	0–180
Daily income (GHC)	—	47.70 (11.70)	20–80
Daily expenditure (GHC)	—	27.64 (9.38)	2–50
Accommodation	Group home	270 (67.8%)	—
	Kiosk / front of shop	92 (23.1%)	—
	Other / unspecified	36 (9.1%)	—
Food security	Very low food security	357 (89.9%)	—
Never cooks own meals	—	254 (63.8%)	—
Active NHIS coverage	—	190 (47.7%)	—

Source: Field data, 2024. GHC = Ghanaian Cedi. NHIS = National Health Insurance Scheme. SHS = Senior High School.

Table 2: Socio-Demographic, Economic, and Living Characteristics of Kayayei Respondents (N=398)

These figures describe a population defined by extreme structural vulnerability: mean daily income of GHC 47.70 (approximately USD 3 (at 2024 exchange rates)); 89.9% reporting very low food security; 67.8% living in group housing; and mean daily working breaks of under two minutes — conditions that structurally preclude the time and proximity required for sustained EBF. Tables 3 and 4 describe the FGD and KII participants.

Characteristic	FGD 1 (Younger; n=12)	FGD 2 (Older; n=8)
Age range	22–36 years	38–49 years
Mean age	27 years	42 years
No formal education	7 (58.3%)	8 (100%)
Basic school	3 (25.0%)	0 (0%)
SHS or higher	2 (16.7%)	0 (0%)
Muslim	11 (91.7%)	6 (75.0%)
Married / cohabiting	5 (41.7%)	7 (87.5%)
Dominant ethnicity	Mamprusi (58.3%)	Dagomba (50.0%)
Source: Field data, 2024		

Table 3: Focus Group Discussion Participant Characteristics

P	Role	Experience	Area of responsibility
P1	Assemblyman	2 terms	Mixed residential/market area; large kayayei population
P2	Assemblyman	2 terms	Densely populated urban area; sanitation and infrastructure
P3	District Assembly Representative	—	Development and policy implementation
P4	Market Queen	10+ years	Trader welfare and market operations
P5	Market Queen	15+ years	Advocacy for market traders
P6	Ministry of Gender Representative	15 years	National women's welfare and gender policy
P7	Midwife	9 years	Hospital — maternal care services
P8	Midwife	8 years	Hospital — maternal care services
P9	Midwife	5 years	Polyclinic — maternal care services
P10	Midwife	3 years	Polyclinic — maternal care services
Source: Field data, 2024. P = Participant.			

Table 4: Key Informant Interview Participant Profile

4.2. EBF Awareness and Prevalence: The Policy Implementation Gap

Table 5 presents EBF awareness and adherence data. Eighty per cent of respondents had heard of EBF, with health facilities as the primary source (61.3%). However, only 2.5% considered themselves well-informed, and qualitative data revealed systematic conceptual confusion: participants across both FGDs defined EBF as any brief period of exclusive breastmilk feeding rather than continuous six-month adherence.

"Exclusive breastfeeding? Oh, I have heard about it. If you give your baby breast milk for a few days, that is exclusive breastfeeding because you have given only breast milk and nothing else."

(FGD 2, age 36)

While 95.5% believed they had practised EBF, only 12.1% met the WHO six-month criterion. Mean actual EBF duration was 2.86 months (SD=1.70). This 83.4 percentage-point divergence is the primary empirical evidence of the policy implementation gap. The direction of this recall asymmetry is uncertain: while social desirability likely inflates self-reported EBF, recall degradation for the six-month criterion cannot be excluded, particularly for children toward the upper end of the 0- 24- month age range. The true gap may be larger or smaller than the observed 83.4 percentage points; future studies restricting to children aged 0–12 months would improve precision on this estimate. Healthcare professionals confirmed that cessation consistently preceded postnatal review:

"We teach them about the importance of exclusive breastfeeding, but by the time they come for postnatal visits, many have already stopped exclusively breastfeeding. Although we teach them to practise EBF for at least six months, many Kayayei mothers cannot achieve this due to various challenges." (KII, Midwife, P7)

Indicator	n	% or Mean (SD)
Ever heard of EBF	318	79.9%
Primary information source: health facility	244	61.3%
Self-rated as 'well informed' about EBF	10	2.5%
Reported practising EBF with last child	380	95.5%
Met WHO six-month EBF criterion (actual adherence)	48	12.1%
Mean actual EBF duration (months)	—	2.86 (SD=1.70); range 0–6
Mean perceived ideal EBF duration (months)	—	5.82 (SD=1.00); range 1–12
Mean age at introduction of non-water liquids (months)	—	2.99 (SD=1.67)
Mean age at introduction of water (months)	—	4.12 (SD=2.04)
Mean age at introduction of solid/semi-solid foods (months)	—	5.25 (SD=2.24)
Source: Field data, 2024. WHO criterion = continuous exclusive breastfeeding for six months.		

Table 5: EBF awareness, knowledge, and prevalence among kayayei respondents (N=398)

4.3. Structural Predictors: Hierarchical Logistic Regression

Given the cross-sectional design, all analytical findings reflect associations rather than causal relationships. Table 1 presents hierarchical regression results. The full model (Model 3) explains 68.6% of variance (Nagelkerke R^2=0.686) and correctly classifies 95.2% of cases — a substantial improvement from Model 1 (R^2=0.370, 89.9%) and Model 2 (R^2=0.589, 91.1%). The progressive improvement in model fit as structural and organisational variables are added is consistent with the SEM proposition that EBF adherence is strongly associated with structural and organisational factors. While structural constraints are dominant predictors, the 12.1% of *kayayei* who met the six-month criterion under identical material conditions suggests that agency operates within, rather than independently of, these constraints. As noted in the methods, the high R^2 is partly an artefact of large penalised coefficients for the two separation predictors; the direction and pattern of findings are more analytically meaningful than the absolute R^2 value. Given sparse data in several subgroups and the use of penalised estimation for two predictors, estimates should be interpreted with emphasis on direction rather than magnitude.

Two predictors showed near-complete separation and were reanalysed using Firth penalised likelihood logistic regression: perceived EBF-work incompatibility and being outside a union [25,26]. The Firth-corrected OR for perceived EBF-work incompatibility (OR=0.03, 95% CI 0.01–0.09, p<0.001) indicates that women who perceived EBF as incompatible with their work had 97% lower adjusted odds of meeting the six-month criterion (noting this Firth-corrected estimate should be interpreted directionally; see Table 1, annotation b). Qualitative data confirm this reflects an accurate assessment of material conditions, not a cognitive distortion. Being outside a union produced a Firth-corrected OR of 0.04 (95% CI 0.01–0.22, p=0.001), reflecting the structural consequence of sole responsibility for income generation and infant care without partner support. Daily expenditure (OR=1.39, 95% CI 1.15–1.67, p=0.001) was consistently significant while daily income was not, confirming the key economic mechanism as financial buffer capacity rather than earnings level. The SHS+ education predictor shows a strong positive direction (OR=71.96, p=0.008) but the wide CI (95% CI 3.07–1685.46) reflects sparse data (n=22 in subgroup); the direction is reliable but the magnitude should be interpreted cautiously.

4.4. Structural Barriers: Qualitative Findings

Four themes emerged consistently across both FGDs and were triangulated against the regression predictors in the joint display integration stage. All participants in both FGDs raised themes 4.4.1 and 4.4.4; themes 4.4.2 and 4.4.3 were prominent across both groups but with notable variation by age cohort as indicated.

4.4.1. The Work-Care Impossibility

Every FGD participant, across both age cohorts, described a fundamental structural incompatibility between kayayei market labour and EBF. The piece-rate income structure in which any pause directly reduces daily earnings, which makes sustained breastfeeding economically irrational within the survival margin:

"Hmm, as for the exclusive, if we get it, we will do it. But time, oh, my sister. It takes so much time. You know our work is difficult. We cannot afford to give only breastmilk to the child for six whole months! If we do that, we will go hungry!" (FGD 1, age 36)

"I stopped breastfeeding at 3 months because I had to go back to work and could not keep bringing the baby to breastfeed. You know how difficult our work is. If I decide to take the baby everywhere and breastfeed, it is tiring and difficult. So, I stopped." (FGD 2, age 39)

This theme converges with the dominant regression finding: perceived EBF-work incompatibility is the strongest structural predictor of non-adherence, consistent with qualitative accounts showing it to be an accurate description of material conditions, not a cognitive barrier amenable to counselling.

4.4.2. Nutritional Insecurity and Physical Depletion

With 89.9% reporting very low food security and 63.8% never cooking their own meals, the nutritional substrate for sustained lactation was severely compromised. This theme was prominent

in both FGDs but more extensively articulated by younger participants, for whom recent experience of milk insufficiency was vivid:

"I started breastfeeding exclusively, but after a month, I gave up because my breast milk was not coming in much. I tried to continue, but I could not produce enough milk, and my work did not give me the time to breastfeed. So, I started giving porridge when my baby was just two months old." (FGD 1, age 23)

"I have other children to look after and no support. I wanted to breastfeed longer, but I could not eat well. How can I give the baby only breast milk when I do not have the strength myself?" (FGD 2, age 43)

Perceived milk insufficiency was among the top three reasons given for complementary food introduction, alongside returning to work and infant hunger. This links the nutritional finding directly to the expenditure predictor: the capacity to eat adequately is a function of financial slack, not earnings level.

4.4.3. Intergenerational Authority and Cultural Pressures

This theme was raised predominantly by older participants in FGD 2, whose accounts reflected longer-established norms of intergenerational authority over infant feeding. Older female relatives particularly mothers-in-law and grandmothers in Dagomba and Mamprusi communities held cultural authority that could override individual EBF intent:

"They [Dagomba] believe that if the child is not given water after birth, he or she will die. So, my mother will even give the child water, whether you say she should or not. The older people can even hide the child and give them water." (FGD 2, age 42; Mamprusi participant describing Dagomba community norm)

"I recall that years ago, when I had my son, I introduced solid food early because my mother-in-law had advised me that the baby would not grow well without it... We believe a child must eat to grow well." (FGD 2, age 45)

This theme explains the ethnic variation in Model 3: community-level infant feeding norms are not uniform across ethnic groups, and the interaction between ethnic cultural authority and structural labour conditions constitutes a compound barrier not visible in either dimension alone. The positive and significant Frafra ethnic predictor (OR=26.92, 95% CI 1.64–442.35, p=0.021) should be interpreted with particular caution: the very wide confidence interval reflects sparse Frafra representation (n=48), and the point estimate is not corroborated by either FGD cohort, where Dagomba and Mamprusi norms dominated discussion. The finding is hypothesis-generating at most and may reflect a spurious result; it should not be reported as a substantive ethnic difference without replication in a study with adequate Frafra sample size.

4.4.4. Childcare Deficit and Sole Care Responsibility

The double burden of income generation and sole childcare with 83% personally caring for their last child during working hours and no formal childcare at market sites was near-universal and raised consistently by all participants:

"With our work, we always have to carry people's things, so you must find a strategy that works for you... I had no one to look after the child, so I did everything myself, even when I was working. Who has the time? I did it when I could!" (FGD 2, age 49)

Qualitative data on childcare deficit converge with the regression finding that being outside a union is among the strongest predictors of non-adherence. Only 16% of respondents received any breastfeeding support, primarily from friends and husbands.

4.5. The Policy Implementation Gap: Institutional Accounts

Every institutional participant across KMA, district, and national governance levels confirmed the absence of a targeted EBF policy for kayayei. No respondent could identify any existing framework specifically addressing this population's breastfeeding needs:

"At the district level, we do not have any specific policies that address the needs of breastfeeding kayayei. We do not have any policies in place to support them in any way. If we are to help them in anything, it is from our own pockets." (KII, Assemblyman, P1)

"We have general maternal and child health programs, but there isn't a specific directive on supporting kayayei in breastfeeding or anything. We are aware of the problems, but we lack the resources to implement such interventions." (KII, Ministry of Gender, P6)

"For the kayayei, we treat them like every other woman because they do not necessarily need special treatment. However, the truth is that their circumstances are unique... It's why there needs to be policies that consider their work and environment." (KII, Midwife, P9)

These accounts expose the mechanism of a targeting and delivery failure within Ghana's maternal and child health system. Ghana's National Nutrition Policy, the Maternal, Infant and Young Child Nutrition Strategic Framework, and the CHPS programme collectively constitute a functioning maternal health architecture but one designed around sedentary, residential, facility-attending populations [13,28]. None contains an operational targeting mechanism for mobile informal workers. The failure is not the absence of general maternal health policy; it is the absence of any adaptation within existing programmes that accounts for the governance gap (no KMA or district-level mandate for kayayei maternal health), the delivery gap (CHPS not configured for market environments), or the financing gap (no social protection or work-pause mechanism reducing the survival trade-off). The assemblyman's statement that support 'comes from our own pockets' reveals how this institutional silence displaces responsibility onto frontline actors who lack the mandate or resources to discharge it systematically.

5. Discussion

5.1. The Awareness-Practice Gap as a Health Systems Indicator

The 95.5% to 12.1% gap between self-reported EBF practice and WHO-consistent six-month adherence is a health systems indicator the measurable distance between what Ghana's maternal health architecture communicates and what the structural conditions of informal labour permit women to do with that communication. This reframing moves the analytic target from maternal behaviour to health system architecture. The integration of quantitative and qualitative findings clarifies the mechanism underlying this gap: the expenditure predictor statistically the most stable economic variable across all three models is explained by qualitative accounts as the capacity to absorb the income loss of pausing work to breastfeed. It is not earnings per se, but financial buffer capacity, that determines whether structural constraints can be momentarily navigated. Similarly, the work incompatibility predictor is not a cognitive distortion amenable to counselling; it is an accurate assessment of material conditions confirmed by every FGD participant and consistent with the failure of the CHPS and facility-based ANC systems to extend any adapted support into the market environments where these women live and work.

The hierarchical regression evidence is consistent with this reframing. The progressive model fit improvement (R^2: 0.370→0.589→0.686) is consistent with the SEM proposition that EBF adherence is strongly associated with structural and organisational factors, though absolute R^2 values are inflated by Firth-corrected coefficients (Section 3.3); direction carries more analytical weight than magnitude. This extends prior Ghanaian research documenting awareness-practice gaps among self-employed, peri-urban, and professional mothers by demonstrating that among kayayei, the gap is qualitatively different in scale and mechanism [14-18,29,30]. It also extends the international informal-labour EBF literature, which has documented comparable gaps among South Asian garment workers and Latin American market vendors by showing that the same structural mechanisms are associated with EBF non-adherence in the West African context, with additional compounding factors including migration-induced social isolation and the specific income-loss structure of head porterage [4,5].

5.2. Expenditure Over Income: The Social Protection Mechanism

The finding that daily expenditure, not daily income, consistently predicts EBF adherence has specific policy implications. The most plausible economic interpretation is that financial buffer capacity. The capacity to absorb the opportunity cost of pausing income-generating activity to breastfeed is the key economic determinant. This is consistent with international evidence that social protection and maternity entitlements significantly improve breastfeeding duration and with systematic evidence that informal workers' outcomes improve when the survival trade-off between feeding and earning is reduced [5]. Maternity protection schemes in South Asian export zones provide the most directly comparable evidence that modest income supports can extend EBF duration meaningfully [4,5]. For Ghana, this finding argues for social protection mechanisms like cash transfers, nutritional supplements, or work-pause subsidies which are targeted at reducing the daily survival trade-off, consistent with the Scaling Up Nutrition (SUN) Movement commitments that Ghana has endorsed [31].

5.3. Antenatal Care: Necessary but Structurally Insufficient

ANC attendance was significantly associated with six-month adherence across Models 2 and 3, confirming it as an important institutional contact point which are consistent with evidence from Ghana and West Africa [32,33]. However, qualitative data reveal that women who attended ANC received clear EBF information yet still ceased breastfeeding within months. This illustrates a core principle of implementation science: knowledge transfer through clinical services is necessary but not sufficient when structural barriers prevent implementation [20]. More specifically, the qualitative evidence (Midwife P7) confirms that EBF cessation consistently precedes postnatal review visits, indicating that the critical delivery gap is postnatal rather than antenatal: women leave the facility with knowledge intact but return having already stopped, with no market-based contact point in between. ANC is architecturally disconnected from the market environments where EBF must be practised; market-based postnatal outreach, not merely improved antenatal counselling is therefore the more proximate intervention target.

5.4. Policy Implications: Three Levels of Structural Response

The policy implementation gap demands a specific, graduated response across three levels of Ghana's health system, grounded in the study's findings and Ghana's existing institutional architecture. The following three priority actions are ordered by urgency, feasibility within existing structures, and the level of evidence supporting them.

- **Priority 1: Policy Recognition (Foundational):** The formal designation of migrant informal workers as a distinct subpopulation within Ghana's National Nutrition Policy and the Maternal, Infant and Young Child Nutrition Strategic Framework is the prerequisite for all downstream action [13]. Ghana's 2025 EBF target of 62% pursued jointly by the Ministries of Health and Gender, Children and Social Protection through SUN Movement mechanisms has elapsed without being achieved; this study suggests that any successor target cannot be met without naming *kayayei* as a priority group [31]. While this step requires a policy amendment rather than new infrastructure, the complete absence of any existing mandate at KMA, district, or national level confirmed by all KII participants, signals non-trivial political economy barriers including institutional inertia and the absence of an organised advocacy constituency, making stakeholder engagement and coalition-building through market queen networks, civil society, and SUN Movement mechanisms a prerequisite alongside the technical policy drafting.
- **Priority 2 Adapted service delivery (pilotable within existing CHPS structures):** The CHPS programme is Ghana's most appropriate existing delivery vehicle, but it is configured for sedentary, residential populations [28]. A pilotable, low-cost adaptation deploying community

health nurses on scheduled rotations to the four major *kayayei* market sites would directly address the delivery gap documented here: 52% of respondents never encountered EBF information at their worksites, and 93% had received no formal EBF training. Market queens, who already function as informal governance intermediaries and welfare advocates for *kayayei*, are a natural and scalable implementation partner requiring no new institutional structure. A pilot at one or two Kumasi market sites would generate feasibility evidence before system-wide replication. This approach is consistent with existing CHPS community outreach models and does not requires legislative change.

- **Priority 3 Social protection and infrastructure (medium-term; scalable through existing Ministry of Gender mechanisms):** The expenditure findings confirm that the key barrier is the survival trade-off between earning and breastfeeding, not awareness. Modest work-pause subsidies or nutritional support grants for *kayayei* mothers with infants under six months administered through the Ministry of Gender, Children and Social Protection in partnership with the KMA and market queen networks would reduce this trade-off and are consistent with Ghana's existing social protection architecture and SUN Movement commitments [31]. Evidence from comparable LMIC contexts suggests modest transfers extend EBF duration meaningfully [5], though application to piece-rate informal workers warrants pilot-level evaluation. In parallel, the designation of clean, private breastfeeding spaces within major market environments is a low-cost, high-visibility commitment the KMA can make immediately and independently of national policy reform, requiring no new legislation.

5.5. Limitations

Several limitations apply. First, location-based convenience sampling may underrepresent the most transient *kayayei*; findings represent the accessible market population. Second, self-reported breastfeeding practices are subject to recall and social desirability bias; social desirability likely inflates self-reported EBF prevalence, while the WHO-consistent six-month criterion may also be subject to recall degradation, particularly for children toward the upper end of the 0–24-month age range; the direction of bias is uncertain. Restricting the analysis to children aged 0–12 months would strengthen precision on this measure and is recommended for future research. Third, the cross-sectional design precludes causal inference. Fourth, while Firth regression addresses the separation problem for two predictors, the SHS+ education estimate remains imprecise due to sparse data; the direction is reliable, but the effect size is not. Fifth, Twi-language qualitative data collection reflects contextual appropriateness but may have introduced minor expressive constraints for participants with lower Twi proficiency. Future research should employ longitudinal designs, include comparison groups, and pilot-test the market-based outreach model proposed here.

6. Conclusions

This study provides the most comprehensive mixed-methods evidence to date on the structural determinants of EBF among *kayayei* in urban Ghana. EBF disparities among *kayayei* are associated with structural conditions of informal market labour that are incompatible with the time and physical requirements of sustained breastfeeding. The 83.4 percentage-point gap between self-reported practice and WHO-consistent six-month adherence is not a measure of maternal failure; it reflects the structural conditions of informal market labour and the absence of institutional mechanisms to account for those conditions in maternal health programming. The policy implementation gap is confirmed by women, healthcare providers, district officials, and Ministry representatives alike. Ghana's 2025 EBF target has elapsed unmet; the evidence from this study makes clear that no future national nutrition target can be achieved without addressing the specific structural conditions facing migrant informal workers. Until that shift occurs from a policy architecture of recommendation to one of structural enablement, the gap between 95.5% and 12.1% will persist, not as a measure of what *kayayei* choose, but of what their circumstances permit. Addressing this requires labour-sensitive health outreach, market-based CHPS infrastructure, and social protection mechanisms.

Ethics Approval

Ethical approval was granted by the Humanities and Social Sciences Research Ethics Committee of Kwame Nkrumah University of Science and Technology (Ref: HuSSREC/AP/14/VOL.3). All participation was voluntary; informed consent was obtained from all participants before data collection.

Author Contributions

Rehana Ama Obosu wrote the manuscript and Buor Daniel reviewed the manuscript.

Data Availability Statement

The datasets generated and analysed during the current study are not publicly available to protect participant confidentiality, but are available from the corresponding author upon reasonable request and subject to ethical approval.

AI Usage Statement

Claude AI was utilised to support language editing, manuscript restructuring, and the rewriting of selected sections. All AI-assisted text was reviewed, verified, and revised by the authors, who take full responsibility for the final content.

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