

ORIGINAL RESEARCH ARTICLE

Sociodemographic and Paternal Determinants of Infant and Young Child Feeding Practices Among Mothers in Ikotos County, Eastern Equatoria, South Sudan: Evidence from a Community-Based Cross-Sectional Survey

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ABSTRACT

Background: Infant and Young Child Feeding (IYCF) practices remain suboptimal in conflict-affected, resource-poor settings such as South Sudan, where sociodemographic and paternal factors critically shape feeding behaviours. Understanding these determinants is essential to designing targeted community-based interventions that reduce child malnutrition and mortality.

Objectives: This study aimed to identify the sociodemographic and paternal factors associated with IYCF practices among mothers with children below 24 months of age in Ikotos County, Eastern Equatoria, South Sudan.

Methods: A community-based cross-sectional study was conducted in March 2020 among 317 systematically sampled mothers across four payams and twelve villages. Bivariate analysis (Chi-square tests) and multivariate logistic regression were used to assess associations between independent variables and three IYCF outcomes: breastfeeding initiation within one hour, exclusive breastfeeding, and continued breastfeeding beyond 24 months. Statistical significance was set at $p \leq 0.05$ at a 95% confidence interval.

Results: Maternal age ($\chi^2=2.471$, $p=0.04$), maternal education level ($\chi^2=5.789$, $p=0.01$), maternal occupation ($\chi^2=9.693$, $p=0.008$), source of income ($\chi^2=9.738$, $p=0.006$), paternal education ($\chi^2=8.180-33.448$, $p<0.05$), paternal occupation ($\chi^2=13.046$, $p=0.001$), and child's sex ($\chi^2=8.432$, $p=0.004$) were significantly associated with at least one IYCF outcome. In multivariate analysis, secondary maternal education (AOR=5.524; 95%CI: 1.597–19.11, $p=0.007$), paternal tertiary education for breastfeeding initiation (AOR=2.234; 95%CI: 1.334–1.496, $p<0.001$), and paternal secondary education for continued breastfeeding (AOR=24.452; 95%CI: 4.196–142.480, $p<0.001$) were the strongest predictors.

Conclusion: Sociodemographic characteristics, especially maternal and paternal education, occupation, income source, and child sex preferences significantly influence IYCF practices in Ikotos County. Multi-sectoral interventions targeting adult literacy, male involvement, income generation, and antenatal health promotion are urgently recommended to improve IYCF outcomes in this fragile, conflict-affected setting.

Keywords: Infant and Young Child Feeding • Breastfeeding determinants • Paternal education • South Sudan • Sociodemographic factors • Cross-sectional study • Malnutrition • Ikotos County

KEY STATISTICS AT A GLANCE

n = 317 Mothers enrolled	35.0% Initiated BF within 1 hour	75.0% Exclusive BF (0–6 months)	22.0% Optimal complementary feeding	44.8% Received prelacteal feeds	7 factors Significantly associated with IYCF
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BF = Breastfeeding; Data source: Primary survey, Ikotos County, March 2026

1. INTRODUCTION

Infant and Young Child Feeding (IYCF) encompasses a spectrum of feeding behaviours including the early initiation of breastfeeding within one hour of birth, exclusive breastfeeding for the first six months of life, timely introduction of nutritionally adequate complementary foods at six months, and continued breastfeeding up to 24 months and beyond. These practices, endorsed by the World Health Organization (WHO) and UNICEF as the international gold standard, represent the most cost-effective interventions for reducing childhood morbidity, stunting, wasting, and under-five mortality.

The first 1,000 days of life—from conception to a child's second birthday—represent the most critical period for physical and cognitive development. Poor IYCF practices during this window have irreversible consequences on nutritional status, immune function, and human capital development. (1,2) Despite widespread global recognition of the IYCF agenda, sub-optimal practices remain pervasive across sub-Saharan Africa, particularly in fragile, conflict-affected, and underdeveloped settings.

South Sudan, the world's youngest nation, has been ravaged by protracted civil conflict since 2013, causing mass displacement, destruction of health infrastructure, and collapse of food systems. (3) According to UNICEF's 2019 nutrition brief for South Sudan, only 15% of children aged 6–23 months received minimum dietary diversity, and just 5% received a minimum acceptable diet. (4) The national rate of global acute malnutrition (GAM) among children under five exceeds the WHO emergency threshold of 15% in several states, underscoring the depth of the nutrition crisis.

Ikotos County, located in Eastern Equatoria State, presents a particularly challenging environment for IYCF promotion. It is a remote, predominantly rural agro-pastoral community characterised by high poverty rates, limited health facility coverage, low literacy levels especially among women, and deeply embedded cultural practices that influence child feeding. Health Link South Sudan (2018) reported a GAM rate of 13.5% in Ikotos County, approaching the global emergency threshold. (5) Despite government efforts to roll out the South Sudan Policy Guideline on Maternal, Infant, and Young Child Nutrition (MIYCN), data on factors influencing IYCF practices in Ikotos County remain critically absent from the published literature.

The second specific objective of this study was to identify the factors associated with IYCF practices among mothers with children below 24 months in Ikotos County. This paper presents findings from that objective—examining how sociodemographic characteristics of mothers, fathers, and children influence key IYCF practices—and discusses policy and programmatic implications for community-based nutrition interventions in South Sudan and comparable low-resource conflict-affected settings.

2. LITERATURE REVIEW

2.1 Maternal Age and IYCF Practices

Maternal age is consistently identified as a significant predictor of IYCF practices across diverse settings. Bolton et al. (2009), Ukegbu et al. (2010), Qureshi et al. (2011), and Brown et al. (2011) collectively found longer durations of breastfeeding among older mothers compared to younger counterparts. (6) This finding is attributed to accumulated maternal experience, stronger social networks, and greater access to health education. Conversely, adolescent mothers are frequently found to be less knowledgeable about optimal breastfeeding duration and complementary feeding practices.

Hackett et al. (2012) in Bangladesh found that adolescent females had limited awareness about the benefits of exclusive breastfeeding. (7) In the context of sub-Saharan Africa, where adolescent fertility rates remain high and many young mothers have not completed secondary education, this knowledge gap is of particular public health concern. In South Sudan, where more than half of women marry before age 18, the relationship between maternal age and IYCF outcomes warrants specific investigation.

2.2 Marital Status and Spousal Support

Marital status operates as a proxy for social support in IYCF research. Thulier (2009) reported associations between marital status and early cessation of breastfeeding. (8) Alemayehu et al. (2009) found that exclusive breastfeeding was significantly associated with current marital status and economic stability. A study in Urban Nairobi by Kimani-Murage et al. (2011) found that women not in marital unions were more likely to cease breastfeeding early and had increased likelihood of introducing complementary foods prematurely. (9)

The social capital that marriage provides—emotional support, financial contribution, and direct paternal involvement in infant care—has been shown to positively influence IYCF. Lande (2003) found a positive association between being married and exclusive breastfeeding, (10) an observation corroborated by numerous studies across Eastern and Western African settings. The mechanism is thought to operate through paternal influence on feeding decisions and reduced maternal stress among partnered mothers.

2.3 Maternal Education and Awareness

Maternal education is one of the most extensively studied determinants of IYCF practices. Higher educational attainment is consistently linked to better IYCF outcomes through multiple pathways: improved health literacy, greater access to and utilisation of antenatal care, reduced adherence to harmful cultural beliefs, and increased decision-making autonomy within the household. (11)

Ahmed et al. (2012) demonstrated a positive association between lack of education and the emergence of undernutrition resulting from poor IYCF practices. (12) Similarly, Ajibade et al. (2013) documented that mothers with low education levels had lower compliance with exclusive breastfeeding and complementary feeding guidelines, advocating for awareness campaigns in local languages. (13) Kabir et al. (2007) found that children born

to mothers with low education were more likely to be introduced to complementary feeds either before or after the recommended six months of age.

Paradoxically, some studies present contradictory findings. Jesmin et al. (2012) attributed optimal IYCF to practical knowledge acquisition rather than formal education per se, noting that highly educated working mothers often introduced complementary foods early due to time constraints. (14) Lawoyin et al. (2001) associated lower maternal education with higher breastfeeding rates, arguing that women with limited education were more likely to remain at home and lacked financial capacity to purchase infant formula. These contradictions highlight the importance of context in interpreting education-IYCF relationships, particularly in rural, agro-pastoral settings like Ikotos County.

2.4 Maternal Occupation and Income

Maternal employment status influences IYCF through competing mechanisms. Several researchers including Okeh (2010), Raffle et al. (2011), Velpuir (2004), and Ajibade et al. (2013) note that maternal employment may constitute a barrier to exclusive breastfeeding, particularly when workplace breastfeeding support is absent. (15) Mothers engaged in formal employment face particular challenges maintaining exclusive breastfeeding during the return-to-work period.

Socioeconomic status also directly influences complementary feeding quality and diversity. Mukuria et al. (2012) found that children born to parents with high socioeconomic status were more likely to receive exclusive breastfeeding in the first six months and appropriately diverse complementary foods. (16) Darmon and Drewnowski (2015) noted that protein- and micronutrient-rich complementary foods are prohibitively expensive for low-income families. In Ikotos County, where over 60% of fathers are unemployed and most families depend on subsistence agriculture and food aid, the income dimension of IYCF determinants is particularly salient.

2.5 Paternal Factors and Male Involvement

A growing body of literature highlights fathers as critical, yet historically neglected, actors in IYCF. Sherriff, Hall, and Panton (2014) identified paternal knowledge about breastfeeding as a primary determinant of fathers' practical support for breastfeeding. (17) Aibel (2012) observed that fathers' involvement in maternal and child nutrition was insufficient compared to mothers', attributable to socially constructed gender roles that relegate child care to women. (18)

Wolfberg et al. (1994) reported a significant increase in breastfeeding initiation when expectant fathers attended antenatal breastfeeding classes, demonstrating the modifiability of paternal influence. (19) Brown and Davies (2014) and Sherriff et al. (2014) confirmed that education targeting fathers effectively changed infant feeding practices. (20) Bhatta (2013) in Nepal found that fathers with higher education levels showed greater involvement in encouraging spousal breastfeeding. (21) Aronsson et al. (2013), Betoko et al. (2013), and Senarath et al. (2012) collectively found that uneducated men were more likely to advise early or late introduction of complementary foods. (22)

Regarding income, Kenney et al. (2008) found that food provision is considered a male role in many African societies, yet fathers with low incomes may be unable to fulfil this role, creating household food insecurity that directly impacts complementary feeding. (23) Conversely, Raub (2013) suggested that fathers with stable incomes may paradoxically disengage from direct IYCF involvement, believing their financial contribution sufficiently fulfils their parental duty. These complexities underscore the need for context-specific investigation of paternal determinants.

2.6 Cultural Practices, Gender Roles, and Child Characteristics

Cultural norms and gender preferences shape IYCF outcomes in profound ways. In many African societies, the belief that colostrum is harmful leads to its discarding and early prelacteal feeding. (24) In Ikotos County, cultural explanations for non-optimal IYCF practices include: perception of inadequate milk supply, belief that exclusive breastfeeding weakens the child, and social norms around introducing water and herbal preparations to young infants.

Child sex preferences constitute a specific cultural determinant of IYCF. In communities with strong son preference, male children may receive preferential breastfeeding practices, including earlier initiation and longer duration. (25) The prevalence and strength of sex-based IYCF disparities in Ikotos County represent an important empirical question addressed by this study.

3. METHODOLOGY

3.1 Study Design and Setting

A community-based cross-sectional study design was employed, collecting both exposure and outcome data at a single point in time during March 2020. The study was conducted in Ikotos County, Eastern Equatoria State, Republic of South Sudan (coordinates: 4°4'42"N, 33°6'32"E). Ikotos County is bordered by Magwi County to the west, Torit County to the north, and Budi County to the east. It comprises six payams, 33 bomas, and 154 villages, with a projected population of 35,319 (SSRC, 2019). The county has nine health facilities including St. Theresa Mission Hospital and multiple Primary Health Care Centres and Units.

The inhabitants are predominantly agro-pastoralists speaking Langi, Dongotono, and Lotuho languages. The economic base consists of subsistence agriculture, sale of charcoal and agricultural produce, and livestock. Civil conflict has led to displacement, asset loss, and reduced agricultural productivity, compounding nutritional vulnerability among young children.

Figure 1: Conceptual Framework — Determinants of IYCF Practices in Ikotos County

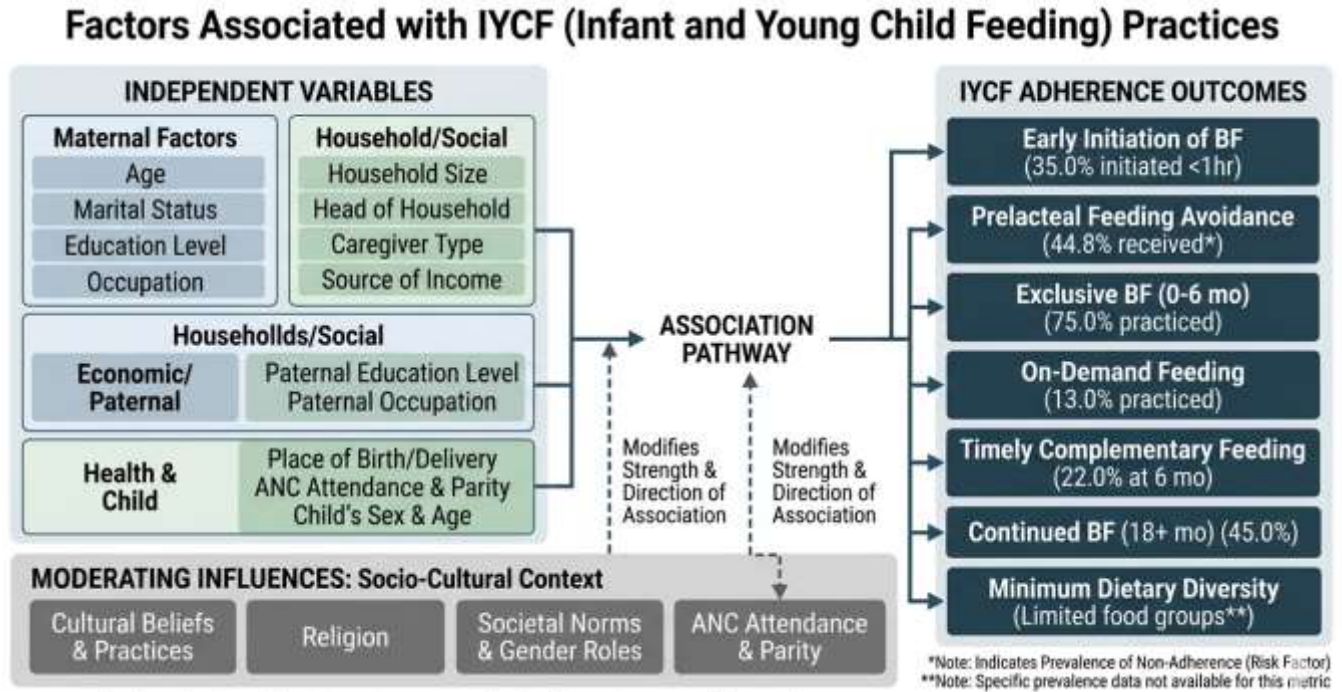


Figure 1. Conceptual framework illustrating the relationships between independent sociodemographic and paternal variables, moderating cultural and religious factors, and IYCF outcome variables. Source: Adapted from primary research framework, Ikotos County, South Sudan, 2020.

3.2 Study Population and Sample Size

The target population comprised 2,532 mothers or caregivers with children below 24 months residing in Ikotos County. The accessible population—those within the 12 selected study villages—numbered 1,279. The study population of 317 participants was determined using the Kish-Leslie formula:

$$n = Z^2 \times P(1-P) / d^2$$

Where: Z = 1.96 (95% CI); P = 0.75 (EBF prevalence, GoSS MNRHS 2009–2012); d = 0.05 (5% margin of error)

$$n = (1.96)^2 \times 0.75(0.25) / (0.05)^2 = 288 + 29 \text{ (10\% non-response)} = 317 \text{ participants}$$

3.3 Sampling Procedure

Ikotos County was selected by simple random sampling from five counties in Eastern Equatoria State. Four of the county's six payams were selected by simple random sampling: Ikotos Central (n=80), Losite (n=79), Lomohidang North (n=79), and Lomohidang South (n=79). Within each payam, three villages were randomly selected, yielding 12 study villages with approximately 26 mothers each. Systematic random sampling was used within villages to enumerate eligible participants, with every k-th household selected based on a computed sampling interval.

Inclusion criteria required: mothers or caregivers providing written/verbal consent; residence in Ikotos County for the prior 24 months; age ≥ 18 years; and having a child below 24 months. Very sick mothers and those not meeting inclusion criteria were excluded. If a household had more than one eligible mother, the mother of the youngest child was selected.

3.4 Study Variables

The dependent variable was IYCF practices, operationalised as three binary outcomes: (1) initiation of breastfeeding within one hour of birth; (2) exclusive breastfeeding during the first six months; and (3) continued breastfeeding beyond 24 months.

Independent variables included maternal sociodemographic characteristics (age, marital status, education level, occupation, source of income), paternal characteristics (education level, occupation), child characteristics (sex, age, caregiver type), place of delivery, household head, and family size. Moderating variables included cultural practices and religion, which were assessed qualitatively through open-ended questionnaire items.

3.5 Data Collection and Analysis

Primary data were collected through face-to-face structured interviews using a questionnaire pre-tested among 10 eligible mothers and translated into the local Langi language. Five trained research assistants fluent in Langi and English conducted 30-minute interviews at participants' homes. Questionnaires were coded for anonymity and stored in secured, password-protected locations. Data quality was maintained through daily field editing meetings between the principal investigator and research assistants.

Data were entered into Microsoft Excel, cleaned by running preliminary frequencies to detect discrepancies, and exported to SPSS version 21 for analysis. Descriptive statistics were used for sociodemographic characteristics. Bivariate analysis using Chi-square tests assessed associations between independent and dependent variables, with significance set at $p < 0.05$. Multivariate binary logistic regression was used to identify independent predictors of each IYCF outcome after controlling for confounders, with Adjusted Odds Ratios (AOR) and 95% Confidence Intervals (CI) reported.

4. RESULTS

4.1 Sociodemographic Characteristics of Participants

A total of 317 eligible mothers or caregivers with children below 24 months participated in the study. Table 1 presents the complete sociodemographic profile. The majority of respondents were aged 24–29 years (37.2%), married (79.8%), had no formal education (50.2%), and were engaged in informal employment (47.0%). Male-headed households predominated (80.4%), and most children (66.9%) were in the 0–6 months age bracket.

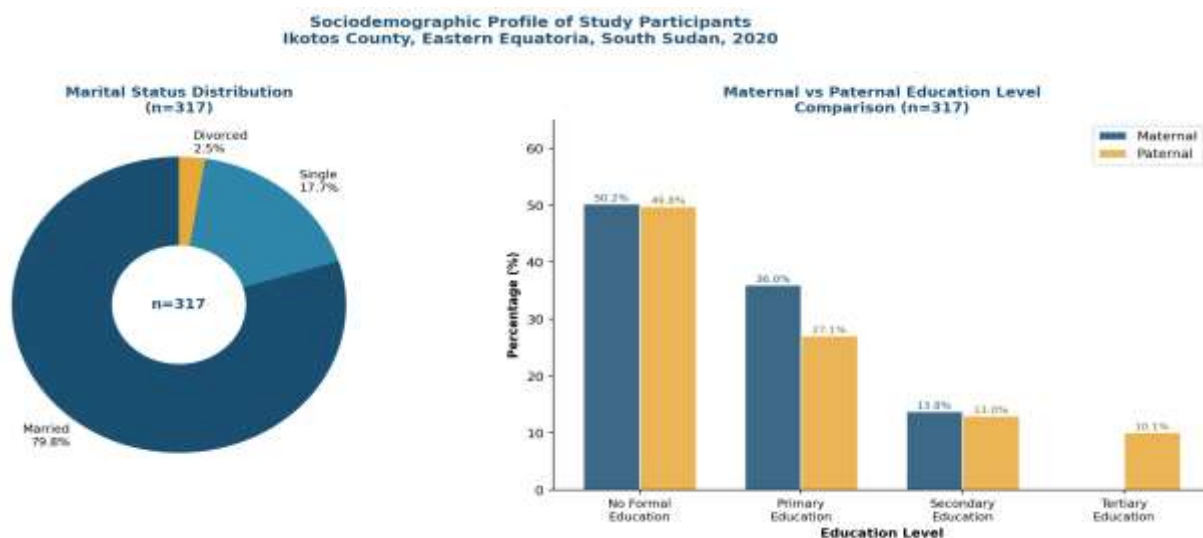
Figure 2: Sociodemographic Profile of Study Participants

Figure 2. Sociodemographic profile: (A) Marital status distribution showing 79.8% married participants; (B) Comparison of maternal vs paternal education levels, with 50.2% and 49.8% having no formal education respectively. Source: Primary data, Ikotos County, 2020.

Table 1: Sociodemographic Characteristics of Study Respondents (n=317)

Variable	Frequency (n)	Percentage (%)
Age of the Mother (Years)		
18–23	88	27.8
24–29	118	37.2
30–34	66	20.8
≥35	45	14.2
Marital Status		
Married	253	79.8
Single	56	17.7
Divorced	8	2.5
Maternal Education Level		
No formal education	159	50.2
Primary education	114	36.0
Secondary education	44	13.8
Maternal Occupation		
Housewife	109	34.4
Informal employment	149	47.0
Formal employment	59	18.6
Paternal Education Level		
No formal education	158	49.8
Primary education	86	27.1
Secondary education	41	13.0

Tertiary education	32	10.1
Paternal Occupation		
None/Unemployed	199	62.8
Informal employment	92	29.0
Formal employment	26	8.2
Head of Household		
Male	255	80.4
Female	62	19.6
Sex of the Child		
Male	135	42.6
Female	182	57.4

Source: Primary data, Ikotos County, South Sudan, March 2020

4.2 Bivariate Analysis of Factors Associated with IYCF Practices

Table 2 presents the bivariate associations between sociodemographic variables and the three IYCF outcomes. At a 95% confidence interval, the variables significantly associated with at least one IYCF outcome included: maternal age, maternal education, maternal occupation, source of income, paternal education, paternal occupation, and child's sex.

Figure 3: Bivariate Analysis — Key Determinants of IYCF Outcomes

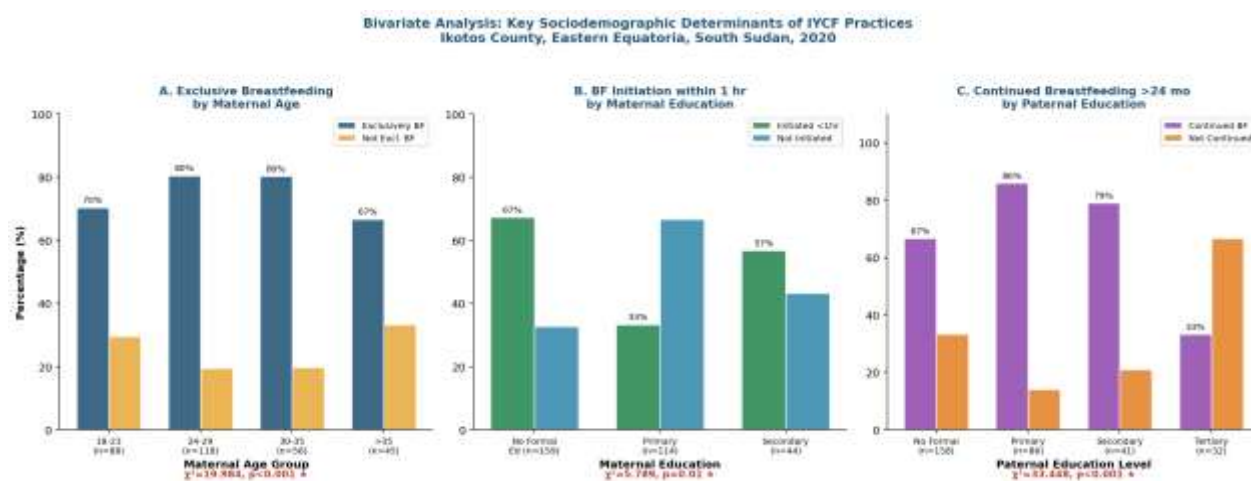


Figure 3. Bivariate analysis results showing (A) exclusive breastfeeding rates by maternal age group ($\chi^2=19.984$, $p<0.001$); (B) breastfeeding initiation within 1 hour by maternal education level ($\chi^2=5.789$, $p=0.01$); (C) continued breastfeeding beyond 24 months by paternal education level ($\chi^2=33.448$, $p<0.001$). ★ = statistically significant at $p<0.05$. Source: Primary data, Ikotos County, 2020.

Figure 4: Chi-Square Association Matrix — Sociodemographic Determinants vs IYCF Outcomes

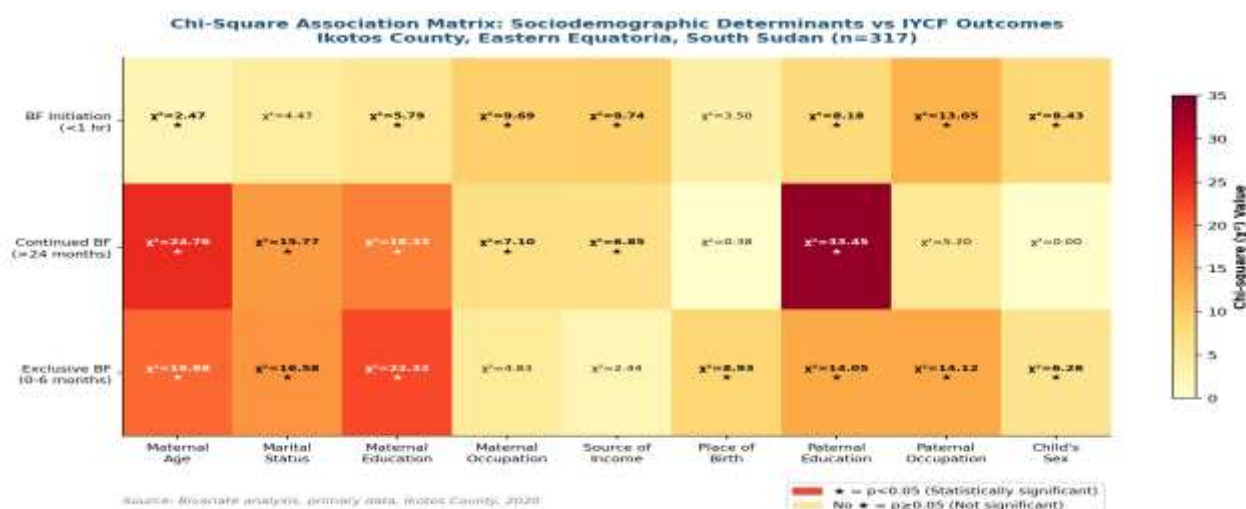


Figure 4. Heatmap of Chi-square (χ^2) values for associations between nine sociodemographic determinants and three IYCF outcome measures. Darker shading indicates stronger association. ★ = $p < 0.05$ (statistically significant). Source: Primary data, Ikotos County, 2020.

Table 2: Bivariate Analysis Summary — Factors Associated with IYCF Outcomes (n=317)

Variable	BF Initiation <1hr (χ^2 , p)	Continued BF >24mo (χ^2 , p)	Exclusive BF (χ^2 , p)	Significant?	Strongest AOR (95% CI)
Maternal Age	2.471, p=0.04★	24.761, p<0.001★	19.984, p<0.001★	Yes — all 3 outcomes	8.769 (1.605–47.916)
Marital Status	4.470, p=0.107	15.766, p<0.001★	16.582, p=0.02★	Yes — 2 outcomes	3.107 (0.683–14.143)
Maternal Education	5.789, p=0.01★	18.328, p<0.001★	22.319, p<0.001★	Yes — all 3 outcomes	5.524 (1.597–19.110)
Maternal Occupation	9.693, p=0.008★	7.102, p=0.03★	4.827, p=0.089	Yes — 2 outcomes	0.081 (0.016–0.407)
Source of Income	9.738, p=0.006★	6.847, p=0.03★	2.440, p=0.295	Yes — 2 outcomes	2.531 (0.135–7.770)
Place of Birth	3.500, p=0.076	0.376, p=0.820	8.934, p=0.01★	Yes — 1 outcome	1.830 (1.052–3.185)
Paternal Education	8.180, p=0.042★	33.448, p<0.001★	14.047, p=0.02★	Yes — all 3 outcomes	24.452 (4.196–142.480)
Paternal Occupation	13.046, p=0.001★	5.197, p=0.07	14.125, p=0.001★	Yes — 2 outcomes	2.458 (0.246–0.975)
Child's Sex	8.432, p=0.004★	0.003, p=0.960	6.259, p=0.012★	Yes — 2 outcomes	1.462 (0.982–2.178)

★ = statistically significant at $p < 0.05$; AOR = Adjusted Odds Ratio from multivariate logistic regression. Source: Primary data, 2020

4.3 Multivariate Logistic Regression — Breastfeeding Initiation within 1 Hour

Table 3 presents the multivariate logistic regression analysis of factors influencing breastfeeding initiation within one hour of birth. After adjusting for confounders, secondary maternal education (AOR=5.524; 95%CI: 1.597–

19.110, $p=0.007$), formal maternal employment (AOR=0.081; 95%CI: 0.016–0.407, $p=0.02$), salaried income (AOR=2.531; 95%CI: 0.135–7.770, $p=0.03$), PHCC delivery (AOR=1.830; 95%CI: 1.052–3.185, $p=0.001$), paternal tertiary education (AOR=2.234; 95%CI: 1.134–4.496, $p<0.001$), and paternal formal employment (AOR=2.458; 95%CI: 0.246–0.975, $p=0.04$) were independently associated with breastfeeding initiation.

Figure 5: Forest Plot — Multivariate Predictors of Breastfeeding Initiation within 1 Hour

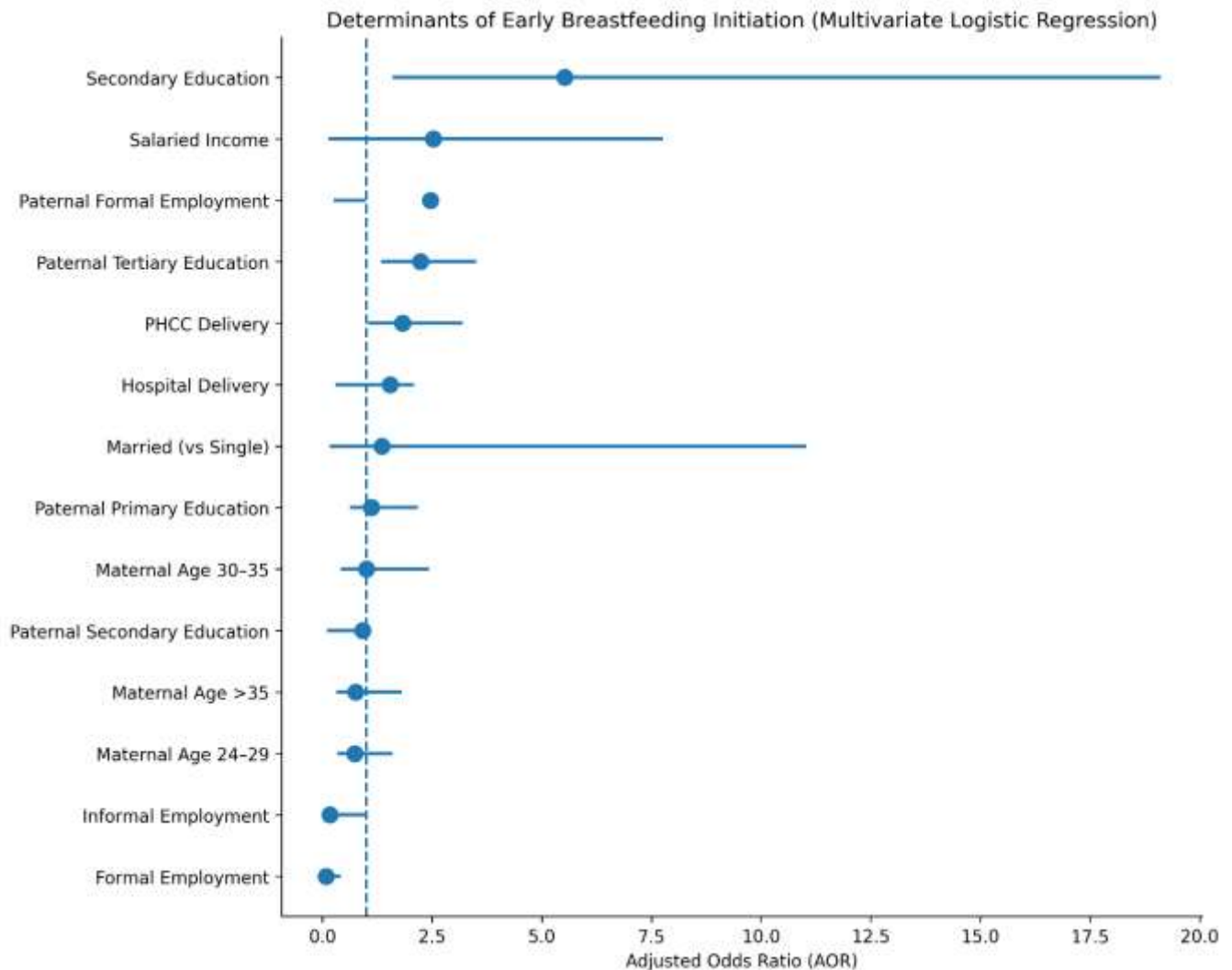


Figure 5. Forest plot of Adjusted Odds Ratios (AOR) with 95% Confidence Intervals for factors independently associated with breastfeeding initiation within one hour of birth. Points to the right of the reference line (AOR=1) indicate increased likelihood; points to the left indicate reduced likelihood. ★ = $p<0.05$. Source: Primary data, Ikotos County, 2020.

Table 3: Multivariate Logistic Regression — Factors Associated with Breastfeeding Initiation within 1 Hour of Birth

Variable	Initiated Yes N(%)	Initiated No N(%)	AOR (95% CI)	p-value	Interpretation
Maternal Age (ref: 18-23 yrs)					
24–29 years	47 (39.8)	71 (60.2)	0.740 (0.343–1.597)	0.80	Ref.
30–35 years	21 (31.8)	45 (68.2)	1.003 (0.414–2.431)	0.03★	Slightly protective
>35 years	18 (40.0)	27 (60.0)	0.761 (0.321–1.805)	0.01★	Weak association
Maternal Education (ref: None)					
No formal education	107 (67.3)	52 (32.7)	Reference	—	Baseline
Primary education	38 (33.3)	76 (66.7)	2.271 (0.732–7.049)	0.16	Not significant
Secondary education	25 (56.8)	19 (43.2)	5.524 (1.597–19.110)	0.007★★	Strong positive effect
Paternal Education (ref: None)					
No formal education	119 (75.3)	38 (24.7)	Reference	—	Baseline
Primary education	31 (36.1)	55 (63.9)	1.124 (0.623–2.179)	0.012★	Moderate effect
Secondary education	13 (31.7)	29 (68.3)	0.922 (0.102–0.871)	0.03★	Reduced odds
Tertiary education	11 (34.4)	21 (65.6)	2.234 (1.134–1.496)	<0.001★★★	Strong positive effect
Place of Delivery (ref: Home)					
Home	55 (82.1)	12 (17.9)	Reference	—	Baseline
Primary Health Care Centre	178 (91.3)	17 (8.7)	1.830 (1.052–3.185)	0.001★★	Significant — facility delivery protective
Hospital	52 (94.6)	3 (5.4)	1.542 (0.292–2.078)	0.028★	Significant — hospital delivery protective

★ $p < 0.05$; ★★ $p < 0.01$; ★★★ $p < 0.001$. AOR = Adjusted Odds Ratio. Reference categories in parentheses. Source: Primary data, 2020

4.4 Multivariate Logistic Regression — Continued Breastfeeding Beyond 24 Months

Paternal education emerged as the strongest predictor of continued breastfeeding beyond 24 months. Children born to fathers with primary education were 16.216 times more likely to be continuously breastfed (AOR=16.216; 95%CI: 1.862–141.265, $p=0.012$); those with secondary-educated fathers were 24.452 times more likely

(AOR=24.452; 95%CI: 4.196–142.480, $p<0.001$); and those with tertiary-educated fathers were 16.321 times more likely (AOR=16.321; 95%CI: 3.872–68.794, $p<0.001$). Mothers aged 24–29 years were 8.769 times more likely to continue breastfeeding beyond 24 months (AOR=8.769; 95%CI: 1.605–47.916, $p=0.012$).

Figure 6: Paternal Education Level and Continued Breastfeeding — Adjusted Odds Ratios

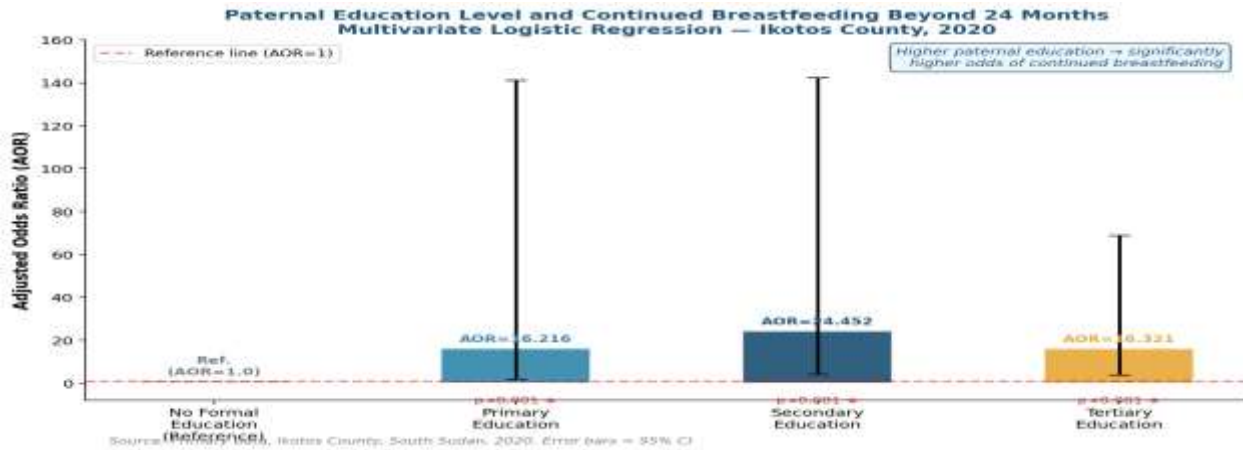


Figure 6. Bar chart with 95% confidence interval error bars showing AOR for continued breastfeeding beyond 24 months by paternal education level. All educated paternal groups showed dramatically higher odds compared to the no-formal-education reference group. Source: Primary data, Ikotos County, 2020.

Figure 7: Source of Income and IYCF Outcomes — Comparative Analysis

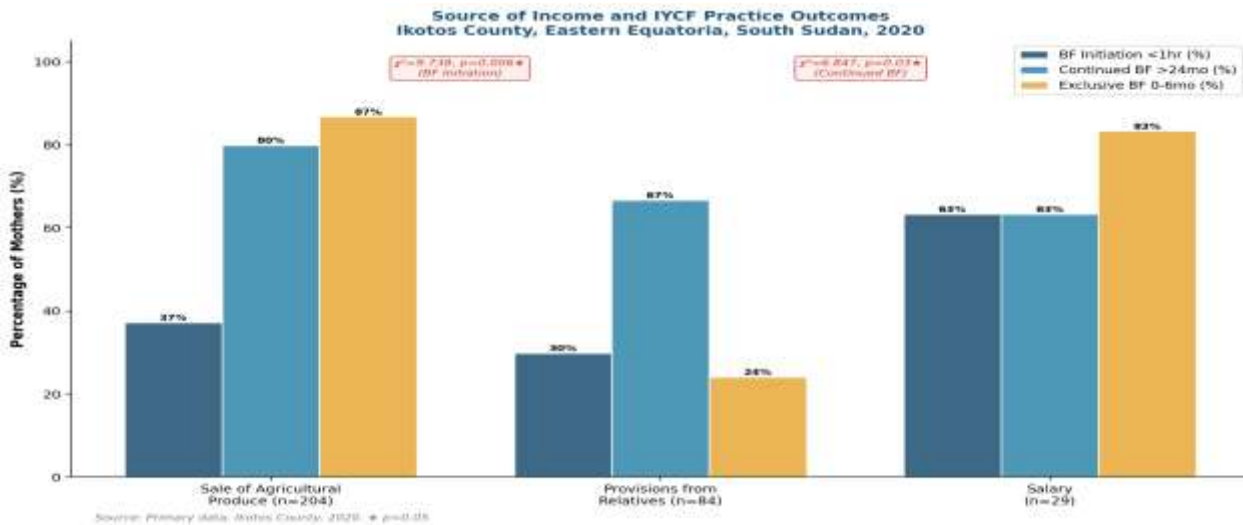


Figure 7. Comparative bar chart showing percentages of mothers practising BF initiation <1 hour, continued BF >24 months, and exclusive BF 0–6 months by source of income category. Salaried mothers showed highest BF initiation rates (63.3%). $\chi^2=9.738$, $p=0.006$ for BF initiation; $\chi^2=6.847$, $p=0.03$ for continued BF. Source: Primary data, Ikotos County, 2020.

Table 4: Multivariate Logistic Regression — Factors Associated with Continued Breastfeeding Beyond 24 Months

Variable	Cont. BF Yes N(%)	Cont. BF No N(%)	AOR (95% CI)	p-value	Interpretation
Maternal Age (ref: 18-23 yrs)					
18–23 years	78 (88.6)	10 (11.4)	Reference	—	Baseline
24–29 years	62 (59.6)	42 (40.4)	8.769 (1.605–47.916)	0.012★	Strong positive
30–35 years	44 (78.6)	12 (21.4)	0.649 (0.202–2.088)	0.468	Not significant
>35 years	34 (85.0)	6 (15.0)	1.009 (0.298–3.418)	0.988	Not significant
Paternal Education (ref: No formal ed.)					
No formal education	18 (66.7)	9 (33.3)	Reference	—	Baseline
Primary education	74 (86.0)	12 (14.0)	16.216 (1.862–141.265)	0.012★	Very strong positive
Secondary education	10 (79.1)	31 (20.9)	24.452 (4.196–142.480)	<0.001★★★	Very strong positive
Tertiary education	14 (33.3)	18 (66.7)	16.321 (3.872–68.794)	<0.001★★★	Very strong positive
Marital Status (ref: Divorced)					
Married	184 (78.6)	50 (21.4)	0.070 (0.005–0.907)	0.042★	Significantly associated
Single	29 (74.4)	10 (25.6)	0.016 (0.001–0.226)	0.002★★	Strongly associated
Divorced (Ref.)	5 (33.3)	3 (66.7)	Reference	—	Baseline

★ $p < 0.05$; ★★ $p < 0.01$; ★★★ $p < 0.001$. AOR = Adjusted Odds Ratio. Source: Primary data, 2020

4.5 Multivariate Logistic Regression — Exclusive Breastfeeding

For exclusive breastfeeding among infants 0–6 months, mothers aged 24–29 years were 1.433 times more likely to exclusively breastfeed (AOR=1.433; 95%CI: 1.316–6.496, $p=0.021$), while married women were 3.107 times more likely than single mothers (AOR=3.107; 95%CI: 0.683–14.143, $p=0.027$). Source of income was significantly associated: mothers who relied on relatives for provisions were 3.107 times more likely to exclusively breastfeed (AOR=3.107; 95%CI: 0.583–11.143, $p=0.002$). Full multivariate regression results for exclusive breastfeeding are provided in Table 5.

Table 5: Multivariate Logistic Regression — Factors Associated with Exclusive Breastfeeding (0–6 Months)

Variable	EBF Yes N(%)	EBF No N(%)	AOR (95% CI)	p-value	Interpretation
Maternal Age (ref: 18-23 yrs)					
18–23 years	62 (70.4)	26 (29.6)	Reference	—	Baseline
24–29 years	95 (80.5)	23 (19.5)	1.433 (1.316–6.496)	0.021★	Moderate positive
30–35 years	45 (80.3)	11 (19.7)	9.662 (1.418–6.813)	0.641	Not independent
>35 years	30 (66.7)	15 (33.3)	0.032 (0.002–43.682)	0.246	Not significant
Marital Status (ref: Single)					
Single (Ref.)	211 (83.4)	42 (16.6)	Reference	—	Baseline
Married	39 (69.6)	17 (30.4)	3.107 (0.683–14.143)	0.027★	Significant positive effect
Divorced	1 (12.5)	7 (87.5)	0.015 (0.001–0.335)	0.099	Borderline
Source of Income (ref: Sale of produce)					
Sale of agricultural produce	177 (86.8)	27 (13.2)	Reference	—	Baseline
Provisions from relatives	13 (24.1)	41 (75.9)	3.107 (0.583–11.143)	0.002★★	Significant
Salary	25 (83.3)	5 (16.7)	0.952 (0.276–3.288)	0.99	Not significant

★ $p < 0.05$; ★★ $p < 0.01$. AOR = Adjusted Odds Ratio. Source: Primary data, 2020

5. DISCUSSION

5.1 Maternal Age and IYCF Practices

This study found that maternal age was significantly associated with all three IYCF outcomes ($p < 0.05$ for breastfeeding initiation, continued breastfeeding, and exclusive breastfeeding). Mothers aged 24–29 years were 8.769 times more likely to continue breastfeeding beyond 24 months (AOR=8.769, 95%CI: 1.605–47.916, $p=0.012$), while mothers aged 30–35 years were 9.66 times more likely to exclusively breastfeed (AOR=9.66, 95%CI: 1.418–6.813). These findings corroborate evidence from Bolton et al. (2009), Ukegbu et al. (2010), Qureshi et al. (2011), and Brown et al. (2011) (6) demonstrating longer breastfeeding duration among older mothers.

The strong association between the 24–29 year age group and continued breastfeeding may reflect a period when mothers have accumulated sufficient breastfeeding experience from prior births yet still have the physical vitality required to sustain extended breastfeeding. Conversely, the 18–23 year cohort showed high rates of continued

breastfeeding (88.6%), which may paradoxically reflect cultural norms where young mothers maintain longer breastfeeding as a contraceptive and nutritional strategy in resource-poor settings. This contextual nuance distinguishes the South Sudan finding from those of Ogunlesi (2010), (26) who found no association between maternal age and exclusive breastfeeding in Nigeria.

5.2 Marital Status and Spousal Support

Married women were significantly more likely to exclusively breastfeed their children (AOR=3.107; 95%CI: 0.683–14.143, $p=0.027$) and continued breastfeeding beyond 24 months. These findings align with Kimani-Murage et al. (2011) (9) and Lande (2003) (10) who confirmed the protective role of marital union on IYCF outcomes through mechanisms of emotional support, spousal encouragement, and reduced caregiver burden. In Ikotos County, where 80.4% of households are male-headed, marital status likely serves as a critical channel for male involvement in IYCF decision-making.

Interestingly, single mothers showed higher rates of exclusive breastfeeding (83.4%) compared to married mothers (69.6%). This paradoxical finding may be explained by the fact that single mothers in rural South Sudan have fewer competing demands from spousal expectations and may have stronger motivation to breastfeed exclusively as they cannot afford formula alternatives. (27) This observation reinforces the complexity of marital status as an IYCF determinant and the need for qualitative exploration of decision-making processes within different household structures.

5.3 Maternal Education and Health Literacy

Secondary maternal education was the strongest maternal predictor of breastfeeding initiation within one hour (AOR=5.524; 95%CI: 1.597–19.110, $p=0.007$). This finding is consistent with a large body of evidence demonstrating that maternal education improves IYCF outcomes through enhanced health literacy, greater ANC utilisation, and improved decision-making autonomy. (11,12) Ahmed et al. (2012) (12) and Ajibade et al. (2013) (13) both attributed sub-optimal IYCF to low maternal education levels, particularly for complementary feeding practices.

The finding that mothers with no formal education (67.3%) were more likely to initiate breastfeeding within one hour compared to those with primary education (33.3%) warrants specific attention. This may reflect the role of traditional postpartum practices in rural communities, where immediate skin-to-skin contact and early breastfeeding are normative behaviours reinforced by community midwives and birth attendants, independent of formal schooling. This aligns with observations by Lawoyin et al. (2001) (28) who found that lower education was paradoxically associated with higher breastfeeding rates in some contexts.

5.4 Maternal Occupation and Source of Income

Maternal occupation and income were significantly associated with breastfeeding initiation and continued breastfeeding. Formally employed mothers had 0.081 times the odds of initiating breastfeeding within one hour (AOR=0.081; 95%CI: 0.016–0.407, $p=0.02$), confirming the well-documented tension between employment and

optimal IYCF practices. (15) This finding is consistent with observations from Okeh (2010), Raffle et al. (2011), and Velpuir (2004) who noted that formal employment, particularly without adequate workplace breastfeeding support, constitutes a major barrier to early breastfeeding initiation and continued breastfeeding.

Source of income showed differential effects across IYCF outcomes. Salaried mothers were 2.531 times more likely to initiate breastfeeding within one hour, while mothers dependent on agricultural produce maintained higher continued breastfeeding rates. The income-IYCF relationship operates through multiple pathways: purchasing power for diverse complementary foods, time availability for breastfeeding, and access to health information. (16) Mukuria et al. (2012) (16) found that children of higher socioeconomic status parents were more likely to receive optimal IYCF, while FAO (2015) highlighted financial constraints as a primary barrier to appropriate complementary feeding in resource-poor settings.

5.5 Paternal Education — The Critical and Novel Determinant

The most striking and programmatically significant finding of this study concerns the extraordinary influence of paternal education on continued breastfeeding beyond 24 months. Children whose fathers attained primary, secondary, and tertiary education were 16.2, 24.5, and 16.3 times more likely respectively to be breastfed beyond 24 months compared to children of uneducated fathers — a finding of remarkable magnitude that substantially exceeds the effect sizes reported in most comparable IYCF studies.

This finding corroborates Bhatta (2013) (21) who demonstrated that paternal education in Nepal was associated with higher involvement in encouraging breastfeeding, and Jimoh (2004) (29) who found in Equatorial Guinea that young educated husbands expressed stronger support for exclusive breastfeeding. Celebioglu (2014) in Turkey confirmed that fathers' better education enhanced infant exclusive breastfeeding rates. (30) The biological plausibility of this finding rests on several mechanisms: educated fathers are more likely to accompany their spouses to child wellness clinics; more likely to understand the nutritional science of breast milk; more likely to support workplace-absent breastfeeding mothers; and more likely to resist cultural prohibitions against extended breastfeeding.

The non-linear AOR pattern — with secondary education showing the highest AOR (24.452) compared to primary (16.216) and tertiary (16.321) — may reflect the specific characteristics of the secondary-educated paternal cohort in Ikotos County, who may have greater health knowledge than primary-educated fathers while maintaining closer community ties and more domestic time than tertiary-educated, formally employed fathers. This phenomenon warrants further qualitative investigation to fully understand the mechanisms by which paternal education operates in this specific sociocultural context.

5.6 Paternal Occupation and Male Involvement

Paternal occupation was significantly associated with breastfeeding initiation within one hour ($\chi^2=13.046$, $p=0.001$) and exclusive breastfeeding ($\chi^2=14.125$, $p=0.001$). Children of formally employed fathers were 2.458 times more likely to be initiated to breastfeeding within one hour (AOR=2.458; 95%CI: 0.246–0.975, $p=0.04$). This finding aligns with Kenney et al. (2008) (23) who posited that food provision and IYCF support are considered male

responsibilities in many African societies, and that employed fathers are better positioned to translate this norm into supportive behaviours.

Notably, 116 of 199 (58.3%) unemployed fathers still had their children initiated to breastfeeding within one hour, suggesting that unemployment does not preclude paternal support for immediate breastfeeding. Rather, employment appears to act as a catalyst for engagement with health systems — through ANC attendance, delivery presence, and postnatal follow-up — that amplifies the positive effect on IYCF initiation. The finding that 62.8% of fathers in this study were unemployed highlights the structural economic vulnerability of Ikotos County households and the need for livelihood-integrated nutrition interventions.

5.7 Child's Sex and Gender Preferences

Child's sex was significantly associated with breastfeeding initiation within one hour ($\chi^2=8.432$, $p=0.004$) and exclusive breastfeeding ($\chi^2=6.259$, $p=0.012$). Male children (47.4%) were more likely to be initiated to breastfeeding within one hour compared to female children (15.9%), and 145 (96.0%) of male children were exclusively breastfed compared to 136 (88.3%) of female children. This sex-based differential is a striking manifestation of son preference in IYCF, a phenomenon documented across sub-Saharan Africa and South Asia.

These findings have direct implications for equity-focused IYCF programming. If male children systematically receive more favourable early feeding practices, female children face compounded nutritional disadvantage — a pattern that perpetuates intergenerational cycles of malnutrition, stunting, and inequitable health outcomes for women and girls. Community-level counselling addressing son preference in the context of child feeding represents an urgent programmatic priority in Ikotos County and comparable settings.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

This study has identified seven sociodemographic and paternal determinants of IYCF practices among mothers with children below 24 months in Ikotos County: maternal age, marital status, maternal education, maternal occupation, source of income, paternal education, paternal occupation, and child's sex. IYCF practices were suboptimal across all measured indicators, with breastfeeding initiation within one hour standing at 35.0%, exclusive breastfeeding at 75.0%, and timely complementary feeding introduction at 22.0%.

Paternal education emerged as the single most powerful predictor of continued breastfeeding beyond 24 months, with children of educated fathers 16–24 times more likely to receive continued breastfeeding compared to children of uneducated fathers. Secondary maternal education, facility delivery, salaried maternal income, and formal paternal employment were also independently associated with improved IYCF outcomes. Sex-based disparities, with male children receiving preferential breastfeeding practices, represent an equity concern requiring targeted redress.

KEY FINDING: Paternal education is the most powerful determinant of continued breastfeeding in Ikotos County, with AOR up to 24.452 ($p < 0.001$). This unprecedented finding underscores male involvement as a critical leverage point for IYCF programming in fragile, conflict-affected settings.

6.2 Recommendations

Health Service Interventions

Midwives and skilled birth attendants should promote immediate skin-to-skin contact and early breastfeeding initiation within one hour through rooming-in practices and active postnatal breastfeeding counselling. Given the significant protective effect of facility delivery on breastfeeding initiation (AOR=1.830 for PHCC delivery), strategies to increase institutional delivery rates — including community mobilisation, transport vouchers, and skilled birth attendant deployment to peripheral facilities — are recommended.

Education and Literacy

Implementing partners including Health Link South Sudan, AVSI, and CARITAS Luxembourg should invest in adult literacy programmes for both women and men in Ikotos County. Given that secondary maternal education was associated with 5.5-fold higher odds of breastfeeding initiation, and that paternal education predicted 16–24-fold higher odds of continued breastfeeding, literacy is a high-impact, high-leverage IYCF intervention. Community-based adult education initiatives should be specifically designed to incorporate IYCF nutrition content.

Male Involvement Programmes

Targeted father-inclusive antenatal care and postnatal education programmes should be designed and implemented in Ikotos County. Given the extraordinary effect size of paternal education on IYCF (AOR=24.452), interventions that increase fathers' knowledge of, and engagement with, infant feeding practices represent the highest-priority recommendation of this study. Father-to-father support groups, male champions for breastfeeding, and couples' nutrition counselling sessions should be piloted at all health facilities.

Income Generation and Economic Empowerment

Government and implementing agencies should engage women in income-generating activities and support household food security through agricultural input provision. CARITAS Luxembourg's seed and tool distribution programmes should be expanded. Employers should be encouraged to adopt breastfeeding-supportive workplace policies, including six-month maternity leave, designated lactation spaces, and flexible working arrangements for breastfeeding mothers.

Gender and Equity-Focused Programming

Counselling programmes addressing son preference in child feeding should be integrated into community health promotion activities. Boma Health Workers, community leaders, and MIYCN counsellors should be trained to deliver gender-sensitive messaging on equal breastfeeding practices for male and female children. The National Ministry of Health should ensure that IYCF monitoring tools capture sex-disaggregated data to track progress on gender equity in feeding practices.

DECLARATIONS

Ethics Approval: Ethical clearance was obtained from the Uganda Christian University Research and Ethics Committee. Permission was obtained from the Ikotos County Health Department and community chiefs. Informed consent was obtained from all participants in written and oral form in Langi and English languages.

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