

# Socio-Economic Status and Exclusive Breastfeeding Among Infants in a Ugandan Cross-Sectional Study

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**Abstract:** Nation-wide population based studies on socio-economic inequality in exclusive breastfeeding among infants is scarce in Uganda. This study examined the socio-economic inequality in exclusive breastfeeding among 1424 infants below 6 months of age in a nation-wide population based cross-sectional study. Self-reported maternal exclusive breastfeeding practice in the first six months of their last born baby's life was the outcome of interest. Household wealth index and maternal occupation constituted the proxy measures of socio-economic status, the exposure variable of interest. The distribution of exclusive breastfeeding practice by infant-mother dyad characteristics was calculated by conducting bivariate analysis. Multivariate binary logistic regression models were then fitted to calculate the odds ratios and their corresponding 95% confidence intervals for exclusive breastfeeding by maternal occupation and household wealth index. The results showed that half of the infants were boys, close to half of their mothers were farmers, and 23% and 16.9% of the infants lived in the poorest and richest households respectively. Overall 67% of the infants were exclusively breastfed. The odds ratios for exclusive breastfeeding by maternal occupation were 0.62 (0.26-1.50) for infants whose mothers were professionals/technical/managers, 0.97(0.50-1.87) for clerical/sales, 0.78 (0.51-1.21), for Farmers, 0.72 (0.29-1.82) for Household/Domestic/Services, 0.72 (0.39-1.36) for skilled manual workers and 0.72 (0.25-2.02) for unskilled manual workers compared to infants of non-working mothers. The odds ratios for exclusive breastfeeding by household wealth index were 2.38 (1.30-4.33), for the poorest, 2.16 (1.18-3.96) poorer, 1.91 (1.10-3.48) middle, and 1.41 (0.75-2.64), for richer households compared to infants in the richest households. In conclusion, an inverse relationship was found between household socio-economic status and exclusive breastfeeding among infants below six months of age and inadequate evidence to conclude existence of an association between maternal socio-economic status and exclusive breastfeeding. Targeting exclusive breastfeeding interventions to mother-infant dyad living in affluent families might be important in reducing socio-economic inequality in exclusive breastfeeding among infants below six months of age in Uganda.

**Keywords:** Exclusive Breastfeeding, Socio-Economic Status, Infants, Uganda

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## 1. Introduction

The importance of exclusive breastfeeding to infant-mother dyad cannot be over-emphasized. It's one of the known nutrition specific interventions that contributes to reduced infant morbidity and mortality especially from infectious diseases and protects against childhood obesity and some chronic conditions in later life [1-4]. Following the Innocenti declaration on the protection, promotion and support for optimal breastfeeding practice across the globe [5], and its subsequent modification by the World Health Organization (WHO) [6], a lot of effort was made at both national and international level to promote optimal breastfeeding practices but yielded moderate results [7]. The global breastfeeding scorecard for 2018 indicated that less than half (41%) of the infants below six months of age were exclusively breastfed globally [8]. For low and middle income countries some estimates showed very low prevalence of exclusive breastfeeding (37%) among infants below six months of age compared to the total global prevalence of exclusive breastfeeding [2]. In sub-Saharan Africa, estimates based on data from nationally representative demographic and health surveys conducted between 2010-2015 in 29 sub-Saharan African countries showed that exclusive breastfeeding prevalence among infants below six months of age ranged from as low as 23.7% to 56.6% [9]. Although Uganda was ranked among the 23 countries included in the Global Breastfeeding Collective group scorecard for 2017 for having achieved the UNICEF/WHO 2025 exclusive breastfeeding prevalence target of 50% [10], 34% of her infants below six months of age are still not exclusively breastfed [11]. This implies, that proportion of infants (exclusively breastfed) are not reaping the benefits of exclusive breastfeeding and might undermine the efforts to reduce infant and under-five mortality in Uganda [11], as well as the achievement of the United Nation 2030 sustainable development goals [12] and the new 2030 UNICEF/WHO global exclusive breastfeeding prevalence target of 70% [13].

Social and behavioral theories have been suggested to explain exclusive breastfeeding practice among women. This include the extended theory of planned behavior [14, 15] and Bourdieu's social theory, which proposed that 'meaning and experiences' influenced by social circumstances in which people live (lay knowledge) as opposed to attitudes' or 'beliefs might be important in explaining infant feeding practices among women living in various social environments [16, 17]. Indeed infant feeding practices vary between societies and communities within the same society, hence the multi-causal nature of the default in exclusive breastfeeding practice. Substantial evidence exists on the association between low socio-economic status and negative health outcomes [18] in both children and adults. Socio-economic inequalities in exclusive breastfeeding of infants have been reported in both developing and developed countries, however the direction and the magnitude of the association between socio-economic status and exclusive

breastfeeding of infants differs between developed and developing countries [19]. In sub-Saharan Africa, a systematic review of Kenyan studies showed that employed mothers were less likely to exclusively breastfeed their infants compared to non-working mothers, and household food insecurity was associated with less likelihood of exclusive breastfeeding practices among women [20]. On the same note, a population based cross-sectional study in Ethiopia, found that unemployed mothers were 9 times more likely to exclusively breastfeed compared to employed mothers [21]. On the contrary a Nigerian cross-sectional study found no association between maternal occupation (work status) and exclusive breastfeeding [22] however this study included all occupational groups into one category hence misclassification of the subjects with respect to exposure and residual confounding cannot be ruled out. In studies where socio-economic status was measured using formal educational attainment, Mothers who reported having attained primary level education were found to be less likely to exclusively breastfeed their infants in the first six months compared to those that reported having attained tertiary level education [22]. The challenge of using proxy measures of socio-economic status in assessing health inequalities in developing countries has been discussed elsewhere [23]. As a result the validity of education and occupation in measuring household and individual income has been questioned hence the development of the household wealth index commonly applied in demographic and health surveys in developing countries. Therefore the discrepancies in results of studies that assessed the effect of maternal socio-economic status on exclusive breastfeeding practices using the above proxy measures are expected.

Few epidemiological studies investigated the relationship between socio-economic status and exclusive breastfeeding of infants below six months of age in Uganda. A more recent population based cross-sectional study based on secondary data from 2006 and 2011 Uganda Demographic and Health Surveys (UDHS) found inadequate evidence of an association between maternal socio-economic status and exclusive breastfeeding practice in the year 2006, however infants in the 60% affluent households were less likely to be exclusively breastfed compared to their counterparts in less affluent families. The same study did not find evidence of an association between maternal formal education, occupation and exclusive breastfeeding among infants, when data for 2011 UDHS was analyzed [24]. These findings are inconsistent given the short duration of the two periods for data collection and the expected changes in socio-economic status relative to Uganda's economic growth in the 5 year period (2006-2011). In another Ugandan cross-sectional study based on the 2006 UDHS, an inverse relationship between household socio-economic status and exclusive breastfeeding among infants less than 6 months of age was found, although the findings of this study agrees with the earlier described Ugandan study, there were inconsistencies in the statistical analysis and the measure of effect reported were not clear, making the validity of the results questionable

[25]. Another cross-sectional study conducted in Ugandan district of Rakai over a decade ago reported only the crude odds ratios for exclusive breastfeeding by maternal formal education and occupation but no evidence of association was found, this makes the conclusion of existence or non-existence of association between socio-economic status and exclusive breastfeeding invalid because potential confounders were not adjusted for [26].

Other factors that have been reported to be positively associated with exclusive breastfeeding among infants below six months of age in sub-Saharan Africa and other developing countries include maternal postnatal care attendance, births attended to by healthcare workers, absence of maternal breast conditions/disease [27], living in rural area, maternal none smoking habits, multi-parity, infant gestational age of  $\geq 37$ , supportive husbands and mother-infant bed sharing when sleeping [28]. Last but not the least, psychosocial factors such as maternal attitude towards breastfeeding, subjective norms and practice control were also found to positively or negatively affect exclusive breastfeeding practices of mothers [29]. In general most factors identified to be influencing exclusive breastfeeding practice tend to rotate around culture, social environment, medical, and maternal social position and socio-economic status. Identifying socio-economic inequalities in exclusive breastfeeding of infants below six months of age is essential for developing evidence based optimal breastfeeding promotion interventions and achieving the WHO goal of health equity (Health for all). Therefore this study aimed to examine the association between socio-economic status and exclusive breastfeeding among infants below six months of age in the general population in Uganda.

## 2. Methods and Materials

### 2.1. Setting and Materials

The materials for this study were obtained from Uganda, a developing country located in East Africa with 2019 projected population of 40 million people [30]. Uganda still has a weak healthcare system financed by a combination of tax and donor funds. The healthcare system has three operational pathways consisting of private not for profit, private for profit and public health care services, however there also exists private for profit services within the public healthcare system especially at the national referral hospital. Nutrition interventions (both curative and preventive services) are integrated into the existing government and private-not-for-profit healthcare services provided at the lowest health unit (health center II) to the highest level health unit (national referral hospital). This study was based on secondary data for the 2016 Uganda Demographic and Health Survey (UDHS) sponsored by USAID. The 2016 UDHS is the 6<sup>th</sup> in a series of five-year interval surveys that started since 1988/89. It utilized a two-stage cluster sampling method to select a household sample nation-wide from which data on health and social issues of national importance were

collected. In the first stage, the 2014 Uganda census enumeration areas were selected and in the second stage a random sample of households were then selected. In each selected household, women aged 15-49 years and a sub-sample of men aged 18-54 years was interviewed. Standardized structured questionnaires were dispensed through face-to-face interviews by trained enumerators, anthropometry and biochemical test for specific health indicators were also conducted by trained and experienced medical professionals. The response rate for both women and men was very high 97% and 94% respectively. For more details on the sampling procedure applied, data collection tools and processes, survey response rate, please refer to the 2016 UDHS final report [11].

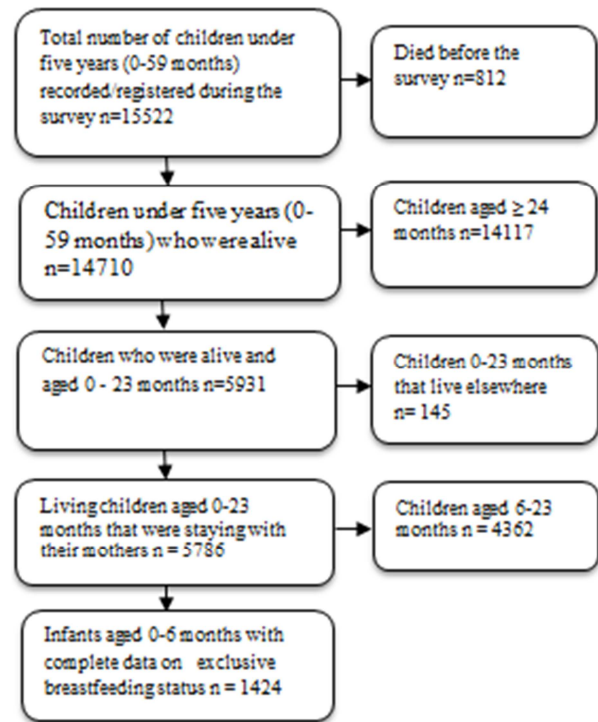


Figure 1. Schematic representation of the selection process of the study population.

### 2.2. Study Population and Design

A population based cross-sectional study based on the 2016 UDHS children’s dataset obtained for Demographic and Health Survey program. A total of 1424 (weighted=1389) infants less than 6 months who were alive and whose mothers participated in survey were examined at the time of the 2016 UDHS. This mother-infant dyad was chosen based on the WHO recommendation/guidelines on infant and young child feeding practices [31]. Although HIV prevalence in the general population remained high (7.3%) and mothers who are HIV positive can opt for alternative feeding options for their infants below six months [32], Uganda’s policy on IYCF recommends all infants less than 6 months to be exclusively breastfeed unless replacement feeding is acceptable, feasible, affordable, sustainable and safe [33].

### 2.3. Exposure and Outcome

#### 2.3.1. Socio-Economic Status

Household wealth index and maternal occupation as proxy measures of socio-economic status at household and individual level were the exposure variables of interests. These self-reported proxy measures of socio-economic status were measured using standardized structured questionnaires. Household wealth index, a measure of a household's cumulative standard of living, was calculated based on households ownership of selected assets. Data on household assets was collected using the household questionnaire which included questions on household ownership of properties such as cars and televisions, housing characteristics such as floor, wall, roofing materials etc, drinking water sources, toilet facilities, etc. Each household item for which data was collected was then assigned a factor score generated through principle component analysis. The scores were then summed up and individuals were ranked according to the score of their households. The sample was then divided into population quintiles ranking households into in the 20% poorest, poorer, middle, and richer to the top 20% richest households. Readers may refer to the 2016 UDHS report for details on the construction of the household wealth index variable [11]. By answering the question; what is your occupation? (That is, what kind of work do you mainly do?), mothers stated their occupations, recorded according to international classification of occupations [34]. For suitability of analysis, mothers were grouped into seven occupational categories that have similar earnings in Ugandan context; Not working, (not in the labor force), professional/technical/managerial, clerical and sales, agriculture (self-employed & employee), household/domestic/services providers, skilled manual and unskilled manual workers. The occupational category not working (not in the labor force) was used as the reference category.

#### 2.3.2. Exclusive Breastfeeding

Maternal self-reported exclusive breastfeeding of their infants was defined as having fed their infant on breast milk only in the 24 hours preceding the interview day in the 2016 UDHS. This definition was derived from the World Health Organization's (WHO) Infant and Young Child Feeding Practices indicators [35]. It was measured using the standardized women's questionnaire. Mothers were asked a series of questions about their infant feeding practices in the last 24 hours preceding the survey day. Did you ever breastfeed (NAME)? In the first three days after delivery, was (NAME) given anything to drink other than breast milk? Are you still breastfeeding (NAME)? Did (Name) drink or eat? a) Plain water? b) Fresh fruit juice or juice concentrate? c) Clear broth? d) Milk such as tinned, powdered, or fresh animal milk? e) Infant formula? f) Any other liquids? g) Yogurt? h) Cheese or other foods made from milk? i) Any commercially fortified baby food such as cerelac? k) Pumpkins,

Pumpkin, carrots, squash, or sweet potatoes that are yellow or orange inside? l) Cassava, yams (Juuni, Ndaggu, Baluggu), white sweet potatoes, Irish potatoes, manioc or any other roots or tubers?, m) Banana (Matooke, Ndiizi, Gonja)? n) Any dark green, leafy vegetables (dodo, nakati, spinach, amaranth, bugga, sunsa, jobyo, marakwang, sukuma wiki, Nsugga, Ggobe, Timpa)? o) Ripe mangoes, or pawpaws? p) Any other fruits or vegetables (passion fruit, jack fruit, pineapple, oranges, sugarcane)? q) Liver, kidney, heart, or other organ meats? r) Any beef, pork, lamb or goat, including products made from these meats (kebabs, sausages, chaps)? s) Any chicken, duck, turkey, pigeon, or other poultry? t) Eggs (from chickens, ducks or other poultry)? u) Fresh or dried fish or silver fish (mukene, kenje)? v) Any foods made from beans, peas, lentils, or nuts? w) Any sugary foods such as chocolates, sweets, candies, pastries, cakes or biscuits? x) Any cooking oil, margarine, butter or other oils/fats? y) Any other solid, semi-solid, or soft food? Maternal responses to the above questions were recorded in the 2016 UDHS dataset as yes or no. Then a binary variable exclusive breastfeeding was created and recorded as 1 if the infant was exclusively breastfed in the last 24 hours preceding the survey and 0 otherwise.

#### 2.4. Confounding

The following variables were included as potential confounding variables based on published literature on their association with exclusive breastfeeding among infants below six months of age. Infants sex, age (months), birth weight (grams: two categories  $\geq 2500$  and less than 2500g), mode of delivery (two categories: vaginal delivery, caesarean section), place of delivery (three categories: home, health facility, others), maternal age (years), maternal education level (four categories no education, primary, secondary and tertiary), maternal marital status (four categories; never married, married, living with a partner, widow/divorced/separated) paternal educational level (four categories; no education, primary, secondary and tertiary level), and place of residence (urban Vs rural). Information on these potential confounding variables was collected using the standardized 2016 UDHS questionnaires. Refer to the 2016 UDHS final report for details of the questionnaires used for data collection.

#### 2.5. Statistical Analysis

To calculate the distribution of the study subjects by socio-demographic characteristics and exclusive breastfeeding status, bivariate analysis was conducted. To calculate the crude and adjusted odds ratios and their corresponding 95% confidence intervals for exclusive breastfeeding by household wealth index and maternal occupation, univariate and multivariate binary logistic regression models were fitted. Only potential confounding variables with significant contribution to the models were included. To account for clustering and stratification introduced by the study design, complex survey data

analysis techniques were applied. All infants with missing values for either outcome or exposure variables were excluded from the analysis. The statistical analysis was conducted using SPSS version 24.

### 2.6. Ethical Consideration

The survey procedures and questionnaires were reviewed and ethical approval was done by ICF International (Calverton, MD, USA) Institutional Review Board (IRB). Before the data collection exercise, women and men that participated in the survey provided a written informed consent. To ensure privacy, data obtained from participants was recorded in an anonymous manner hence individual information was un-identifiable. The use of the secondary data for the purpose is research was approved by DHS program archivist, authorization number 117079.

## 3. Results

As shown on Table 1, half of the infants were girls, 5.8% had low birth weight, slightly more (35.9%) were in the age group of 2-3 years, majority (76.2%) of them were delivered in health facilities, and the majority (35.9%) were aged 2-3 months. Most of the infants had mothers (62.60%) who reported having attained primary level education and the majority (47.30%) of had mothers that reported living with a male partner. Occupational distribution of the infants mothers showed that close to half (46.7%) of their mothers were employed in the agricultural sector (Farmers) and the lowest proportion (2.6%) of their mothers identified their occupation as unskilled manual. The distribution of infants by paternal formal education was similar to that of their mothers. Majority (54.4%) of the infants had fathers who attained primary level education and the least proportion (5.9%) had fathers with no formal education. Similar percent distribution of infants by household socio-economic status was found with slightly more (23%) of the infants were living in the poorest households and the lowest proportion (16.9%) in lived in the richest households. Most (82.6%) of the infants had mothers that resided in rural areas.

The prevalence of exclusive breastfeeding of infants aged 0.5 months was 67%. However in general the distribution of the prevalence of exclusive breastfeeding was similar across all socio-demographic characteristics of the infants. Notably infants aged 0-1 month had the highest (81.5%) and those aged 4-5 months had the lowest (50%) prevalence of exclusive breastfeeding. Girls compared to boys also had slightly high prevalence of exclusive breastfeeding (68.8% Vs 65.2%). Low birth weight infants also had higher prevalence (69.1%) than infants that had normal birth weights (66.8%). Infants whose mothers were reported not having been married had the highest prevalence (72.8%) and those whose mothers were living with a male partner had the lowest prevalence (65%) of exclusive breastfeeding. By

place of delivery, infants born in other places other than a health facility and at home had the highest prevalence (69%) and those born in health facilities had the lowest prevalence (66.7%) of exclusive breastfeeding. The distribution of the prevalence of exclusive breastfeeding was also similar across maternal age groups. However older mothers in the age group of 40-49 years had the highest (75.6%) prevalence of exclusive breastfeeding and those in the age group of 25-29 years had the lowest (62.7%) prevalence of exclusive breastfeeding. Similar distribution of the prevalence of exclusive was observed across maternal education. However infants whose mothers had primary level education had the highest (67.9%) prevalence of exclusive breastfeeding and those whose mothers had tertiary level education had the lowest prevalence (64.3%) of exclusive breastfeeding. Maternal occupational distribution of the prevalence of exclusive breastfeeding showed that infants whose mothers were skilled manual workers had the lowest prevalence (57.7%) and those that did clerical/sales job had the highest prevalence (73.2%) of exclusive breastfeeding. The distribution of the prevalence of exclusive breastfeeding by paternal education also showed that infants whose fathers had no formal education had the highest (69.60%) and those whose fathers had tertiary level education had the lowest (63.6%) prevalence of exclusive breastfeeding. Infants in the poorest and poorer households had the highest prevalence of exclusive breastfeeding i. 71.2 and 70.90% respectively while those in the richer households had the lowest prevalence of exclusive breastfeeding. Rural-urban distribution in the prevalence of exclusive breastfeeding was similar (67.0 Vs 67.2%). Lastly infants whose mothers had no health insurance had slightly higher prevalence (67.1%) than their counterparts whose mothers had health insurance (60.9%).

The crude and adjusted odds ratios for exclusive breastfeeding by maternal occupation and household wealth index are shown on Table 2 and Table 3 respectively. Compared to infants whose mothers were not working, reduced odds ratios for exclusive breastfeeding was found with infants whose mothers had who professional/technical/managerial, clerical/sales, agricultural, household/domestic/services skilled manual and unskilled manual work having OR; 0.68, 1.22, 0.95, 0.65, 0.60, 1.2 respectively. However after adjusting for potential explanatory variables, the odds ratios either increased or decreased to 0.62, 0.97, 0.78, 0.72, 0.72, and 0.72 respectively. While the crude odds ratios for exclusive breastfeeding for infants in the poorest, poorer, middle and richer households compared to the richest households were 1.46, 1.43, 1.20 and 0.88 respectively. When adjusted for important confounding variables, the odds ratios increased to 2.38, 2.16, 1.91, and 1.41 for infants in the poorest, poorer, middle and richer households respectively.

**Table 1.** Socio-demographic characteristics of 1424 (weighted 1389) infants aged 0-6 months by exclusive breastfeeding status.

Characteristics	Total (%)	Exclusive breastfeeding status	
		Not exclusively breastfed	Exclusively breastfed
Child sex			
Male	690(49.70)	240 (34.80)	450(65.20)
Female	699 (50.30)	218(31.20)	481(68.80)
Total	1389 (100)	458 (33.00)	931 (67.00)
Birth weight (grams)			
< 2500	81 (5.80)	25(30.90)	56 (69.10)
≥ 2500	1308 (94.20)	434 (33.20)	874 (66.80)
Child's age (years)			
0-1	439 (31.60)	81(18.50)	358 (81.50)
2-3	499 (35.90)	152 (30.50)	347 (69.50)
4-5	452 (32.50)	226(50.00)	226 (50.00)
Place of delivery			
Home	301 (21.70)	97 (32.20)	204 (67.80)
Health facility	1059 (76.20)	353 (33.30)	706 (66.70)
Others	29 (2.10)	9 (31.00)	20(69.00)
Maternal age (years)			
15-19	199 (14.30)	72 (36.20)	127 (63.80)
20-24	445 (32.00)	124 (27.90)	321 (72.10)
25-29	319 (22.90)	119 (37.30)	200 (62.70)
30-34	243 (17.50)	88 (36.20)	155 (63.80)
35-39	143 (10.30)	46 (32.20)	97 (67.80)
40-49	41 (2.90)	10 (24.40)	31 (75.60)
Maternal Education			
No education	136 (9.80)	45 (33.10)	91 (66.90)
Primary	870 (62.60)	279 (32.10)	591 (67.90)
Secondary	286 (20.60)	100 (35.00)	186 (65.00)
Tertiary	98 (7.10)	35 (35.70)	63 (64.30)
Maternal Marital Status			
Never married	81 (5.80)	22 (27.20)	59 (72.80)
Married	542 (39.00)	174 (32.10)	368 (67.90)
Living with a partner	657 (47.30)	230 (35.00)	427 (65.00)
Widow/Divorced/Separated	109 (7.80)	32 (29.40)	77 (70.60)
Maternal occupation			
Not in labor force	282 (20.30)	87 (30.90)	195 (69.10)
Professional/Technical/Managerial	78 (5.60)	31 (39.70)	47 (60.30)
Clerical/Sales	127 (9.10)	34 (26.80)	93 (73.20)
Agriculture (self-employed/employee)	649 (46.70)	207 (31.90)	442 (68.10)
Household/domestic/services	69 (5.00)	28 (40.60)	41 (59.40)
Skilled manual	149 (10.70)	63 (42.30)	86 (57.70)
Unskilled manual	36 (2.60)	10 (27.80)	26 (72.20)
Paternal Education level			
No education	69 (5.90)	21 (30.40)	48 (69.60)
Primary	633 (54.40)	214 (33.80)	419 (66.20)
Secondary	321 (27.60)	102 (31.80)	219 (68.20)
Tertiary	140 (12.00)	51 (36.40)	89 (63.60)
Household Wealth index			
Poorest	320 (23.00)	92 (28.80)	228 (71.20)
Poorer	306 (22.00)	89 (29.10)	217 (70.90)
Middle	275 (19.80)	90 (32.70)	185 (67.30)
Richer	254 (18.30)	101 (39.80)	153 (60.20)
Richest	235 (16.90)	87 (37.00)	148 (63.00)
Type of place of residence			
Urban	241 (17.40)	79 (32.80)	162 (67.20)
Rural	1147 (82.60)	379 (33.00)	768 (67.00)

Note: weighted totals might not add-up to the sample size across different characteristics due to missing values. NA= Not available

**Table 2.** Crude and adjusted odds ratio (OR) and 95% Confidence Interval (CI) for exclusive breastfeeding among 1389 (Un-weighted 1424) infants aged 0-6 months by maternal occupation

Maternal Occupation	Exclusive breastfeeding for infants aged 0-5 months	
	Crude OR (95% CI)	Adjusted OR (95% CI)
Not working	1.00	1.00
Professional/Technical/Managerial	0.68 (0.45 – 1.32)	0.62 (0.26 – 1.50)
Clerical / Sales	1.22 (0.71 – 2.08)	0.97 (0.50 - 1.87)
Agricultural work	0.95 (0.67 – 1.35)	0.78 (0.51 – 1.21)
Household / Domestic / Services	0.65 (0.34 – 1.25)	0.72 (0.29 – 1.82)
Skilled Manual	0.60 (0.38 - 0.96)	0.72 (0.39 – 1.36)
Unskilled Manual	1.22 (0.52- 2.83)	0.72 (0.25 – 2.02)

OR Adjusted for maternal age, maternal education level, Place of Delivery, Child's gender, Child's Age, Paternal Education, Health Insurance, time for initiation of breastfeeding after birth, Type of Place Residence, household wealth index.

**Table 3.** Crude and adjusted odds ratio (OR) and their corresponding 95% Confidence Intervals (CI) for exclusive breastfeeding among 1389 (Un-weighted 1424) infants aged 0-6 months by household socio-economic status.

Household Wealth Index	Exclusive breastfeeding for infants aged 0-5 months	
	Crude OR (95% CI)	Adjusted OR (95% CI)
Richest	1.00	1.00
Poorest	1.46 (0.95 - 2.24)	2.38 (1.30 – 4.33)
Poorer	1.43 (0.95 - 2.16)	2.16 (1.18 – 3.96)
Middle	1.20 (0.77 - 1.88)	1.91 (1.10 – 3.48)
Richer	0.88 (0.56 - 1.40)	1.41 (0.75 – 2.64)

OR Adjusted for child sex, child age, birth weight, maternal age, maternal education level, occupation mother, paternal education, type of place residence

## 4. Discussion

The findings of this study showed high prevalence (67%) of exclusive breastfeeding among infants below six months of age. This is above the global average of 41% reported by UNICEF/WHO in their most recent breastfeeding scorecard of 2018 [8] and slightly above the Kenyan exclusive breastfeeding rate of 61% in their 2014 demographic and health survey [36] as well as that of Tanzania's 59% in 2015/2016 [37], though these are not standardized prevalence of exclusive breastfeeding to necessitate direct comparison. Nevertheless the country has achieved the WHO/UNICEF 2025 exclusive breastfeeding prevalence target of 50% among infants below six months of age [10], but fell short of the new UNICEF/WHO exclusive breastfeeding target of 70% by the year 2030[8].

When socio-economic status was assessed using maternal occupation, the results showed that infants whose mothers had professional/technical/managerial occupation were 38%, clerical/sales 3%, agriculture 22%, household/domestic/services 28%, skilled manual 28%, and unskilled manual 28% less likely to be exclusively breastfed compared to those whose mothers were not working (not in the labor force) at the time of conduct of the 2016 UDHS. However there was inadequate evidence on the existence of an association between maternal occupation and exclusive breastfeeding of infants below six months of age. This might be due to the weakness of occupation as a proxy measure of socio-economic status in low and middle income countries [23], where formal occupations are scarce and casual labor plus small household enterprises are the most common sources of income that are often unstable [38]. Secondly the comparator i. e. mothers not in the labor market might be a mixture of mothers from different occupational groups with differential causal pathways to exclusive breastfeeding practices leading to under

or over estimate of the effect measure. However the findings are in agreement with those of a Ugandan cross-sectional study that found no association between maternal occupation and exclusive breastfeeding among infants below six months of age [24] and that of an Ethiopian study that found a positive association between maternal unemployment and exclusive breastfeeding [21]. However this finding differed from those of a Kenyan systematic review that found a positive association between maternal occupation and exclusive breastfeeding of infants below six months of age [20]. These disparities in the relationship between maternal occupation and exclusive breastfeeding might need further investigation to ascertain whether maternal occupation has an independent effect on exclusive breastfeeding practice as opposed to its being a proxy measure of socio-economic status or some effect medication might by the different environments in which Ugandan infant-mother dyads.

When household wealth index (proxy measure of household socio-economic status) was used in the analysis as the exposure variable, adjusted for important confounders, we found an association between household socio-economic status and exclusive breastfeeding of infants below six months of age. The results showed that infants in the poorest and poorer households were 1.38 and 1.16 times more likely to be exclusively breastfed compared to those that lived in the richest households. Likewise infants that lived in the middle and richer households were 0.91 and 0.41 times more likely to be exclusively breastfed compared to infants in the richest households. These findings might be because the less affluent families have less financial and physical access to baby formulas, and less access to information on alternative feeding options for infants given that majority of the mother-infant dyads stay in rural areas of Uganda. On the other, the high prevalence of antenatal care attendance among Ugandan

women might have contributed to increased maternal knowledge on optimal breastfeeding practices, of which knowledge might have been translated into practice after delivery of their newborns. This finding is in agreement with those of a Ugandan cross-sectional study that found an inverse relationship between household socio-economic status and exclusive breastfeeding of infants when they utilized the 2006 UDHS data, however in the same study when the authors used the 2011 UDHS data, no association was found between household socio-economic status and exclusive breastfeeding among infants, contrary to the findings of this study [24]. The inverse association between household socio-economic status and exclusive breastfeeding among infants under-five months of age might be linked to the inability of mothers in the less affluent families to have access to commercial baby foods, availability of time for breastfeeding their infants since most of these mother-infant dyads live in rural areas where the predominant economic activity is agriculture and mothers tend to take their infants to their gardens (work place). The implementation of the baby friendly hospital initiative through lower level health facilities in rural areas and the WHO code of marketing of breast milk substitutes by Ugandan ministry of health might be some of the likely factors accounting for the higher likelihood of exclusive breastfeeding among infants in less affluent families, however mothers in affluent families might have all resources and access to information on breastmilk substitutes and since most of these mothers live in urban areas and tend to either work in offices or engaged in commercial activities, they tend to live their infants at home taken care of by maids, hence less likely to exclusively breastfeed them in the first six months of their infants lives. Other likely explanation could be linked to the limited period of maternity leave, often three months and lack of appropriate breastfeeding facilities in most working places in urban areas of Uganda, although probable it might warrant further investigations.

## 5. Conclusion

An inverse relationship was found between household socio-economic status and exclusive breastfeeding of infants below six months of age. However inadequate evidence was found to conclude existence of an association between maternal socio-economic status and exclusive breastfeeding of infants below six months of age. Targeting exclusive breastfeeding interventions to mother-infant dyad living in affluent families might be important in reducing socio-economic inequality in exclusive breastfeeding among infants below six months of age in Uganda. Further studies might be required to investigate the relationship between maternal occupation and exclusive breastfeeding at regional levels.

## Strengths and Weakness

This study is based on a nationally representative survey hence the findings can be generalized to all infants in

Uganda. Mothers might have only reported one form of occupation yet it's a common practice for women in Uganda to engage in two or more occupations to earn living. This might have led to misclassification of mothers with respect to the exposure (occupation) leading to under or over-estimation of the effect measure. Due to small number of subjects in some categories of maternal occupation, we regrouped subjects from two or more occupational groups into one category; this might have led to residual confounding. Other potential confounders might not have been adjusted for, leading to over or underestimate of the effect of socio-economic status on exclusive breastfeeding.

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## Conflict of Interest

All the authors do not have any possible conflicts of interest.

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