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Single motherhood in Ghana: analysis of trends and predictors using demographic and health survey data

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The rising rate of single-mother families has gained scholarly and policy attention. Understanding the dynamics in the socio-economic and demographic transformations that have led to the relatively high single-mother families in Ghana is important to advance policy and intervention to mitigate adverse effects of single motherhood. The study sought to examine the trends and predictors of single motherhood in Ghana from 1993 to 2014. This paper was based on data from the last five waves of the Ghana Demographic and Health Survey. Descriptive statistics of proportions with Chi-square test and binary logistic regression were used to assess individual and contextual factors associated with single motherhood in Ghana. The proportion of single motherhood increased significantly over the period from 14.1% in 1993 to 19.5% in 2014. Premarital birth emerged as the major pathway to single motherhood. Among individual factors, the likelihood of single motherhood declines as age at first sex [OR = 0.58; 95% CI = 0.48,0.70] and first birth [OR = 0.43; CI = 0.32,0.59] were 25 years and above. Also, Contraceptive users were less likely to be single mothers than non-users. Contextually, women who profess Islam [OR = 0.58; 95% CI = 0.46, 0.74] were less likely to be single mothers than women who had no religious affiliation. We observed that, after accounting some important factors, women with higher economic status—richer [OR = 0.76; 95% CI = 0.59,0.96] and richest [OR = 0.57; 95% CI = 0.31,0.56] were less likely to be single mothers than poorest women. The findings give an impression of single mothers being over-represented among economically poor women. Policies and programmes meant to mitigate adverse effects of single motherhood should also focus on empowering single mothers and their children as a way of alleviating poverty and improve the well-being of children in this family type, as well as enhance Ghana's capacity to attain the Sustainable Development Goal 1, particularly target 1.2.

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Background

Over the last 6 decades, the issue of single motherhood has received much research and policy attention, especially in the high-income countries, owing principally to the fact that single motherhood is associated with poverty and negative health outcomes for both mothers and their children (Thomson & McLanahan, 2012). The adverse effects of single motherhood on children's well-being are usually higher due to high poverty levels and gender gap in high-wage employment and education (Ntoimo & Odimegwu, 2014). Usually, the socio-economic conditions of single-mother families are worse than that of single fathers (Heine, 2016). Increasing rates of cognitive, emotional and social detrimental effects have been identified among children living with divorced single-parent families and those born to unmarried women (Amato, 2005; Kim, 2011). Studies in some African regions associate single motherhood with several adverse effects on children's health outcomes, including higher rates of malnutrition and under-five mortality (Ntoimo & Odimegwu, 2014; Clark & Hamplova, 2013; Tette et al., 2016). Nonetheless, the basic concern to single motherhood is their greatest risk to economic hardships (Ellwood & Jencks, 2004). Unlike most high-income e countries with well-structured policies and interventions to ameliorate the adverse effects of single motherhood, low- and middle-income countries including Ghana lack adequate social and welfare programmes or policies to protect vulnerable individuals such as single mothers from severe economic hardships (Clark & Hamplova, 2013).

Although there are no systematic estimates of the trends of single motherhood in Ghana, several important indicators suggest that single motherhood is probably quite common in the country. According to the Ghana Statistical Service, the median age at first marriage for women increased from 18.3 years in 1988 to 20.7 years in 2014 (Ghana Statistical Service (GSS), 2015). Existing evidence shows that the increasing age at first marriage has increased the duration at which women are at risk of premarital childbearing across countries (Okigbo & Speizer, 2015; Reda & Lindstrom, 2014). Regarding the incidence of divorce in the country, some studies suggest a high incidence rate (Takyi, 2001; Takyi & Broughton, 2006; Takyi & Gyimah, 2007). The prevalence of divorce increased from 5.6% in 1988 to 7.7% in 2014, and the prevalence of separation soared from 2.7% in 1988 to 7.7% in 2014. Concerning premarital childbirth, twenty-two percent of Ghanaian women aged 25–49 years have given birth before reaching age 18, and thirty-nine percent have given birth by age 20 (GSS, 2015). All these transformations in the family and household structure may have the propensity to increase single-mother families in Ghana, hence, its associated adverse effects.

In Ghana, the limited studies that examine the growing transformation of the family structure have focused on marital dissolution (divorce and separation) (Takyi, 2001; Takyi & Broughton, 2006; Takyi & Gyimah, 2007), with less attention to single motherhood, which is an important outcome of the demographic changes in the family and household structure. Cognizant of this empirical gap, this study contributes to the research on the Ghanaian family by focusing on single motherhood.

Understanding the dynamics in the socio-economic and demographic transformations that influence single-mother families in Ghana is essential to ensure that policy makers are able to respond to the needs of single mothers and their dependents. For the most part, studies on this subject focused on the implications of single parenthood in some parts of the country (Abudu & Fuseini, 2013; Nkyi, 2013; Amissah et al., 2015). However, the scope of these studies has not included the extent of single parenthood overtime, specifically, single motherhood and its predictors. To address this research gap, we used the last five waves of the Ghana Demographic and Health Survey (GDHS), a nationally representative data, to assess trends and predictors of single motherhood in Ghana.

Theoretical underpinnings

The role of economic resources has been key to theoretical explanations to decisions on union/marital formation. Becker's economic theory and the economic independence hypothesis (Becker, 1973; Becker et al., 1977) remain some of the common theoretical explanations that have been extensively utilised by scholars in the context of family structure and formation. The economic theory draws on economic models to explain decisions on union/family formation. Becker's economic theory stresses that women would choose divorce/separation when the utility expected from being single exceeds the utility of marital union and vice versa (Becker, 1974).

The economic perspective is premised on gendered division of labour and specialisation in the labour market. In view of this perspective, women's skills were specialised and more treasured in domestic activities whereas men's skills were relegated to and more esteemed in the labour market. However, with the rise of rapid industrialisation, increasing number of women are extensively engaged in market activities, likewise domestic activities. Also, with the growth of the welfare state and rise in welfare payments, the gendered division of labour and specialisation has become progressively more equitable. According to Becker and colleagues, this transformation has altered union life (Becker et al., 1977). Thus, the rise in women's economic independence has reduced their gain to marriage, which has consequently altered both marital and non-marital unions. As a result, this perspective asserts that the stability of on-going marriages is undermined and non-marriage becomes more attractive to women because they no longer have to depend on their partners for economic support. Hence in the context of this theory, improvements in women's economic status would instigate an upsurge of single motherhood through high divorce rates and non-marital births.

Empirical evidence supports this perspective. For instance, studies have revealed that additional income diminishes the need for a woman to find a partner with whom she can largely depend on financially, thus increase in her economic status is assumed to make her more independent and less likely to partner (Burstein, 2007; Bzostek et al., 2012). According to Vignoli and Ferro (2009), it is usual to anticipate that the higher the economic status of a woman, the more likely it is that she will separate (Vignoli & Ferro, 2009). Thus, single mothers with a stable or secure source of income will find it much easier to support/afford the expense of establishing a separate home. Based on the economic perspective, the hypothesis we test is whether women with strong economic position are more likely to experience single motherhood than their counterparts with poor economic status.

Social-cultural context of single motherhood in Ghana

In the Ghanaian context, socio-cultural context such as the kinship systems play significant roles in marital formation and consequently its outcomes including the possibility of single motherhood. The kinship system may partly influence the significance placed on children due to the role children play in the perpetuation of family lineage. For instance, in the matrilineal system, children perpetuate their maternal lineage but not the paternal line, and the opposite is true for the paternal kinship system. These cultural dynamics may have significant influence on the living arrangement of children after marital dissolution or premarital birth. As already emphasised, kinship differences

regarding social organisation and marriage formation (Takyi, 2001; Takyi & Gyimah, 2007), and living arrangements may contribute to variations in prevalence of single motherhood among these common kinship systems (matrilineal and patrilineal) in Ghana.

Concerning processes in marriage formation and dissolution among these major kinship systems, there are some similarities. Traditionally, marriage formation in both matrilineal and patrilineal lineage is often viewed as a contract between two families rather than a union between two individuals (Frost & Dodoo, 2010). For marriage to be formed and legitimised, there is the need for the payment of bride wealth (which varies in the form of livestock, cash and other items dependent on the type of ethnic group) to the bride's kinsmen. The payment of the bride wealth does not only give recognition to the marriage but also transfers some rights and responsibilities to the couple. For example, the payment of the bride wealth transfers higher rights to men to women's labour and the children the woman reproduces to the man (both in matrilineal and patrilineal) and his lineage (in patrilineal descent) (Dodoo et al., 2014). In both kinship systems, the woman's kinsmen are obliged to refund the bride wealth if the marriage is dissolved. However, there are some differences, which are likely to influence marital outcomes and its contribution to single motherhood. For instance, in the patrilineal lineage, marriage attracts higher bride wealth compared to the matrilineal descents (Horne et al., 2013). Where bride wealth is substantial, the woman's kinsmen have a higher obligation to ensure the survival of the marriage to prevent the refund of bride wealth paid to them (Takyi, 2001). This practice may discourage marital dissolution even among abusive union in the patrilineal system (Wendo, 2004). These cultural dimensions and its sociological explanation may offer convincing reason to conclude that kinship systems may help drive single motherhood in matrilineal kinship systems compared to patrilineal descent. This cultural dimension of single motherhood is limited in this study due to the nature of our data set hence further qualitative study is recommended to explore the roles of socio-cultural factors in predicting single motherhood in Ghana.

Methods
Data source and study design. This is a secondary data analysis of data from five waves of GDHS. To create our sample, we used a pooled data set from the 1993, 1998, 2003, 2008 and 2014 GDHS. Each survey collected data from a nationally representative sample of women aged between 15 and 49 years from all the then ten administrative regions of Ghana. Customary of nationwide representative datasets, the GDHS uses sample weights to regulate for effects of under- and over-sampling to allow for generalisability of the results. Sample weights are alteration factors used to account for differences in probability of selection and interview between cases as a result of survey design or chance (GSS, 2015; 2009). The GDHS utilised a two-stage sample design. The first stage involved selecting points or clusters from an updated master sampling frame constructed from the most current Ghana Population and Housing Census. Thus, the GDHS 1993 and 1998 were based on the 1984 Population and Housing Census while the GDHS 2003, 2008 and 2014 were based on the 2000 and 2010 Population and Housing Census, respectively. The second stage includes a systematic sampling of households listed in each cluster. We limited our sample to mothers who were living with at least a child of their own. As our study focuses on mothers, we removed non-mothers and mothers who had none of their children living with them. Our final analytic sample consists of mothers from 1993 ($n = 3204$), 1998 ($n = 3000$), 2003 ($n = 3380$), 2008 ($n = 2837$) and 2014 ($n = 5644$).

Measurement of variables
Dependent variable. 'Single motherhood' is the dependent variable in this study. The dependent variable was measured as a dichotomous indication of whether a mother is single '1' or not '0'. Single motherhood in this study refers to female respondents who were not married or in a union who had at least a child of their own living with them at the time of the survey (thus through premarital births, divorce, separation and widowed).

Independent variables. The study considered eleven independent variables conceptually relevant in predicting single motherhood: age, educational level, occupation, age at first sex, age at first birth, number living children, current age of child, wealth status, religion, region and residence. Age was originally captured into 7 age groups: 15–19, 20–24, 25–29, 30–34, 35–39, 40–44, and 45–49. Educational level was recoded as no education, primary, and secondary and above. Occupation was recoded as not working, professional, sales and service, agricultural, and skilled and unskilled worker. Age at first sex and age at first birth was recoded into four groups, respectively: <15, 15–19, 20–24, and 25+. Current age of child was recoded as <5, 5–9, 10–14, and 15 + . Number of living children was recoded as 1, 2, 3, and 4 children and above. Type of place of residence coded as urban or rural. Contraceptive usage was coded as users '1' and non-users '0'. Wealth quintile was categorised as poorest, poorer, middle, richer and richest. Religion was recoded as no religion, Orthodox and Protestant, others Christians, Islam and other religion. Region was captured as Western, Central, greater Accra, Volta, Eastern, Ashanti, Brong-Ahafo, Northern, Upper East and Upper West.

Statistical analyses. The dichotomous nature of the outcome variable suggested logistic regression as the appropriate technique for the analysis (DeMaris, 1995). Regression procedures are critical for understanding and explaining complex associations among variables and for making predictions to a criterion (King, 2002). Data analysis for this study was carried out at three levels: univariate, bivariate and multivariate. Respondents' profile was presented using descriptive statistics. Pearson chi-square test was used to examine the association between single motherhood and each selected independent categorical variable. Bivariate and multivariate binary logistic regression was then employed to examine the association between the independent variables and single motherhood. All the analysis was conducted using Statistical data (Stata) version 13. The women's sample weight provided in the Demographic and Health Survey (DHS) individual data set was used in generating estimates. Application of the sample weight is essential when generating estimates because it adjusts for non-response and over-sampling of some population segments in the survey data. As GDHS is hierarchical in nature and respondents are layered within survey clusters with a potential of biasing standard errors, the Huber-White technique for dealing with clustering was used to derive robust standard errors (Amo-Adjei & Kumi-Kyereme, 2014). The analysis started separately for each survey year to derive the percentage contributions of the various pathways to single motherhood before appending various datasets for further analysis.

To ensure that the fitted model is reliable and stable in its parameter estimation in the regression analysis, multicollinearity diagnosis was conducted, and no multicollinearity was found between the regressors. Variance inflation factor (VIF) was used as the diagnostic measure and this found a mean VIF (7.98), which is an indication of an absence of multicollinearity. Chatterjee and colleagues suggest that a VIF value >10 indicates the existence of multicollinearity (Chatterjee et al., 2000). The

Table 1 Background characteristics of respondents by motherhood status, 1993–2014.

Covariates	Motherhood status				χ^2
	In-union		Single		
	(%)	n	(%)	n	
Age group					393.5478***
15–19	59.77	367	40.23	247	
20–24	79.73	2044	20.27	519	
25–29	87.21	3235	12.79	475	
30–34	87.99	3117	12.01	425	
35–39	87.20	2802	12.80	411	
40–44	85.03	2042	14.97	359	
45–49	79.66	1423	20.34	363	
Highest education level					284.8496***
No education	90.14	5265	9.86	576	
Primary	82.62	3762	17.38	791	
Secondary and above	80.73	6003	19.27	1433	
Occupation					191.1688***
Not working	80.22	1758	19.78	433	
Professional	86.20	609	13.80	97	
Sales/service	81.58	5637	18.42	1272	
Agricultural worker	89.18	5179	10.82	628	
Skilled/unskilled	83.36	1847	16.64	369	
Age at 1st sex					207.8907***
<15	79.67	1172	20.33	299	
15–19	82.44	7956	17.56	1695	
20–24	82.48	1715	17.52	364	
25+	90.44	4188	9.56	442	
Age at 1st birth					37.4526***
<15	81.85	557	18.15	124	
15–19	82.38	6840	17.62	1463	
20–24	85.88	5614	14.12	923	
25+	87.40	2019	12.60	291	
Current age of child					526.6615***
<5	87.92	11,457	12.08	1574	
5–9	77.30	2385	22.70	700	
10–14	71.55	912	28.45	363	
15+	62.79	276	37.21	164	
Number of living children					627.2808***
1	70.84	2660	29.16	1095	
2	84.50	3176	15.50	583	
3	88.98	2851	11.02	353	
4+	89.18	6344	10.82	770	
Contraceptive usage					65.9171***
Not using	82.86	11,180	17.14	2312	
Using	88.75	3850	11.25	488	
Wealth index					94.1731***
Poorest	88.30	3054	11.70	487	
Poorer	83.33	3076	16.67	691	
Middle	80.91	3181	19.09	823	
Richer	83.24	3278	16.76	736	
Richest	86.59	2100	13.41	405	
Religion					202.0547***
No religion	87.05	1077	12.95	160	
Orthodox/Protestant	81.67	7328	18.33	1645	
Other Christians	83.31	3596	16.69	721	
Islam	91.82	2338	8.18	208	
Other religion	91.23	692	8.77	67	
Type of place of residence					89.1039***
Rural	86.26	9098	13.74	1449	
Urban	81.44	5933	18.56	1352	
Region					314.2883***
Western	80.21	1405	19.79	346	
Central	80.57	1409	19.43	340	
Greater Accra	82.90	2161	17.10	446	
Volta	85.58	1417	14.42	239	

Table 1 (continued)

Covariates	Motherhood status				χ^2
	In-union		Single		
	(%)	n	(%)	n	
Eastern	81.98	1590	18.02	349	
Ashanti	81.47	2639	18.53	600	
Brong-Ahafo	84.02	1388	15.98	264	
Northern	94.86	1620	5.14	88	
Upper East	90.33	627	9.67	67	
Upper West	92.69	775	7.31	61	
Years of survey					90.3666***
1993	87.68	2650	12.32	372	
1998	85.40	2561	14.60	438	
2003	87.09	2889	12.91	428	
2008	83.69	2390	16.31	466	
2014	80.55	4540	19.45	1096	
N	84.29	15030	15.71	2801	

***$p < 0.001$, note: weighted values.

VIF estimates how much the variance of a regression coefficient is inflated due to multicollinearity in the model. We dropped the GDHS 1988 from the analysis due to the absence of the wealth index variable deemed conceptually relevant in predicting single motherhood.

Results

Descriptive. Table 1 shows the segregated description of the covariates by motherhood status, and the association between motherhood status and each of the socio-economic and demographic variables in proportions. Overall, out of the 17,831 sample of mothers living with at least a child of their own, 84% and 16% were in-union and single, respectively. The results reveal a highly significant association between all socio-economic and demographic variables used in the analysis such as age, education, age at first birth, age at first sex, occupation, current age of child(ren), number of children a woman is living with, wealth status, contraceptive use; and motherhood status as shown by the Pearson's chi-square test results.

With mothers with no education, 90% and 10% were in union and single, respectively. Regarding mothers who experienced their first birth at ages below 15 years, 81.9% were in union and 18.2% were single, and this distribution was similar regarding age at first sex. With respect to mothers who use any form of contraceptive, 88.8% were in union compared to 11.3% being single mothers.

Concerning mothers with children aged 15 years and above, 62.8% were in union and 37.2% were single. Eighty-six percent of mothers in the rural setting were in union compared to 14% who were single. In terms of wealth status, 88.3% of the mothers with poorest wealth quintile were in union and 11.7% were single. Concerning mothers who professed Islam, 91.8% and 8.2% were in union and single, respectively (see Table 1).

Trends of single motherhood in Ghana, 1993–2014. Figure 1 below shows the trends of single motherhood from 1993–2014 in percentages. The percentage of single mothers increased slightly from 14.1% in 1993 to 14.6% in 1998. However, the percentage of single mothers declined sharply from 14.6% to 13% from 1998 to 2003. The percentage of single mothers, then again, increased consistently from 13% in 2003 to 16.3% in 2008 and further increased to 19.5% in 2014 (see Fig. 1).

Figure 2 shows the percentage contributions of the various pathways to single motherhood from 1993–2014. In 1993, divorce rate was the major cause of single motherhood in the country,
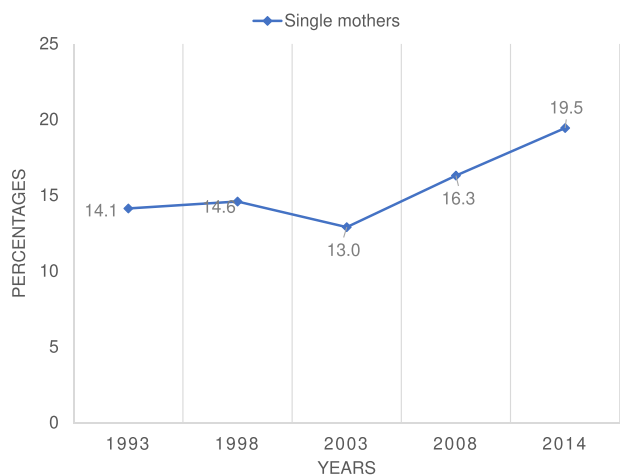
Fig. 1 A graph showing percentages for the trends of single motherhood in Ghana from 1993 to 2014.
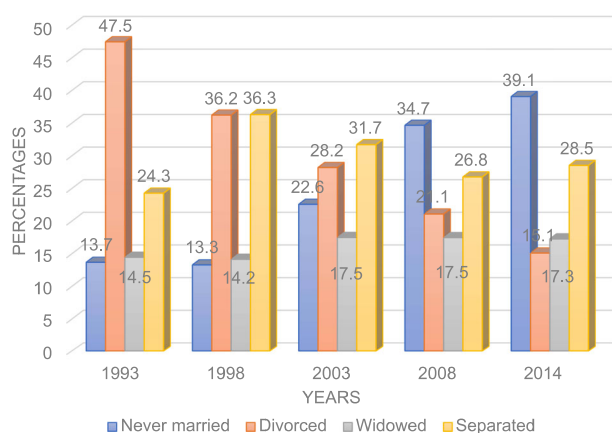

Fig. 2 A graph showing the percentage contributions of women who are never married, divorced, widowed, and separation to single motherhood in Ghana from 1993 to 2014.

which stood at 47.5%, followed by separation (24.3%), widowed (14.5) and never married mothers. However, the contribution of divorce rate to single motherhood declined sharply to 36.2%, equating to the percentage contribution of separation (36.3%), with never married still being the least among the pathways in 1998. The contribution of divorce rate to single motherhood continuously declined throughout the various waves, which now placed as the least among the various pathways (15.1%) in 2014.

However, the contribution of never married to single motherhood increased abruptly from 13.3% in 1998 to 22.57% in 2003 and then further took over as the major pathway to single motherhood in 2008 and 2014, with 34.7% and 39.1%, respectively. The contribution of widowhood to single motherhood has been relatively low throughout the various waves, from 14.5% in 1993 to 17.3% in 2014 (see Fig. 2).

Regression analysis. To examine the predictors of single motherhood, two sequential models were run and the results are presented in Table 2. The Akaike's information criterion values for the two models considered in the analysis were Model 1: 13160.8, Model II: 12864.3. The Pseudo R^2 for Models 1 & 2 were 0.1132 and 0.1363, respectively. The results indicate in Model 2 that a combination of both individual and contextual factors best predict single motherhood after controlling for the effects of

differences in survey years as portrayed by comparing the Akaike's information criterion values for both models.

The results of the final model revealed that, compared to younger mothers within the ages 15–19 years, the likelihood of a woman becoming a single mother declined with an increasing age. Thus, the likelihood of single motherhood decreased by 42% and 48% at the age of 20–24 and 25–29, respectively, compared to younger mothers within the ages 15–19 years.

It was observed that women with some levels of education were more likely to be single mothers [primary: OR = 1.27; 95% CI = 1.11,1.46; secondary and above: OR = 1.31; 95% CI = 1.15,1.51] compared to women with no education. The findings also showed that women who work are less likely to be single mothers compared to their unemployed counterparts. Specifically, women who occupied the professional and agricultural sectors were 28% and 32% less likely to be single mothers compared to non-working women. Single motherhood was significantly less likely associated with older (25 years and above) age at first sex and age at first birth compared to women who had their first sex and birth at less than 15 years old. The findings revealed that women who use any form of contraceptive [OR = 0.64; 95% CI = 0.57,0.71] were less likely to be single mothers compared to their counterparts who were not using any form of contraceptive. The likelihood of single motherhood declined as age at first sex [OR = 0.58; 95% CI = 0.48,0.70] and first birth [OR = 0.43; CI = 0.32,0.59] were 25 years and above.

It is observed that the likelihood of a woman becoming a single mother is positively associated with an increasing age of her children. Compared to women with children less than 5 years old, the likelihood of being a single mother is 2.6 times higher in mothers with children aged 15 years and older. The likelihood of single motherhood decreases with an increasing number of children that a woman has. For instance, compared with women with one child, the likelihood of single motherhood decreased by 57%, 73% and 78% among women with 2, 3 and 4 or more children, respectively (see Table 2). With reference to wealth status, it was observed that richer [OR = 0.76; 95% CI = 0.59,0.96] and richest [OR = 0.57; 95% CI = 0.31,0.56] women were less likely to be single mothers than poorest women. The results suggest that women in the urban areas [OR = 1.21; 95% CI = 1.08,1.36] were more likely to be single mothers compared to women who reside in the rural areas.

It is worthy to note that there was a significant relationship between single motherhood and women's affiliation to the Islamic religion. It was less likely for women who profess Islam [OR = 0.58; 95% CI = 0.46,0.74] to be single mothers, compared to women who had no religious affiliation. The likelihood of single motherhood varied by region. For instance, women from the Northern, Upper East and Upper West Regions were 61%, 44% and 47%, respectively less likely to be single mothers compared to the reference category (Western Region).

Discussion

With the rapid transformation of family structure in both developing and advanced countries, social response to improving welfare of single mothers and their children has become an important concern to researchers and policy makers as this phenomenon has major implications for many kinds of family behaviour. In this study, pooled data from the second round (1993) to the recent GDHS (2014) are used to examine the trends and predictors of single motherhood in Ghana, with emphasis on socio-economic and demographic factors. Overall, 16% of the mothers were identified as single. Generally, the evidence points to the rejection of the two null hypotheses. Indeed, there were significant relationships

Table 2 Binary logistic regression on socio-economic and demographic correlates of single motherhood.				
Correlates	**Model I**		**Model II**	
	OR	**95% CI**	**OR**	**95% CI**
Age group				
15–19	Ref		Ref	
20–24	0.55***	[0.45,0.68]	0.58***	[0.47.0.71]
25–29	0.48***	[0.38,0.60]	0.52***	[0.41,0.66]
30–34	0.61***	[0.47,0.79]	0.67**	[0.51,0.88]
35–39	0.67**	[0.50,0.80]	0.76	[0.56,1.02]
40–44	0.75	[0.54,1.05]	0.84	[0.60,1.16]
45–49	0.96	[0.67,1.36]	1.09	[0.76,1.56]
Highest education level				
No education	Ref		Ref	
Primary	1.59***	[1.40,1.70]	1.27**	[1.11,1.46]
Secondary and above	1.70***	[1.51,1.91]	1.31***	[1.15,1.51]
Occupation				
Not working	Ref		Ref	
Professional	0.63**	[0.48,0.82]	0.72*	[0.55,0.94]
Sales/service	0.93	[0.81,1.06]	0.91	[0.79,1.05]
Agricultural worker	0.71***	[0.61,0.82]	0.68***	[0.58,0.79]
Skilled/unskilled	0.88	[0.75,1.04]	0.86	[0.73,1.02]
Age at 1st sex				
<15	Ref		Ref	
15–19	0.86	[0.73,1.01]	0.91	[0.77,1.07]
20–24	0.95	[0.77,1.17]	1.05	[0.84,1.30]
25+	0.53***	[0.44,0.64]	0.58***	[0.48,0.70]
Age at first birth				
<15	Ref		Ref	
15–19	0.86	[0.68,1.09]	0.87	[0.68,1.11]
20–24	0.65**	[0.51, 0.83]	0.66**	[0.51,0.85]
25+	0.44***	[0.33,0.59]	0.43***	[0.32,0.59]
Current age of child				
<5	Ref		Ref	
5–9	2.47***	[2.17,2.82]	2.42***	[2.12,2.76]
10–14	2.80***	[2.32,3.36]	2.71***	[2.24,3.27]
15+	2.70***	[2.04,3.58]	2.63***	[1.97,3.51]
Number of living children				
1	Ref		Ref	
2	0.46***	[0.40,0.53]	0.43***	[0.38,0.50]
3	0.29***	[0.24,0.34]	0.27***	[0.22,0.32]
4+	0.25***	[0.21,0.31]	0.22***	[0.18,0.26]
Contraceptive use				
Not using	Ref		Ref	
Using	0.66***	[0.59,0.74]	0.64***	[0.57,0.71]
Wealth index				
Poorest			Ref	
Poorer			1.07	[1.08,1.70]
Middle			1.01	[1.02,1.59]
Richer			0.76*	[0.59,0.96]
Richest			0.57***	[0.31,0.56]
Religion				
No religion			Ref	
Orthodox/Protestant			0.90	[0.74,1.10]
Other Christians			0.92	[0.74,1.13]
Islam			0.58***	[0.46,0.74]
Other religion			0.87	[0.64,1.19]
Type of place of residence				
Rural			Ref	
Urban			1.21**	[1.08,1.36]
Region				
Western			Ref	
Central			0.92	[0.76,1.11]
Greater Accra			0.83	[0.69,1.01]
Volta			0.60***	[0.49,0.74]
Eastern			0.81*	[0.67,0.97]
Ashanti			0.93	[0.78,1.10]
Brong-Ahafo			0.74**	[0.61,0.90]

Table 2 (continued)

Correlates	Model I		Model II	
	OR	95% CI	OR	95% CI
Northern			0.39***	[0.30,0.51]
Upper East			0.56***	[0.44,0.70]
Upper West			0.53***	[0.42,0.68]
Years of survey				
1993			Ref	
1998			1.00	[0.84,1.20]
2003			1.08	[0.90,1.30]
2008			1.29**	[1.08,1.54]
2014			1.81***	[1.54,2.13]
Constant	0.74	[0.55, 0.99]	1.04	[0.69,1.57]
Model fitness				
Prob > chi^2	<0.001		<0.001	
AIC	13,160.8		12,864.3	
Pseudo R^2	0.1132		0.1363	
Sample size	17,831		17,831	

Source: Computed from the 1993–2014 GDHS.
OR odds ratio, 95% CI 95 percent confidence interval, Ref reference category, AIC Akaike's information criterion.
***$p < 0.001$, **$p < 0.01$, *$p < 0.05$.

between socio-economic and demographic characteristics, and single motherhood.

We observed a consistent increase in single motherhood in Ghana except 2003, which recorded the least proportion (13%) of single mothers. This may be because of the sharp decline in divorce rate from 47.5% in 1993 to 28.2% in 2003 as the major pathway to single motherhood. However, the sudden surge of single motherhood again from 2008 after it declined in 2003 may be attributed to the emergence of premarital childbearing as the major pathway to single motherhood, thus, the observed rapid increase from 22.6% in 2003 to 34.7% and 39.1% in 2008 and 2014, respectively.

Divorce rate was found to be a major pathway to single motherhood in Ghana in the 1990s. However, its contribution continuously declined over the years as premarital childbearing in 2008 and 2014 emerged strongly. This finding confirms the works of Clark and Brauner-Otto, who observed a declining rate of divorce in Ghana (Clark & Brauner-Otto, 2015). There are several possible reasons that could explain the declining contribution of divorce rate to single motherhood. Among them is the improvement in age at first marriage (GSS, 2015), which may account for the declining rate of divorce in Ghana, hence a decline in its contribution to single motherhood.

Several existing empirical evidence demonstrate that divorce rate is over-represented among women who marry at a younger age (Dagnew et al., 2020; Erulkar, 2013; Santhya et al., 2010). However, this demographic change in increasing age at first marriage comes with some indirect effect on family structure. Evidence shows that increasing age at first marriage than first sexual debut has increased the duration at which women are at a higher risk of premarital childbearing and unintended pregnancies across countries (Soura et al., 2018; Reda & Lindstrom, 2014; Okigbo et al., 2015), hence, increasing the rate of premarital childbearing and its contribution to single-mother families. Another plausible cause of increasing single-mother families may be attributed to emerging cultural changes to accepting premarital birth compared to the days when it's prohibited and punished if a girl became pregnant before marriage—puberty rites (Moyo & Kawewe, 2009). In the past, premarital virginity was an essential condition for giving a young woman's hand in marriage, however, this seems to be disappearing, and hence with the great prospects to contribute to the increasing rate of single-mother families in

the country. The finding which depicts premarital childbearing as the leading pathway to single motherhood is in line with current findings in both advanced and developing countries (Chadoka-Mutanda & Mbanefo, 2015).

To an extent, the study suggests that the likelihood of a woman being a single mother declines with an increasing age. This finding confirms existing studies (Muthuri et al., 2017; Clark & Hamplova, 2013). A plausible explanation is that increasing age increases the risk of women getting married, hence bearing and/ or raising children within marriage/union or the likelihood of a single mother to (re)enter a stable relationship.

Women with some levels of education were found to be more likely to be single mothers compared to women with no education. This finding is consistent with the work of Chadoka-Mutanda and Mbanefo (2015) who observed that educated mothers were more likely to be single mothers compared to uneducated mothers in Gabon. However, some existing evidence from both advanced and developing countries (Lamidi et al., 2019; Harkonen, 2017; Perelli-Harris et al., 2010) contrasts with the finding of this study. For instance, Harkonen (2017) observed in 33 North American, Asian, and European countries that a major increase in the number of single mothers largely occurred among low- and middle-educated women. Perhaps, the observed association between higher educational levels and the higher likelihood of single motherhood may be due to the fact that higher levels of education wield women with some level of autonomy, which is more likely to break them loose of an oppressed marriage/union (Takyi & Broughton, 2006), hence increasing the likelihood of single motherhood among this group.

Mothers who were employed in the professional and agricultural sectors were less likely to be single mothers compared to their counterparts who were not working. This finding corroborates the findings of Chadoka-Mutanda and Mbanefo (2015) who observed a higher percentage of single mothers who were unemployed in countries like Namibia, Swaziland, and Gabon. Perhaps, this could be that in some instances, single mothers must forgo some economic activities to offer the needed care for their young babies. Also, studies have established that single mothers are over-represented among the uneducated (Nyarko & Potter, 2021; Lamidi et al., 2019; Harkonen, 2017), which may indicate their lack of the requisite knowledge and technical skills needed in the job market, especially in the formal sector.

Consequently, they stay in relationships/marriages even under provocative circumstances, including intimate partner violence. For such women, staying in marriage at all costs is better economic and social alternative to single motherhood with its attendant economic constraints.

The finding that single motherhood was significantly less likely associated with older (25 years and above) ages at first sex and age at first birth compared to women who had their first sex and birth at less than 15 years old are not surprising, as it is consistent with normative and empirical evidence. Muthuri, Oyolola and Faye (2017) found that women who had their first birth at older ages were less likely to be single mothers in Kenya. However, about the connection between age at first sex and single motherhood, the finding shows contradictory evidence compared to Chadoka-Mutanda and Mbanefo (2015) who found a positive association between age at first sex and single motherhood in Namibia. The inverse relationship found between older age at first sex and age at first birth, and single motherhood may be attributed to the fact that a higher risk of single motherhood because of unintended pregnancy and premarital birth may be minified with an increasing age at first sex and birth.

The findings revealed a statistically significantly inverse relationship between contraceptive use and single motherhood. As expected, women who uses any form of contraceptive were less likely to be single mothers compared to their counterparts who were not using any form of contraceptive. The plausible reason could be that non-usage of contraceptive is more likely to expose women at higher risk of teenage pregnancy or unintended pregnancy, especially outside stable union (Stephenson et al., 2008; Coombe et al., 2016; Grindlay et al., 2018; Sarder et al., 2021) hence resulting in single motherhood.

I also noted that the likelihood of a woman becoming a single mother is positively associated with an increasing age of her children. Compared to women with children less than 5 years old, the likelihood of being a single mother is higher in mothers with children aged 15 years and older. This finding affirms the works of Xu, Yu and Qiu (2015) in China. Their study revealed that couples with younger children are less likely to divorce. The view is that the presence of younger children in a relationship offers a greater protective effect on the stability of the relation. One possible explanation for my finding could be because of lesser financial burden associated with raising older children compared to younger ones. Thus, raising older children could offer some form of financial autonomy to mothers as older children could take up some economic roles to support the household. Then, also, compared to younger children, older children may be more likely to live on their own or with the father after marital dissolution.

The study also revealed that the likelihood of single motherhood decreases with an increasing number of children that a woman has. Similar finding has been made regarding significant inverse relationship between the number of living children that a woman has and the likelihood of single motherhood (Chadoka-Mutanda & Mbanefo, 2015). A similar result was seen by Xu and colleagues in their study that assessed the impact of children on divorce risk in China based on the Chinese Family Panel study, 2010 (Xu et al., 2015). They observed that the risk of divorce significantly declines with an increasing number of children between a couple. The possible explanation for this result may be inherent in the varied socio-cultural and financial obligations associated with raising children alone, which may serve as disincentive to mothers to opt for either divorce or separation even if they desire to do so due to some oppressing circumstances.

Differences in wealth status appeared to be particularly strong, with richest women less likely to be single mothers than poorest women. Theoretically, this finding contrasts with the economic independence hypothesis that asserts that improvements in

women's economic status have the tendency to promote marital dissolution, which is more likely to fuel the extent of single motherhood. Nonetheless, my findings are consistent with some previous evidence (Nyarko & Potter, 2021; Jordal et al., 2013; Chadoka-Mutanda & Mbanefo, 2015). For instance, Chadoka-Mutanda and Mbanefo (2015) observed a higher likelihood of single motherhood among women with lower economic status than higher economic status in Congo Brazzaville and Swaziland. Nyarko and Potter proffers a possible pathway to this finding; women from affluent households appear considerably less likely to have children out of wedlock compared to women from poor households. As depicted by the findings of this study, single mothers are over-represented among women with lower wealth status. This could be that women's education is more likely to be truncated due to teenage pregnancy or unintended pregnancy, which may have long-term effects on their developmental capacity regarding the acquisition of the required skills and knowledge to be gainfully employed to boost their wealth status. Also, it could be that due to high responsibilities associated with child upbringing, a single mother may have to forgo some personal development skills and jobs to invest more of their productive time in raising their children, which may affect their economic development. In contrast to the finding of this study, single mothers were found to be highly represented among women with higher economic status in Kenya (Muthuri et al., 2017).

The rural-urban dichotomy also played an important role in predicting single motherhood, with women in the urban areas more likely to be single mothers compared to women who reside in the rural areas. In Kenya women living in rural areas were found to be less likely to be single mothers compared to their urban counterparts (Muthuri et al., 2017). These findings are, however, contrary to Chadoka-Mutanda and Mbanefo (2015). The possible explanation for the result may be that women who reside in rural areas are more likely to marry at a younger age compared to their counterparts in urban areas, who marry about 3.5 years later than rural women (GSS, 2015). Thus, women in rural settings are more likely to give birth within marriage/union. Accordingly, the risk of premarital childbearing among mothers in rural settings is expected to be lower compared to their counterparts in the urban setting. The mixed results may be due to the differential national contextual factors in countries. Hence, further studies are needed to explore deeply into contextual factors that can explain these contextual variations.

Religious variations also featured as an important determinant of single motherhood. Women who profess Islam were less likely to be single mothers compared to women who had no religious affiliation. This finding corroborates the results of some existing literature (Addai, 2000; Jones, 1997). Jones observed that divorce customs and laws serve as a deterrent to perpetual divorce rates due to rigorous religious practices in Islamic religion (Jones, 1997). Hence, the observed significantly inverse relationship between women who profess Islamic religion and single motherhood may be partly explained due to the possibility of a lower contribution of divorce rates to single motherhood among Muslim mothers compared to mothers with no religious affiliation. Also, another possible explanation for the less likelihood of single motherhood among Muslim women compared to women with no religious affiliation may be the lower rate of premarital sex among Muslim women compared to women with no religious affiliation as observed by Addai (2000). Thus, compared to women with no religious affiliation, a lower prevalence of premarital sex among Muslim women is more likely to reduce their risk of premarital childbearing, which emerged as the major pathway to single motherhood.

The study also revealed varying regional differences in predicting the likelihood of a woman being a single mother.

Compared to women from the Western Region, women from the Northern, Upper East and Upper West Regions were less likely to be single mothers. This finding could be attributed to the fact that, compared to Western Region, Northern, Upper East and Upper West Regions have a lower median age at first marriage (GSS, 2015), and this could indicate that childbearing is more likely to occur in marriage in Northern, Upper East and Upper West Regions than Western Region, hence, the lower likelihood of single motherhood in those respective regions. The finding is partly in line with the works of Nyarko and Potter who observed lower childbearing risks of non-marital births in Upper West Region (Nyarko & Potter, 2021).

Strengths and limitations of the study. The strength of this study lies in its large sample size, national representativeness from a pooled data set of five rounds of the GDHS. Also, to the best of our knowledge this is the first study using the GDHS to examine the trends and predictors of single motherhood in Ghana. In spite of the relevant findings from this study and the useful suggestions, by using cross-sectional data, we are limited to make causal claims. Consequently, we cannot impute causation into the findings. Also, there are other important factors such as normalisation of single motherhood, sex education, and attitude of men towards marrying and starting a family with economically independent women, which may predict single motherhood. However, the DHS data set is limited in gathering data on such issues. For this reason, further studies using qualitative approach is need to find answers to how these issues influence motherhood status, and the 'why' questions, which is a major challenge to quantitative studies.

Conclusion

The close universality of marriage in Africa attests to the value Africans place on childbearing within marriage, yet there are indications that increasing number of women are giving birth and raising children outside marriage, much like reports concerning single motherhood in the Western world. The proportion of single motherhood continues to increase rapidly in Ghana especially in the last decade. Although the contribution of divorce rates, which used to be the major pathway to single motherhood, has been tremendously declining over the years, recently, premarital childbearing has emerged as the major pathway to single motherhood. Findings from this study show the relevance of individual level factors such as age, educational level, occupation, age at first sex, age at first birth, number living children, current age of child, contraceptive use, as well as contextual factors (religion, region and residence) in predicting single motherhood. It has been demonstrated in this study that in contrast to the economic independence hypothesis, women with lower economic status were more likely to be single mothers compared to those with higher economic status. Policies and programmes meant to mitigate adverse effects of single motherhood should also focus on empowering single mothers and their children as a way of alleviating poverty and improve the well-being of children in this family type, as well as enhance Ghana's capacity to attain Sustainable Development Goal (SGD) 1, particularly target 1.2.

Data availability

The data set is freely available for public use on www.measuredhs. com. The authors were not directly involved in the actual data collection process. Questionnaires used for the survey are appended to the DHS final report published, which can be found at: http://dhsprogram.com/publications/.

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Competing interests
The authors declare no competing interests.

Ethical approval
The Ghana Health Service Ethics Review Committee and the Institutional Review Board of ICF Macro reviewed and approved the protocol for the survey. Ethical clearance for the use of the data set by this study was not required since it was drawn from an existing data source. Permission for its use was, however, secured from Measure DHS.

Informed consent
Each respondent provided written consent prior to participation in the study. For respondents under the age of 18 (the legal age for defining adulthood), parental or guardian consent followed by the respondent's assent was obtained.

Additional information
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