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Determinants of under Five Mortality in Ghana; A Logistic Regression Analysis Using Evidence from the Demographic and Health Survey (1988-2014)

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Abstract A dramatic reduction in child mortality has been noted in Ghana in recent time and although the trend has been projected to continue to decline, studies have shown that the decline in under-five mortality has stalled and the effect more outstanding at different levels. Here we examine the issue of under five mortality using data from the demographic and health survey by examining the trends in under-five mortality between 1988-2014 and develop a predictive model to identify risk factors of under five mortality. Data from the Ghana Demographic and Health survey between 1988-2014 was used to conduct a retrospective analysis of recorded children data (0-5 years). A descriptive analysis of the explanatory and response variables was carried out followed by a subsequent trend analysis of under-five mortalities from 1988-2014. A logistic regression was used to predict the association between the explanatory variables and the dependent outcome variable. The study established that the decrease in under five mortality that Ghana witnessed from 1988-2014 was not significant and that more measures need to be put in place to reduce the phenomenon. Variables such as maternal age *(R^2=0.0646, $p<0.05$)*, duration of breastfeeding *(R^2=0.3300, $p<0.05$)* and the type of assistance at delivery *(R^2=0.2898, $p<0.05$)* were all strong predictors of under five mortality relative to other explanatory variables. The study identified that issues such as young maternal age, exclusive breast feeding beyond 6 months and unskilled or no assistance at birth were all contributors of under five mortality in Ghana and as such it is necessary for all these predictors to be addressed and factored during formulation and implementation of policies in an effort to curb under five mortality.

Keywords: *under five mortality, Ghana demographic and health survey (GDHS), logistic regression, child survival, trend analysis*

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1. Introduction

Under five mortality rate is an essential component of the United Nations human development index [1]; a sensitive indicator of the socioeconomic and health status of a community. This is because more than any other age-group of a population, child survival is dependent on the socioeconomic conditions of their environment [2]. Hence its importance in the evaluation and planning of the public health strategies [3]. The promotion of good health and well-being for all ages is one of the essential components of the Sustainable Development Goals (SDG's) [4]. According to the United Nations development program, despite big strides made in reducing preventable child deaths by more than half, some other numbers remain tragically high, like the fact that every year 6 million children die before their fifth birthday [4]. Newborn morbidity and mortality are crucial determinants of under-five mortality rates in developing countries [5]. Studies conducted globally suggest that , mother's exposure to mass media, use of clean cooking fuel, access to a toilet facility, improved/safe drinking water facility, mother's religion and ethnicity, income of the household, birth order, mother's age at birth, birth intervals, availability of professional antenatal and delivery care, full immunization of children, mother's education, and urban-rural residence are all correlates of infant and child mortality [6,7,8,9]. With regards to the mother's educational level, studies have found an inverse relationship between highest level of education of mother and child survival [10]. Mothers living in rural areas are likely to have reduced access to health facilities and are more likely to experience infant or child mortality [11]. Preceding birth interval has as well been reported to have an inverse relationship with infant mortality [12].

Ghana was noted as experiencing one of the most dramatic declines in child mortality in recent time, and although the trend of child mortality had been projected to continue to decline. Studies showed that the decline in under-five mortality has stalled and the effect is more

outstanding at different levels. This has attributed in part to lack of recent progress in socio economic development [13]. The results of MICS (Multiple Indicator Cluster Survey) 2011 on Ghana indicate that infant and under-five mortality rates are still very high, that is 53 deaths per 1,000 live births and 82 per 1,000 live births, respectively. The statistics indicate that neonatal mortality rate represents 60 per cent of the infant mortality rate while 13 per cent of children under five years of age are moderately or severely underweight and 57 per cent of all children aged six to fifty-nine months are anemic [14]. A UNICEF report in 2013 also supported the fact that the infant mortality rate in Ghana reduced from 76 per 1,000 live births to 52 per 1,000 live births in 2011, while under-five mortality reduced from 121 per 1,000 in 1990 to 78 per 1,000 in 2011.The figures also indicate that as at 2012, the child mortality rate in Ghana was 72 per 1,000 live births, meaning that there had been a reduction in child mortality by 44 per cent since 1990.The efforts and level of progress notwithstanding, maternal, newborn and child mortality levels remain high in Ghana [15,16,17]. The need to identify factors that influence under-five mortality to enable the right targeting of where, when and how public health resources should be channeled to address child health issues, improve health and avoid untimely deaths cannot be overemphasized. The present study takes advantage of past and most recent demographic and health surveys from 1988-2014 to re-examine the issue of under-five mortality in Ghana. Specifically, the study is aimed at; examining the trend of under-five mortality between 1988-2014 and identifying common risk factors that affect childhood mortality to measure the strength of the relations of these factors. Using pooled data in this regard is necessary for providing an important framework for public health researchers and policy makers in reviewing and designing new child survival intervention strategies

2. Study Area

2.1. Country Profile

Ghana is located in West Africa, bordering the Gulf of Guinea, between Cote d'Ivoire and Togo with a population of about 26 million. According to the 2014 demography and health survey, Ghana's birth rate stands at 30.8 births/1,000 population (2016 est.) and death rate 7.1 deaths/1,000 population (2016 est.). The population structure by age group is given in Table 1 below [18].

The 2014 GDHS documented a reducing trend in under-5 mortality during the 15 years prior to the survey. Results from the six GDHS surveys conducted between 1988 and 2014 show a decline in childhood mortality over the past two and a half decades (Figure 1). This decline is especially pronounced over the past decade. For example, the child mortality rate declined from 50 per 1,000 for the five-year period preceding the 2003 GDHS to 19 per 1,000 during the same period prior to the 2014 GDHS. Similarly, the under-5 mortality rate decreased from 111 per 1,000 for the five-year period preceding the 2003 GDHS to 60 per 1,000 during the same period prior to the 2014 GDHS as shown in Figure 1. However, the GDHS report confirmed that a further examination of neonatal, infant, and under-5 mortality rates in Ghana since 1998 revealed that neonatal mortality had decreased at a much slower pace than infant and child mortality. This has resulted in an increase in the contribution of neonatal deaths to infant deaths from 53 percent in 1998 to 71 percent in 2014. Similarly, the contribution of neonatal deaths to under-5 mortality also increased from 28 percent of under-5 deaths to 48 percent over the same period. Statistical inferences gathered from the GDHS establishes that a gradual increase in neonatal mortality has contributed to the much slower decline in under-five mortality. It is necessary in this regard to carefully explore the other independent factors responsible for the increase in affecting under five mortality apart from the rise in neonatal deaths to carefully inform intervention strategies. Hence this study.

Table 1. Population distribution by sex and age group (2016 est.) [18]

Age structure (years)	Percentage distribution (%)	Sex	
		Male population	**Female population**
0-14	38.2	5,164,505	5,113,185
15-24	18.66	2,498,185	2,522,353
25-54	34.05	4,445,321	4,716,311
55-64	4.91	642,984	678,784
65>	4.19	520,589	606,045

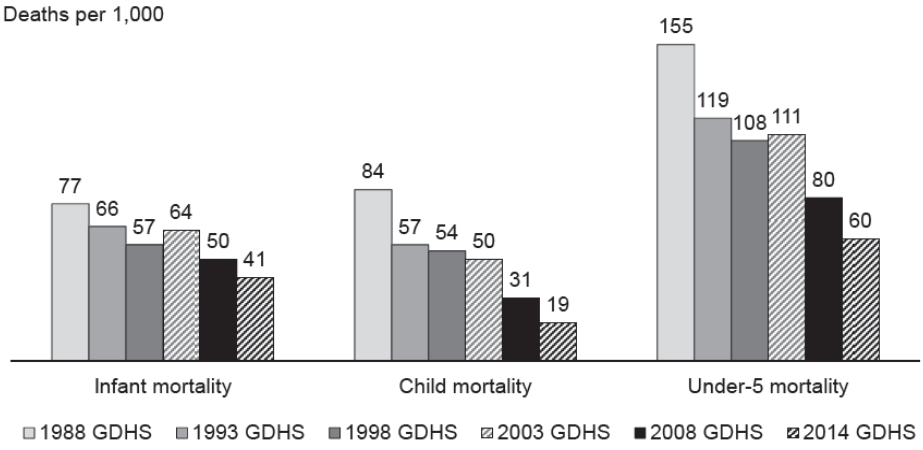

Figure 1. Extract from the GDHS 2014 report [19]

Figure 2. Map of Ghana showing administrative regions and boundaries [20]

3. Methods

Data from the Ghana Demographic and Health survey between 1988-2014 was used to conduct a retrospective analysis of recorded children data (0-5 years). Our analysis was based on the recoded children data which consist of 33,154 births from Ghana.

3.1. Study Variables

Women between ages 17-45 years interviewed during the survey (1988-2014) were asked to provide a detailed history of all their live births in chronological order. Under-five mortality was defined as the probability of dying before completing the fifth birthday; this was used as the outcome variable. The explanatory variables that were selected were based on a number of prior studies [2,21,22,23]. The following explanatory variables were included in the study: maternal age, highest level of education of mother, place of residence, method of family planning, source of drinking water, assistance at delivery, duration of breast feeding and the preceding birth interval.

3.2. Data Analysis

1. All analysis was done based on set aims and objectives. STATA'14 statistical software package (Stata Corp.2007. Stata Statistical Software. Release12.StataCorp LP, College Station, TX, USA) was used for all univariate, bivariate and multivariate analysis.
2. Both Independent and dependent variables were recoded.
3. A survival outcome variable was generated (the probability of dying before completing the fifth birthday).
4. Descriptive analysis of the explanatory and response variables was done.
5. A subsequent trend analysis of under-five mortalities from 1988-2014 was carried out to determine the significance of the trends of mortalities throughout the duration of the survey.
6. A logistic regression was then used to predict the association between the explanatory variables and the dependent variable.

4. Results

This survey retrospectively covered 1988 to 2014. A total of 8,315 children out of 33,154 delivered by an identical number of women died before turning 5 years as shown in Table 3. Majority of the women occurred in the age brackets 25 to 44 years as displayed in Table 2. Over 70% of women interviewed were married with just about 4% being either widowed or never married. Twice the number of women who lived in urban areas lived in rural settings with a total of 24,637 women having at most primary education. Again, more than 80% of women did not have access to portable water and as such either relied on water from streams, lakes, rivers or rain. Only about 7% of women out of the total number of women who breast fed their children exclusively breastfed their children for up to 6 months, a greater number of women continued breastfeeding from the 7 months to at most 24 months. An alarming 16,230 women had no assistance at delivery while a little over 3000 women were assisted by skilled personnel (doctors, nurses) during delivery. About 80% of women did not use any form of contraception. Most women who used contraceptives utilized the modern methods including; pill, IUD, injectable, diaphragm, female sterilization and condoms. Only about 2% of women interviewed mentioned they had birth spacing of at most a year, most women observed a preceding birth interval of at least 13 months. The dominant birth spacing period observed among respondents was 25 to 36 months.

A look at Table 3 and Figure 3 indicates a general decline in under five mortality from 1988 to 2014, a slight decrease was observed from 1988 to 1998, this was followed by a marginal increase in 2003, a significant decrease in 2008 and then a subsequent increase 2014.The general trend observed in under five mortalities between the period of the survey though decreasing over the years is however not a significant decrease (Prob I Z I = 0.749) , this is shown by the results of the trend analysis displayed in Table 4. The results of a multiple logistic regression analysis carried out to determine the predictors of under-five mortality was displayed in Table 6. The results from this analysis shows that with the exception of place of residence, all other explanatory variables (*maternal age, highest education level of mother, mother's marital status, duration of breastfeeding, preceding birth interval, assistance at birth, source of drinking water and method of family planning*) were significant predictors of

under-five mortality. The mother's assistance at delivery per the multivariable logistic regression in Table 6 was the strongest predictor of under five mortality. [*O.R. = 1.661, p<0.05*].

A subsequent univariable logistic regression was carried out to determine the independent predictors of under five mortality, the results were displayed in Table 5. The strongest predictor of under five mortality as observed in Table 5 was the duration of breast feeding [R^2 = 0.3300] with increasing duration of breast feeding (with reference to 0-6 months) a risk factor for under five mortality. This was followed by the type of assistance at delivery [R^2 =0.2898] with respondents receiving no assistance at birth standing at a greater risk of having their children dying before age 5. Another strong predictor of under five mortality was maternal age [R^2=0.0646], decreasing maternal age puts women at greater risk of experiencing under five mortality. Preceding birth interval as well explained about 4% of variability in the survival of children under five. Explanatory variables such as highest education level of mother, source of drinking water and method of family planning were all significant predictors of under five mortality but only explained about 0.2% of variability in the survival of children under five.

Table 2. Frequency distribution of predictor variables of under five mortality

VARIABLE	VARIABLE STRATA	FREQUENCY (n= 33,154)	PERCENTAGE (%)
Age of mother (years)	15-24	6,139	18.52
	25-34	15,771	47.57
	35-44	11,244	33.91
Maternal marital status	Never married	951	2.87
	Married	25,408	76.64
	Living together	4,144	12.50
	Widowed	592	1.79
	Divorced	1,008	3.04
	Not living together	1,050	3.17
Place of residence	Rural	23,301	70.28
	Urban	9,853	29.72
Mother's highest level of education	No education	14,624	44.11
	Primary	10,013	30.20
	Secondary	8,002	24.14
	Tertiary	514	1.55
Duration of breast feeding (months)	0-6	509	6.69
	7-12	1,533	20.15
	13-18	2,732	35.91
	19-24	2,833	37.24
Assistance at delivery	No one	16,230	75.57
	Doctor	1,773	8.26
	Trained nurse	1,332	6.20
	Birth attendant	1,096	5.10
	Relative	948	4.41
	Other	98	0.45
Method of family planning	Not using	26,069	78.63
	Modern methods	4,806	14.49
	Withdrawal	378	1.14
	Others	385	1.16
	Periodic abstinence	1,516	4.57
Source of drinking water	Stand pipe	1,474	4.57
	Rain/Well/Borehole	1,242	3.75
	River/Stream/Lake	3,102	9.35
	Other	27,331	82.45
Preceding birth interval in months	0-12	477	1.93
	13-24	4,670	18.86
	25-36	8,061	32.56
	37-48	5,436	21.96
	49-60	2,767	11.18
	61-72	1,348	5.44
	72<	1,999	8.07

Univariate analysis was carried out using STATA'14 statistical software package (StataCorp.2007. Stata statistical Software. Release 12. StataCorp LP, College Station, TX, USA).

Table 3. Trend analysis of under five mortality rate in Ghana (1988-2014)

YEAR	NUMBER OF DEATHS RECORDED IN CHILDREN UNDER FIVE
1988	1,734
1993	1,431
1998	1,322
2003	1,424
2008	925
2014	1,479
TOTAL	8,315

Table 4. Trend analysis of under five mortailty rates in Ghana from 1988-2014

YEAR	SCORE	OBSERVATIONS	SUM OF RANKS
1988	1	1	5
1993	2	1	3
1998	3	1	1
2003	4	1	2
2008	5	1	6
2014	6	1	4

Z =0.32, Prob I Z I = 0.749

Bivariate analysis was carried out using STATA'14 statistical software package (StataCorp.2007. Stata statistical Software. Release 12. StataCorp LP, College Station, TX, USA).

Table 5. Result for Bivariate Odds Ratio of Explanatory Variable Strata (Univariable Analysis)

VARIABLE	R^2 (Prob>chi2)	VARIABLE STRATA	P-VALUE	ODDS RATIO (O.R)	CONFIDENCE INTERVAL (C.I)
Mother's age (years)	0.0646 (0.000)	15-24	0.000	5.937	[5.424-6.499]
		25-34	0.000	2.789	[2.642-2.946]
		35-44 (Reference group)			
Maternal marital status	0.0109 (0.000)	Married (Reference group)			
		Never married	0.000	2.516	[2.065-3.066]
		Living together	0.000	1.483	[1.365-1.611]
		Widowed	0.000	0.369	[0.313-0.435]
		Divorced	0.000	0.604	[0.529-0.689]
		Not living together	0.166	0.907	[0.789-1.041]
Place of residence	0.0024 (0.000)	Urban (Reference group)			
		Rural	0.000	0.764	[0.723-0.809]
Mother's highest level of education	0.0176 (0.000)	No education	0.000	0.263	[0.199-0.349]
		Primary	0.000	0.401	[0.302-0.533]
		Secondary	0.000	0.573	[0.431-0.763]
		Tertiary (Reference group)			
Duration of breastfeeding (months)	0.3300 (0.000)	0-6 (Reference group)			
		7-12	0.000	13.064	[10.247-16.656]
		13-18	0.000	45.369	[34.214-60.161]
		19-24	0.000	57.586	[42.837-77.414]
Assistance at delivery	0.2898 (0.000)	No assistance	0.000	1.433	[1.243-1.652]
		Unskilled	0.001	0.727	[0.605-0.875]
		Skilled (Reference)			
Method of family planning	0.0024 (0.000)	Modern methods (Reference group)			
		Not using	0.000	0.794	[0.734-0.859]
		Withdrawal	0.642	1.063	[0.821-1.377]
		Others	0.000	1.419	[1.184-1.703]
		Periodic abstinence	0.689	0.971	[0.844-1.119]
Source of drinking water	0.0021 (0.000)	Stand pipe (Reference group)			
		Rain/Well/Borehole	0.002	0.775	[0.657-0.914]
		River/Stream/Lake	0.170	0.908	[0.791-1.042]
		Other non-portable sources	0.006	1.048	[1.048-1.326]
Preceding birth interval (months)	0.0441 (0.000)	0-12	0.000	0.104	[0.083-0.131]
		13-24	0.000	0.222	[0.191-0.258]
		25-36	0.000	0.412	[0.356-0.478]
		37-48	0.000	0.558	[0.478-0.652]
		49-60	0.006	0.783	[0.657-0.934]
		61-72	0.786	1.031	[0.827-1.285]
		72< (Reference group)			

Bivariate analysis was carried out using STATA'14 statistical software package (StataCorp.2007. Stata statistical Software. Release 12. StataCorp LP, College Station, TX, USA).

Table 6. Results for Multiple Logistic Regression for Predictors of under Five Mortality

EXPLANATORY VARIABLE	ODDS RATIO (O.R)	P-VALUE	CONFIDENCE INTERVAL (C.I)
Mother's age	0.859	*0.002	[0.781-0.946]
Maternal marital status	0.922	*0.019	[0.862-0.987]
Place of residence	0.941	0.412	[0.813-1.089]
Mother's highest level of education	1.144	*0.001	[1.057-1.238]
Duration of breastfeeding	1.003	*0.001	[1.001-1.004]
Assistance at delivery	1.661	*0.000	[1.458-1.891]
Method of family planning	1.224	*0.000	[1.106-1.356]
Source of drinking water	1.538	*0.000	[1.395-1.696]
Preceding birth interval	1.184	*0.000	[1.132-1.238]

Prob >chi2 = 0.000, Pseudo R^2 = 0.0252.

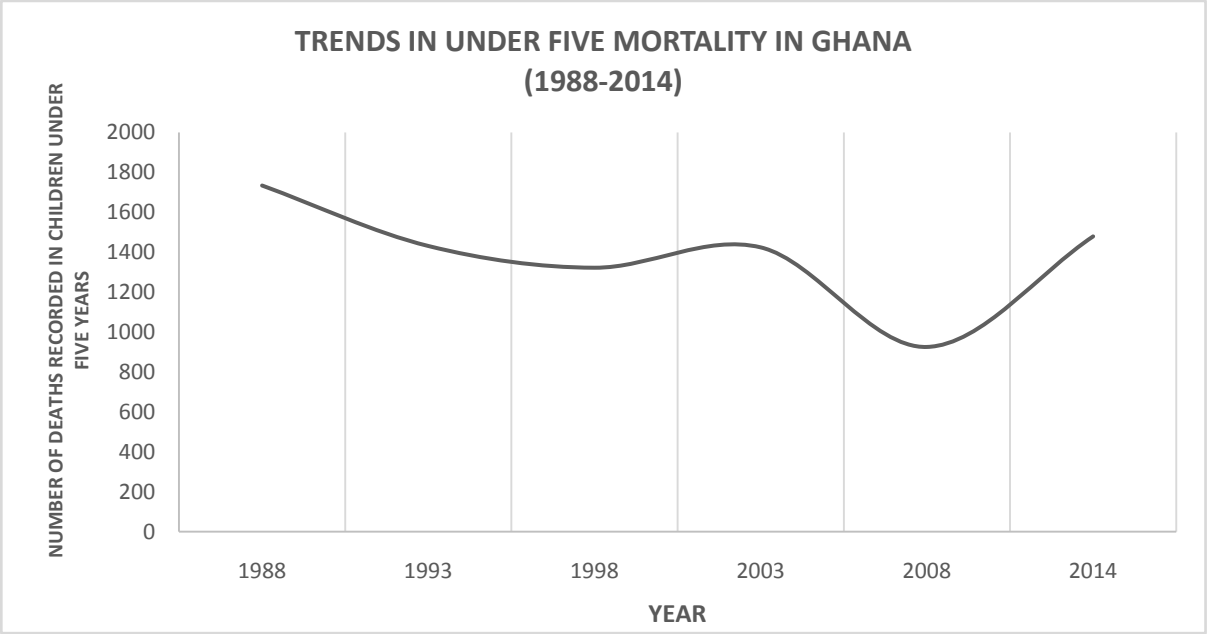

Figure 3. GRAPH SHOWING TRENDS IN THE DEATHS RECORDED IN CHILDREN UNDER FIVE YEARS IN GHANA FROM 1988-2014

5. Discussion

The current study has placed emphasis on the determinants and trends of under five mortality from 1988 to 2014. According to the results of the trend analysis displayed in Figure 3, the decrease in under five mortality over the entire period of the survey was not significant, this observation is consistent with results obtained from other studies, the slow decline in UFMR (Under Five Mortality Rate) has been attributed to a stagnation in socio-economic development over the years (Okantey, 2008) and an indication that more work needs to be done by Ghana's health system with regards to significantly reducing under five mortality. It is as well imperative to carry out further studies on the trends of other contributing factors of under five mortality such as neonatal and infant mortality rate in Ghana over a similar time period (1988-2014) in order to properly understand and address the current situation of under five mortality in Ghana.

The study was also able to establish that young maternal age was a significant risk factor for infant mortality and independently accounted for 6% of the chances of survival of children under five; with mothers between the ages of 15 and 24 years at the greatest risk. Mothers in the aforementioned age brackets were more likely to have children with poor health outcomes than older mothers (34 years and above). This can to some extent be attributed to unequal health, economic experiences across the different maternal age groups [9,21]. Similar results were obtained in a study in 2011 on the association of maternal age and infant mortality; an evidence from 55 low and middle income countries, mentioned that teen mothers had children with the worst health outcomes, children of mothers who had their first birth in their early 20s were also at risk of poor health outcomes compared to first time mothers in their late 20s [24].

Maternal marital status per the multivariable logistic regression did not proof a significant predictor of under five mortality however even though the R^2 obtained was very low (0.01) for the simple logistic regression it proofed a significant contributor of under five mortality. With reference to married women, mothers who were never married were about twice more likely to have their children under five dying. Surveys in the United States for example showed that non-marital childbearing seems to be associated with an increased risk of fetal and infant death [25,26]. Studies in Vietnam have found out that the rate of non-marital childbearing has risen over a 10-year period from 1995 until 2004 and that pregnancies among

unmarried women are associated with an increased risk of prematurity and fetal and infant mortality [25]. In another development, women who were widowed and divorced were at a lower risk of experiencing under five mortality than their counterparts who weren't living with their spouses. Further studies are however required to determine the true causal relationship of this association between under five mortality and widowed mothers and that between women not living with their spouses. In this respect, Unmarried women should be targeted with the goal of educating, increasing awareness, and especially, providing resources for proper obstetrical and maternal care.

A rather controversial result from this study was the fact that there was a lower risk of under five mortality in children of mothers in of rural dwellings [O.R.= 0.764] with reference to children of mothers urban dwelling mothers. This result can to some extent be attributed to the number of mothers interviewed in rural areas far outweighing those in urban areas in this study. Mother's interviewed from rural areas formed more than 70% of respondents and hence there was always a likelihood of more under five mortalities recorded in children of rural dwellings than those of urban areas. Contrary to this study, other studies have brought to light the influence of various socio-economic and demographic factors on infant mortality [27]. Mothers living in rural areas are likely to have reduced access to health facilities and even if health facilities are available there is likelihood that a rural dwelling mother's financial capacities may not be enough to seek quality healthcare from a service provider [28,29,30,31].

Contrary to the results of other studies which found an inverse relationship between education of mother and under five mortality [1,32], our study revealed that mothers with no formal education were at a much lower risk of experiencing under five mortality compared to those with primary and secondary education. Buor in 2003 examined the impact of mothers' education on childhood mortality in Ghana using the Ghana Demographic and Health Survey data of 1998 and World Bank data of 2000. The survey emphatically established that there was an inverse relationship between mothers 'education and child survival sighting the use of basic health facilities (that relate to childhood survival) showing a direct relationship with mothers' education. On the phase of this argument it can be said there was a strong association between mother's education and the use of health facilities between 1998 and 2000. This association may have decreased down the years from 2003-2014 which may be due to increased socio-economic and infrastructural development and in turn enabling more mothers to gain access to health facilities. Maternal education in this respect may not necessarily have an inverse relationship with infant mortality since health facilities are increasingly becoming available to all women of different educational backgrounds. It is however prudent for further studies to be conducted to verify the assertion that the maternal education advantage over the years is gradually being wiped out.

This study revealed that, the duration of breastfeeding was the strongest predictors of under five mortality [R^2 = 0.3300]. With reference to women who breastfed their infants from 0-6 months, women who breastfed their infants for over 13 months were at much greater odds of having children with poor health outcomes [O.R.=45.369] compared to their counterparts breastfeeding for between 7 to 12months [O.R.= 13.064].Exclusive breast feeding has been described as the strongest predictor of infant and under five survival in a number of studies, early initiation of breast milk within an hour and exclusive breastfeeding in the first six months of a child's life is critical for infant survival [33,34,35], however prolonged breast feeding has been mentioned as a strong predictor of poor nutritional status and subsequently infant mortality. The effect of weaning on food intake was studied in 15 breastfed malnourished children in a rural community in Ghana in 1988, breastfeeding beyond the age of 19 months was found to be associated with malnutrition, the results indicated that prolonged breastfeeding can reduce total food intake and thus predispose to malnutrition [36]. Other studies established that prolonged breastfeeding did not reduce the measures of adiposity, increase stature, or reduce blood pressure in children [37]. Further studies are required to determine the true causal relationship of this association between infant mortality and mother's duration of breastfeeding.

The type of assistance at delivery was one of the strongest predictors of under five mortality [R^2 = 0.2898]. Our results again reveal that with reference to mother's who received assistance from skilled personnel at delivery, mothers who did not have any assistance [O.R. =1.433] at delivery were at a higher risk of having their children dying compared to those of unskilled personnel [O.R.=0.727]. Other studies that have analyzed the skilled health personnel category revealed that women who were attended to by midwives, nurses and doctors were far less likely to experience infant mortality compared to those attended to by relatives [38]. Studies on the relationship between antenatal provider, postnatal provider type and maternal care and infant mortality have been comprehensively explored [21,39], however studies on the influence of type of birth attendant on infant mortality have ill been carried out. It is necessary for other variables such as the length of practice of health service providers to be explored to provide more robust explanations.

The method of family planning and source of drinking water were weak predictors of under five mortalities based on R^2 values, as they could explain only 0.002% of variability in under five mortality. However, with regards to source of water, the quality of drinking water in a community is an indicator of the sanitary levels in the community. Sanitation is the most important factor for the reduction of the main killers of children like diarrheal diseases [40]. The source of water in any community is always a crucial predictor of the persisting sanitary conditions in that particular community [41,42]. Good source of drinking water is essential for both provisions of good prenatal and postnatal and is necessary for a child's health [6]. According to the results obtained from this study, women who had their source of drinking water from other non-portable sources were at a higher risk of having their children under five dying. A likely explanation for this result is the case of water from the stand pipes being better treated compared to water from the other non-portable sources. Mothers living in rural areas are likely to have reduced access to good drinking water and subsequently are at risk of having infants with poor health status.

The preceding birth interval or birth spacing accounted for about 4% of variability of survival of children under five years. The odds ratios obtained for the various strata for preceding birth interval showed that increasing birth interval increased the risk of a child dying before the age of five. This result is however inconsistent with other studies [2,12,43]. Preceding birth interval has been reported to have an inverse relationship with infant mortality, a possible explanation to this development is that mothers that waited for more than 18 months before having the next baby would have regained most body nutrients and blood loss during previous pregnancy and breast feeding and hence have a lower odds of having children with poor health outcomes [1]. It is also a common medical knowledge that risk of obstetrics complications is higher in mothers that had short birth interval than those with long birth interval [3]. It is important to note that other variables such as the maternal age may have affected this outcome, studies have documented that longer birth interval has a modest positive effect on early childhood hemoglobin levels of girls, and this effect is strongest when their mothers are in their early twenties and have a high hemoglobin level [44]. This effect of maternal age on childhood hemoglobin levels may have affected the outcome of this study since just about under 18% of mothers below 24 years of age were included in the analysis, this effect may not have been strong in the mothers beyond the aforementioned age category, hence the trend observed for the effect of birth spacing on under five mortality.

6. Conclusion

Based on the findings of this study, it is concluded that the decrease in under five mortality Ghana has witnessed from 1988-2014 is not entirely significant and that more measures be put in place to reduce the phenomenon. Secondly the study was able to established that variables such as young maternal age, non-marital childbearing, exclusive breast feeding beyond 6 months, lack of portable water and unskilled or no assistance at birth are all contributors of under five mortality in Ghana. It is necessary for all these predictors to be effectively examined and factored during formulation and implementation of policies in an effort to improve the situation of child survival in Ghana.

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Declaration of Interest

The authors declare that there are no competing interest in this study.

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