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CONFRONTING THE DEFICIENCY: ANAEMIA AMONG CHILDREN UNDER FIVE YEARS, NATIONAL HEALTH INSURANCE, EVIDENCED FROM MULTIPLE INDICATOR CLUSTER SURVEY, GHANA

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ABSTRACT

Background

Despite the introduction of the NHIS, some cases of anaemia have still been reported among under five children in Ghana. For instance, the most recent Demographic and Health Surveys (DHS) report for Ghana shows that 78% of children suffer some form of anaemia, with 48% moderately anaemic and 7% severely anaemic. Though the NHIS has been in operation since 2003, it has not succeeded in reducing the prevalence of anaemia among children in Ghana. This article, therefore, seeks to examine whether National Health Insurance (NHIS) membership has led to reduced prevalence of anaemia among under five children in Ghana. Specifically, the author sought to examine the correlations that exist between NHIS membership and socio-economic status, and other relevant background factors. The article also seeks to determine the association between NHIS membership and anaemia in children under five years.

Methods

The study relied on Multiple Indicator Cluster Survey (MICS) conducted in 2011. To this effect, multi-stage stratified cluster sampling was used to select the survey sample, where the list of enumeration areas (EAs) from the 2010 Ghana Population and Housing Census (PHC) served as a frame for the MICS sample. This was proceeded by the use of random systematic sampling to select both the enumeration areas and the households for the survey. Univariate and bivariate

analysis between exposure-outcome variables of interest ignoring all other variables was conducted to determine crude association. The multivariate analysis was based on Binary Logistic Regression Models and linear regression techniques to control for the potential confounding effects of the age, sex, socio-economic status, area of residence (rural/urban) of the child, mother's education and several variables that were considered as potential confounders from literature.

Results

After adjusting for confounding effects of sex, age in months, wealth index quintile, place of residence and mother's education. Children within the richest wealth index quintile has 1.67 [95%CI: 1.29-2.16]; P=0.00) times the odds of the poorest within the wealth index quintiles. Thus, when the richest is compared with the poor there is an association between NHIS membership and socio-economic status. When other relevant factors were adjusted for confounding effects, they showed association between various variables. After adjusting for confounding effects of sex, age in months, wealth index quintile, place of residence and mother's education, children with valid NHIS membership cards had 0.64 [95%CI: 0.52-0.79]; P=0.00) times the odds of reduced anaemia compared with children without membership cards. Hence, when children with valid NHIS membership are compared with those who do not have for anaemia, there is an association between NHIS membership and anaemia prevalence among children.

INTRODUCTION

It is estimated that, worldwide, there are 293.1 million (47.4%) under five year-old children who are anaemic, with 67.6% of these children living in the Africa [1]. Anaemia in children is an issue of concern because it impairs their cognitive, physical and social development; it causes negative conduct and cognitive effects that leads to poor academic performance and work capacity later in life. It has been noted that iron deficiency is the most common cause of anaemia in children under five years with a smaller proportion due to other micronutrient deficiency such as folate, Vitamin A and B12 [2-4]. A number of studies have revealed that iron deficiency anaemia, especially during the first two years of a child's life leads to deterioration in the mental and behavioural development, a situation which persists even after treatment of iron deficiency. In spite of the serious health and social implications that it brings, the prevalence of anaemia remains a major public health issue as anaemia has been cited as one of the leading causes of infant mortality and morbidity in developing countries, particularly those in Africa. A study

conducted in Southern Cameroon revealed that the prevalence of anaemia in children less than 2 years was found to be 45% [5-6].

In Ghana, it is indicated that about 78% of children aged between 6–59 months are anaemic, 28% have stunted growth and 90.6% fully immunised by membership of NHIS (Demographic and Health Survey, 2008). In the Western world, the upsurge of numerous contagious diseases has been blamed on inadequate immunisation coverage. Therefore, it is assumed that childhood immunisation programmes help in fighting communicable diseases [7]. Studies that assess the relative importance of factors that lead to inadequate vaccination, as well as socioeconomic factors, medical management healthcare provider practices, parental awareness and inadequate health education and communication [8] have important policy implications [9].In view of this, a number of countries including Ghana have adopted different health financing strategies, which are aimed at ensuring global access to quality basic health care [10], but by the 1980s, the system experienced financial challenges. As a result, the government introduced user fees where people had to pay money before they could access - health services. This, however, created a situation whereby people, especially the poor, could not access health care. By 1990, Ghana had begun to consider the community-based health insurance schemes (CBHIS) as an alternative for financing health care. A pilot of this system was carried out in some selected communities and subsequently adopted as the health financing policy for the country. Through the institution of compulsory district-level mutual health insurance schemes, the NHIS is to enhance access to quality health care in Ghana. It is aimed at ensuring that healthcare is accessible to all and also to offer financial protection against high costs of health care spending [11]. Ghana is one of the few nations in sub-Saharan Africa that spend a relatively high percentage of their Gross Domestic Product (GDP) on health. In 2013, the country spent 5.4% of its GDP on health compared to 3.9% in Nigeria, 4.5% in Kenya, and 4.6% in Benin. In a similar vein, the government of Ghana (GoG) allocated 10.6% of its total government expenditure on health [12-13].

In Ghana, severe anaemia leads to 554 deaths in hospitals every year. Notwithstanding evidence of the success of nutritional interventions in improving feeding and preventing malnutrition and anaemia in sub-Sahara Africa, infant mortality still persists and this hampers efforts being made to achieve the millennium development goals [14]. According to the Ghana Health Service

(2013), there has been an increase in immunisation coverage; however, annual immunisation targets are often not attained. This leads to series of mop-up programmes organised to ensure that children who miss immunisation participate fully in the programme. In spite of the introduction of the NHIS, there are still reported cases of anaemia among children in Ghana. For example, according to the most recent Demographic and Health Surveys (DHS) report for Ghana, about 78% of children suffer some form of anaemia, with 48% moderately anaemic and 7% severely anaemic [15].

It is worth noting that although the NHIS has been in operation since 2003, the scheme has not fully succeeded in reducing or eradicating the prevalence of anaemia among children in Ghana. Furthermore, in Ghana only one study has established some evidence of association between national health insurance and anaemia in children which in a randomised controlled trial which [16] concluded that replacing the out-of-pocket payment system with the health insurance scheme improved the health care-seeking behaviour of mothers but the same cannot be said of child health outcomes. However, none of these studies investigates the role of NHIS membership on anaemia reduction among children in Ghana. This paper, therefore, seeks to examine whether NHIS membership leads to a reduced prevalence of anaemia in Ghana. Specifically, the author seeks to determine the correlations between NHIS membership and socio-economic status, and other relevant background factors. This paper also examines the association between NHIS membership and anaemia in children. Findings from this paper will inform policy about NHI membership and anaemia reduction among under five year's children in Ghana and other countries within the sub-region.

METHODOLOGY

Survey Design

The study relied on Multiple Indicator Cluster Survey (MICS) conducted in 2011. The study employed a multi-stage stratified cluster sampling to select the survey sample, where the list of enumeration areas (EAs) from the 2010 Ghana Population and Housing Census (PHC) served as a frame for the MICS sample. Hence, the frame was first stratified into the 10 administrative regions in the country, then into urban and rural enumeration areas. Therefore, the first stage

sampling units consisted of census enumeration areas and the second stage sampling was made up of households. This was preceded by the use of random systematic sampling to select both the enumeration areas and the households for the survey.

Source of data

The study used secondary data source, which is a nationally representative household sample survey of 12,150 households in 810 enumeration areas (EAs). A total of 7626 under-five children were used for the survey. Hence data from children under-five years was used for the purposes of statistical analysis. The survey provided estimates of all key health indicators at both regionals and national levels including rural and urban areas.

Variable definition

The main outcome variables of interest to the study are: NHIS membership, socio-economic status and other relevant background factors; NHIS membership and anaemia in children. National Health Insurance Scheme Membership served as the main exposure variable which was measured as NHIS valid card of the child seen and valid card not seen or missing at the time of interview. The confounding variables and effects modifiers identified from literature were mother's education level, sex, age, area of residence and wealth indicator quintile. According to WHO (2011), children under 5 years of age with haemoglobin level less than 11.0 g/dl are considered anaemic. However, for the purpose of this study, any anaemia in children is defined as haemoglobin level below or equal to10.9 g/dL. The variable AM8 in the dataset was used to define any anaemia in children (i.e. the dependent 2 variable or outcome of interest). A new variable was generated by the use of Stata command gen anaemia=AM8 and then recoded using the cut-off as defined above. Statistical associations among the various variables were examined using a chi-square test and regression analysis. Analyses were performed using the Stata version 15.

Weighting the sample

In order to compensate for the unequal probability of selection between the strata that had been geographically defined as well as for non-response, sample weights were applied.

Statistical analysis

Bivariate and univariate analysis between exposure-outcome variables of interest ignoring all other variables were undertaken to determine crude association. NHIS membership of children and relevant health outcomes of interest in the study were determined by the use of Chi-Square test to determine the association between the variables. The multivariate analysis was based on Binary Logistic Regression Models and linear regression techniques to control for the potential confounding effects of age, sex, socio-economic status, area of residence (rural/urban) of the child, mother's education and several variables that were considered as potential confounders from literature.

FINDING

Descriptive analysis of exposures and outcome variables for NHIS membership.

The following finding shows crude associations between socio-demographic factors and valid NHIS membership of children under five years (see Table 4.1). Result suggests that a proportion of male (26.7 percent) and female (27.4 percent) with NHIS membership were sampled respectively. About 34.5 percent were within the fourth wealth quintile as well as 32.4 percent within the rich quintile. Within the age brackets, a proportion of 31.6 percent were between 24-35 months old which was almost identical to other age groupings with the exception of 12.2 percent who were within 0-11 months old. Similarly, the proportion of both urban and rural residents was identical in terms of NHIS membership; however, urban residence accounted for 29.0 percent as compared to rural 25.6 percent. Mothers' level of education influenced acquisition of NHIS membership. For example, mothers who had attained secondary school level of education (37.0 percent) had valid NHIS membership card, whereas the mothers who had had no education but had NHIS membership accounted for 24.0 percent.

Table 1: Summary of cross-tabulation of socio-demographic characteristics and National Health Insurance Scheme Membership of under five children based on Chi-square test statistic with corresponding p-value in Ghana, 2011

		NHIS status		Pearson designed based F test
Characteristics	**Total**	**No Valid NHIS membership (%)**	**Valid NHIS membership (%)**	
Sex				0.149;P <0.699
Male	3757	2753(73.3)	1004(26.7)	
Female	3793	2755 (72.6)	1039(27.4)	
Wealth index quintile				7.27;P >0.000
Poorest	1730	1375(79.5)	355(20.5)	
Second	1551	1182(76.2)	369 (23.8)	
Middle	1559	1147(73.6)	411(26.4)	
Fourth	1397	915 (65.5)	482(34.5)	
Richest	1313	888(67.6)	424(32.4)	
Child's age (months)				22.35;P >0.000
0-11	1543	1354(87.8)	188 (12.2)	
12-23	1453	1005(69.2)	447 (30.8)	
24-35	1553	1061(68.4)	491(31.6)	
36-47	1576	1092(69.3)	484(30.7)	
48-59	1426	995(69.8)	430(30.2)	
Area of residence				2.38; P > 0.123
Urban	3283	2331(71.0)	951(29.0)	
Rural	4267	3176(74.4)	1091(25.6)	
Mother's education				6.43;P >0.001
None	2455	1865(76.0)	590(24.0)	

		NHIS status		Pearson designed based F test
Characteristics	**Total**	**No Valid NHIS membership (%)**	**Valid NHIS membership (%)**	
Primary	1628	1225 (75.2)	403(24.8)	
Middle/JHS	2578	1857(72.0)	720(28.0)	
Secondary	889	560 (63.0)	328(37.0)	

Analysis of Multivariate outcome variables

Acquisition of NHIS membership and socioeconomic status and other relevant background factors of the study population. Controlling for confounding effect of socioeconomic status, sex, wealth quintile, mother's education level, age in months, area of residence and wealth index as indicated in Table 2 suggests that children with valid NHIS membership had 0.60 times the odds of those without NHIS membership.

In terms of sex, females with NHIS membership were 1.04 times the odds of males without valid membership. Mothers with secondary level of education with NHIS membership card were 1.30 times the odds of those with no education. Children within the age in month bracket of 24-35 months were 3.09 times the odds of those without valid card who were in month in age between 0-11 categories. Those with NHIS membership who were living in rural areas were 0.84 times the odds of those in the urban areas who were without NHIS membership. Children who are richest with NHIS membership are 1.13 times the odds of those who are poor.

After adjusting for confounding effects of sex, age in months, wealth index quintile, place of residence and mother's education, children within the richest wealth index quintile had 1.67 [95%CI: 1.29-2.16]; P=0.00) times the odds of the poorest within the wealth index quintiles. Thus, when the richest is compared with the poor, there is an association between NHIS membership and socio-economic status.

For other relevant factors when adjusted for confounding effects, females with NHIS membership had 1.04[95%CI: 0.89-1.21]; P=0.64) times the odds of males without NHIS membership card. However, when the female child is compared to the male child, there is no association between sex and NHIS valid membership. Mothers with middle/JSS level of education had 0.94 [95%CI: 0.74-1.20]; P=0.02) times the odds of those with no education. In effect, there is an association between the level of education and NHIS valid membership. Children within the age in month bracket of 24-35 months had 3.22 [95%CI: 2.47-4.21]; P=0.00) times the odds of those without membership who were in month in age between 0-11 categories. There is, therefore, an association between age in month of a child and NHIS valid membership. Children with NHIS cards and who were living in rural areas had 1.22[95%CI: 0.94-1.57]; P=0.13) odds as compared to those in urban residence. In effect, there is no association between area of residence and valid NHIS membership.

Table 2: Comparing differences between crude analysis (simple logistic regression) and adjusted analysis (multiple logistic regression) on NHIS membership and association with Anaemia of under-five children in Ghana, 2011

	Crude analysis		**Adjusted analysis**	
Exposure Variables Covatiate/exposure	OR(95% CI)	P-value	OR (95% CI)	P-value
NHIS membership exposure variable)				
No valid card	1		1	
Valid card seen	0.60(0.50-0.72)	0.00***	0.67(0.55-0.81)	0.00***
Sex				
Male	1		1	
Female	1.04(0.90-1.21)	0.57	1.04(0.89-1.21)	0.64
Mother's education				
None	1		1	
Primary	1.01(0.80-1.29)	0.00***	0.89(0.69-1.15)	0.02***
Middle/JHS	1.17(0.95 -1.44)		0.94(0.74-1.20)	
Secondary	1.30(0.22-0.41)		1.42(1.04-1.94)	
Age in months				
0-11	1		1	

12-23	3.00(2.30- 3.92)		3.20(2.44-4.20)		
24-35	3.09(2.37-4.02)		3.22(2.47-4.21)		0.00***
36-47	2.98 (2.31-3.85)	0.00***	3.19(2.46-4.14)		
48-59	2.94(2.29-3.78)		3.11(2.41-4.01)		
Area of residence					
Urban		1		1	
Rural	0.84(0.69-1.02)	0.07	1.22(0.94-1.57)		0.13
Wealth index quintile					
Poorest		1		1	
Second	1.13(0.91-1.41)		1.21(0.95-1.54)		0.00***
Middle	1.25(0.93-1.68)		1.41(1.02-1.95)		
Fourth	1.89(1.48-2.42)		2.21(1.62-3.01)		
Richest	1.67(1.29-2.16)	0.00***	1.84(1.26-2.69)		

Descriptive analysis of exposures and outcome variables for Anaemia

Result of a crude association between NHIS membership and anaemia in children under five years as indicated in Table 4.3 shows that the proportion of males with NHIS membership accounted for 58.5 percent and female 51.1 percent. Most of the respondents (72.5 percent) who held NHIS membership were the poorest in the wealth index quintile. There was an identical proportion in terms of the age category between ages 12-23 (67.0 percent) and 0-11 (62.0 percent) respectively. The proportion of rural residents with NHIS membership accounted for 61.8 percent as compared to the urban residents, 46.2 percent. About 66.7 percent with no education had the NHIS membership as compared to those with secondary education, 40.1 percent.

Table 3: Summary of cross-tabulation of National Health Insurance Scheme Membership and Anaemia status of under five children based on Chi-square test statistic with corresponding p-value in Ghana, 2011

		NHIS status		Pearson designed based F test
Characteristics	**Total**	**No Valid NHIS membership (%)**	**Valid NHIS membership (%)**	
Anaemia status				
Sex				12.90;P >0.001
Male	2777	1152(41.5)	1625(58.5)	
Female	2897	1417(48.9)	1480(51.1)	
Wealth index quintile				30.40;P >0.000
Poorest	1115	1306(27.5)	808(72.5)	
Second	1199	451(37.6)	747 (62.4)	
Middle	1202	541(45.1)	659(54.9)	
Fourth	1147	612(53.4)	543(46.6)	
Richest	1012	656(64.9)	354(35.1)	
Child's age (months)				14.11;P >0.000
0-11	604	229(38.0)	374(62.0)	
12-23	1215	401(33.0)	814(67.0)	
24-35	1316	615(46.8)	700(53.2)	
36-47	1327	659(49.7)	667(50.3)	
48-59	1211	663(54.8)	548(45.2)	
Area of residence				37.45;P >0.000
Urban	2571	1383(53.8)	1188(46.2)	
Rural	3103	1185(38.2)	1918(61.8)	
Mother's education				24.50;P >0.000
None	1670	556(33.3)	1114(66.7)	
Primary	1265	527(41.7)	738(58.3)	

		NHIS status		Pearson designed based F test
Characteristics	**Total**	**No Valid NHIS membership (%)**	**Valid NHIS membership (%)**	
Anaemia status				
Middle/JHS	2063	1080(52.4)	983(47.6)	
Secondary	676	405(59.9)	271(40.1)	

Analysis of Multivariate outcome variables

The risk factors associated with anaemia included NHIS membership, sex of the child, socioeconomic status, age in months of the child, mother's educational level and area of residence (see Table 4). Children with NHIS membership had 0.59 times more the odds of reduced anaemia than those without NHIS membership. Females with NHIS membership had 0.74 times the odds of reduced anaemia than males without valid membership.

Mothers who had had primary education and had NHIS membership had 0.69 times the odds of reduced anaemia as compared to those without education. Those within the age in month's bracket of 24-35 with membership cards were 0.70 times the odds of reduced anaemia than those within 0-11 age in months old. Those living in rural areas and who had NHIS membership had 0.88 times the odds of reduced anaemia than those living in the urban areas without valid NHIS membership. Children with valid NHIS membership within the second wealth index quintile had 0.63 times the odds of reduced anaemia than those within the poorest quintile who were without valid membership.

After adjusting for confounding effects of sex, age in months, wealth index quintile, place of residence and mother's education, children with valid NHIS membership had 0.64 [95%CI: 0.52-0.79]; P=0.00) times the odds of reduced anaemia compared with children without membership . Hence, when children with valid NHIS membership are compared with those without membership for anaemia, there is an association between NHIS membership and anaemia prevalence among children.

Table 4 Comparing differences between crude analysis (simple logistic regression) and adjusted analysis (multiple logistic regression) on NHIS membership and association with Anaemia of under-five children in Ghana, 2011

	Crude analysis		**Adjusted analysis**	
Exposure Variables	OR (95% CI)	P-value	OR (95% CI)	P-value
Covatiate/exposure				
Anaemia				
exposure variable)				
No valid card	1		1	
Valid card seen	0.59(0.49-0.72)	0.00***	0.64(0.52-0.79)	0.00***
Sex				
Male	1		1	
Female	0.74(0.63-0.88)	0.00***	0.71(0.59-0.86)	0.01***
Mother's education				
None	1		1	
Primary	0.69(0.55-0.88)	0.00***	0.84(0.63-1.11)	0.00***
Middle/J	0.45(0.36 -0.57)		0.65(0.50-0.85)	
Secondary	0.33(0.24-0.47)		0.66(0.44-0.99)	
Age in months				
0-11	1		1	
12-23	1.25(0.91-1.71)		1.14(0.82-1.69)	
24-35	0.70(0.50-0.97)		0.62(0.44-0.88)	0.00***
36-47	0.62 (0.46-0.84)	0.00***	0.51(0.37-0.71)	
48-59	0.51(0.36-713)		0.43(0.31-0.61)	
Area of residence				
Urban	1		1	
Rural	0.88(1.53-2.31)	0.00***	1.07(0.59-0.86)	0.58
Wealth index quintile				
Poorest	1		1	
Second	0.63(0.49-0.81)		0.68(0.51-0.91)	0.00***
Middle	0.46(0.34-0.63)		0.55(0.38-0.80)	
Fourth	0.33(0.24-0.45)		0.40(0.27-0.59)	
Richest	0.21(0.15-0.28)	0.00***	0.27(0.18-0.41)	

Discussion

According to the scholarly work of [11, 21, 23], in the Ghanaian setting, the ability of households to enroll and renew their NHIS policy is associated with the wealth quintiles mostly linked to income. It is previously reported that households with a higher socioeconomic status

have higher odds to enroll and renew their NHIS policy compared with those in poor socioeconomic standings. This clearly suggests that the socio-demographic factors poses hindrances to some households from enrolling into the subscription of NHIS, thereby inhibiting universal health coverage. In several regional and geographic boundaries, social factors such as gender influences NHIS policy enrolment [17]. While findings from the study between male and female was quite identical, female enrollment was more than that of male. The study, for instance, has shown that the chances of female's enrollment and renewal of their NHIS policy is high as compared to the males and this is consistent with other studies [18, 19, 20]. Such a tendency of increased participation of females in the NHIS policy is mostly linked to their role as mothers and vulnerability to health care. This in effect, might have accounted for more female enrolment as suggested in the study.

Wealth index quintile, as indicated in the study, means that the poor are unable to acquire valid NHIS membership cards, which is consistent with [21,22], who argue that **t**he failure of households to have their subscription renewed is attributed to varying factors such as unemployment and low level of income. The study found that children between the ages of 0 and 11 months - recorded a low valid NHIS membership and this could be attributed to the fact that most mothers delay in acquiring membership for their children because their membership covers their children even while they are yet to be delivered.

Most of the studies that focused on rural-urban differences in NHIS membership have suggested conflicting results. In Ghana, very few studies have been conducted to specifically assess the rural-urban differences in health insurance coverage and the possible determinants of these differences. However, one of such studies did a comparative analysis of the impact of Mutual Health Organisations in three West African countries: Ghana, Mali and Senegal. The study found higher rates of enrolment in mutual health organisations (57.6%) in urban areas of Ghana as compared to 42.4% in rural areas [23] and this is consistent with our findings. One could attribute the geographical differences in NHIS valid membership to the fact that there are more health facilities in the city than there are in the rural areas, so mothers in the cities can access healthcare more easily than those in the rural areas. Similarly, the study found that the level of education played a key role in mothers' ability to enroll in a valid NHIS membership. This

finding corroborates previous studies in Ghana [24, 25, 11] and other West African settings, including Senegal and Mali. Across these settings, individuals educated at the higher level, especially secondary and tertiary levels, were more likely to enroll and renew their NHIS policy [26, 27, 11].

After adjusting for confounding effects of sex, age in months, wealth index quintile, place of residence and mother's education, children within the richest wealth index quintile had 1.67 [95%CI: 1.29-2.16]; P=0.00) times the odds of the poorest within the wealth index quintiles. Thus, when the richest is compared with the poor there is an association between NHIS membership and socio-economic status. When adjusted for confounding effects, the study has pointed out that, for other relevant factors, females with NHIS membership had 1.04[95%CI: 0.89-1.21]; P=0.64) times the odds of males without NHIS membership. There is no association between sex and NHIS valid membership. Mothers with middle/JHS level of education had 0.94[95%CI: 0.74-1.20]; P=0.02) times the odds of those with no education. In effect, there is an association between the level of education and NHIS valid membership.

Children within the age in month bracket of 24-35 months had 3.22 [95%CI: 2.47-4.21]; P=0.00) times the odds of those without membership cards who were in month in age between 0-11 categories. An association was found between the level of education and valid NHIS membership. Children with NHIS membership cards who were living in rural areas had 1.22[95%CI: 0.94-1.57]; P=0.13) odds as compared to those in urban residence. There was, however, no association between area of residence and NHIS valid card membership. Evidence points to the fact that the introduction of insurance has been characterised by increased out-patient utilisation and subsequently increased out-patients per-capita. This means that individuals who are insured against health risks are more likely to utilise outpatients care in public health facilities, especially among poor income groups [28]. However, as socioeconomic factors have been a major stumbling block to subscription to the scheme, this finding corroborates that of [17], who attested that socio-demographic and other household factors limit people from enrolling into the NHIS subscription, thereby preventing universal health coverage [29]. Consequently, among the population who are able to register for the scheme, there has been inconsistency in renewal and utilisation of health care [30].

Our finding on NHIS membership and anaemia in children under five years reveals that gender influenced membership enrollment in favour of male children. This could be attributed to faster growth velocity in boys with higher iron requirement as compared to girls as suggested in a Swedish study [31]. This might have encouraged mothers to enroll more of their male children than their female children. In a related finding, [32] observed that a higher prevalence of anaemia in boys may be due to the faster growth of pre-school boys compared to girls, which leads to a high iron demand that is unmet by daily diet alone.

Far from the widely held belief that it is only the rich who are able to enroll on the scheme [21,22], findings from this study have revealed the contrary. In some other study [33], attributed the poorest enrolling on the scheme as a result of financing reforms which may have seen improvement in immunisation delivery and reduce the load on the public. As reported in this study, mothers with no education were involved in the early enrollment of mothers. Probably, the education of mothers on immunisation and the necessary health precautions against anaemia might have influenced the early months in age of enrollment into the scheme.

Though there was evidence of enrollment in both urban and rural areas, rural enrolment was more noticeable than urban enrollment. This finding debunks earlier works that children living in rural areas were more likely to fail timely vaccination with BCG than children living in urban areas [34]. This finding could be due to studies which focus on rural-urban differences in health insurance coverage that have provided inconsistent results. A study by [35] found that, in developed countries, health insurance coverage in rural areas was significantly lower. Others reported that rural areas had higher health insurance coverage [36] and still other studies found no significant differences in insurance coverage between urban and rural areas [37].

The study also found that, after adjusting for confounding effects of sex, age in months, wealth index quintile, place of residence and mother's education, children with valid NHIS membership cards had 0.64 [95%CI: 0.52-0.79]; P=0.00) times the odds of reduced anaemia compared with children without membership cards. There was association between NHIS membership and anaemia prevalence among children. In related studies [29, 30], pregnant women who were

involved in the scheme enjoyed reduced incidence of birth complications and were more likely to receive care from their parents, utilise hospital delivery, and be attended to by a trained health professional during labour.

Conclusion

The study makes the following conclusions based on objectives that the study sought to achieve and the methodology it adopted. First, the study concludes that NHIS membership can serve as an efficient means by which anaemia prevalence among under five years children can be addressed. The study has suggested that children within the richest wealth index quintile have 1.67 [95%CI: 1.29-2.16]; P=0.00) times the odds of the poorest within the wealth index quintiles. Thus, when the richest is compared with the poor there is an association between NHIS membership and socio-economic status. In relation to other relevant factors, females with NHIS membership have 1.04[95%CI: 0.89-1.21]; P=0.64) times the odds of males without NHIS membership cards. There was also an association between the sex of a child and NHIS valid membership. The study also concluded that mothers with middle/JSS level of education have 0.94[95%CI: 0.74-1.20]; P=0.02) times the odds of those with no education. An association between the level of education and valid NHIS membership was found. Children within the age in month bracket of 24-35 months have 3.22 [95%CI: 2.47-4.21]; P=0.00) times the odds of those without membership cards who are in month in age between 0-11 categories. An association was found between the level of education and valid NHIS membership. Children with NHIS membership living in rural areas have 1.22[95%CI: 0.94-1.57]; P=0.13) odds as compared to those in urban residence. An association was found between area of residence and valid NHIS membership. The study, after adjusting for confounding effects of sex, age in months, wealth index quintile, place of residence and mother's education, indicated that children with valid NHIS membership have 0.64 [95%CI: 0.52-0.79]; P=0.00) times the odds of reduced anaemia compared with children without membership cards. An association was found between NHIS membership and anaemia prevalence among children.

Policy implications

The findings that have been gleaned from this study raise a number of policy issues that deal with national health insurance (NHIS) membership and the curtailment in the incidence of

anaemia prevalence in children under five years. These, therefore, require the following policy responses:

1. Address the impediments in the administration of NHIS. This include different methods of managing premiums and guaranteeing that the scheme is successful in addressing the issue of anaemia prevalence in Ghana;
2. Engage in a consistent education of mothers or couples across the country, that is both rural and urban areas, in regards to matters concerning anaemia and how best it can be controlled;
3. Ensure that pregnant women and nursing mothers are given the necessary opportunity that will make it easier for them to participate in the scheme fully;
4. Connect with the general population through education with the aim of upgrading regular contributions to achieve the aims of the scheme.

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