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Maternal Mortality in Ghana: Impact of the Fee-Free Delivery Policy and the National Health Insurance Scheme

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ABSTRACT

Maternal mortality (MMR) is the second largest cause of female deaths in Ghana. Yet, many households cannot afford the cost of skilled delivery The study utilized the Panel Data Model to examine the impact of the fee-free delivery (FEP) and the National Health Insurance Policy (NIP) exemptions on MMR in Ghana. The Demographic and Health Survey reports on Ghana from 2002 to 2009 served as the main data source. Data were analyzed using Panel data model with within group fixed effects estimator.MMR declined significantly over the period studied. Both FEP and NIP positively impacted MMR at a 5% level of significance.In addition, skilled delivery was a significant predictor of MMR. Stakeholders would do well to ensure that NIP is adequately funded in order to sustain the decline in MMR.

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1. INTRODUCTION

Despite the decline in maternal mortality ratio (MMR) globally, it is likely that Ghana (as other African countries) will not attain the Millennium Development Goal 5 by the year 2015 [1]. Maternal mortality, which accounts for 14% of all female deaths, is still the second largest cause of female deaths in Ghana [2]. A major factor in reducing MMR is the availability of skilled delivery [3]. For example, [4] reported skilled delivery as the factor that most predicted MMR in Ghana. However, many households in sub-Saharan Africa cannot afford the cost of skilled delivery, especially emergency obstetric care [5],[6].

To increase accessibility to skilled delivery, Ghana introduced a fee-free delivery policy (FEP) in four regions of the country in 2003: Northern, Upper East, Upper West, and Central regions [7]. The policy provided free delivery services at all public and private health facilities. The fee exemption was extended to the rest of the country in 2005. The exemption covered all normal deliveries, management of all assisted deliveries, and management of medical and surgical complications arising out of deliveries [7].

The fee exemption policy resulted in increase in facility delivery coverage [8]-[10] the increase was greatest among the poorest. On a positive note, the quality of care did not deteriorate due to increased utilization without a corresponding increase in resources [11]. Second, there was a significant drop in out-of-pocket payments for caesarean section and normal delivery after introduction of the policy, especially among the poorest [12]. Third, delivery-related MMR in two regions decreased, even though these were not statistically significant [8]. Finally, the policy resulted in a decline in direct maternal deaths but not on indirect maternal deaths [13].

A major challenge for the fee-free delivery policy was that doctors were not well prepared to deal with the obstetric conditions commonly seen in district hospitals [10]. In addition, some regions had exhausted funds by late 2005 [5]. The lack of funds resulted in a decline in facility deliveries between 2006 and 2007 [12]. To address this setback, the government in 2008 exempted pregnant women from paying the National Health Insurance Scheme (NHIS) registration and premium fees. The 2008 policy provided pregnant women with six antenatal and two postnatal visits, childcare and other primary healthcare benefits [8]. There is evidence to support the positive impact of health insurance on maternal health [14]. However, little is known about the impact of both the fee-free delivery and health insurance fee exemption policies on MMR nationwide.

To date, studies on the FEP and NIP policies focused on healthcare utilization and economic outcomes, and were conducted in a few selected regions of the country. Furthermore, the few studies that examined the effect of these policies on MMR reported mixed results [8],[13]. Therefore, the aim of the current study was to examine the impact of the fee-free delivery and the NIP exemptions on MMR in Ghana. The specific objectives were to examine: (a) if there was significant decline in MMR post policies and (b) the significant predictors of MMR after implementation of the policies.

2. RESEARCH METHOD

The Demographic and Health Survey data for Ghana from 2002 to 2009 [15] served as the main data sources. The variables used from the surveys included: MMR (response variable), Doctor Population Ratio (DR), Nurse Population Ratio (NR), Antenatal Coverage (ANC), Postnatal Coverage (PNC), Skilled Delivery (SD), and Family Planning Acceptors (FPA). MMR values for the periods before and after the introduction of the FEP and NIP were compared to determine the impact of the policies.

Data were analyzed using descriptive and inferential statistics. Averages, standard deviations, coefficients of Skewness and Kurtosis, and confidence intervals were computed for the introduction of FEP (2002-2005), impact of FEP (2006-2008), and impact of NIP (2009). The study utilized the within group estimator to analyze the impact of two health insurance policies in Ghana. These policies included FEP and NIP. The FE estimator is appropriate for panel data— data collected on the same subjects over time. Panel data are correlated within subjects but independent between subjects. This is a characteristic that the data in the current study exhibit, hence the choice of within group fixed effects estimator. To introduce the within group fixed effects estimator, we first provide a brief description of panel data model.

2.1. Panel Data Model

A Panel data model with one-way error components disturbances is given by

$$y_{it} = x_{it}'\beta + \mu_i + \vartheta_{it} \quad i = 1, \dots, N; t = 1, \dots, T \tag{1}$$

The i and t denote the cross-section and time-series dimensions respectively. β is $K \times 1$ and x_{it} is the i^{th} observation on K predictor variable. μ_i is the unobserved heterogeneity across individuals that is fixed over time. ϑ_{it} denotes the stochastic term which is independent, identically distributed (i.i.d.) with mean 0 and variance σ_ϑ^2.

2.2. Within Group Fixed Effects Estimator

To implement the within group estimator, we consider (1) and then assume that $E(X_{it}\mu_i) \neq 0$, $E(X_{it}\vartheta_{it}) = 0$, and $E(\vartheta_i\vartheta_i') = \Sigma$. Stacking all the observation for $t = 1, \dots, T$ as presented in [16] we obtain

$$\underset{T\times 1}{y_i} = \underset{(T\times M)}{x_i}\underset{(M\times 1)}{\beta} + \underset{(1\times 1)}{\mu_i}\underset{(T\times 1)}{1_T} + \underset{T\times 1}{\vartheta_i} \tag{2}$$

Let

$$\underset{T\times T}{V_T} = I_T - 1_T(1_T'1_T)^{-1}1_T' = I_T - U_T$$

and

$$U_T = 1_T(1_T'1_T)^{-1}1_T' = T^{-1}1_T1_T'$$

Note the following:

i. $U_T 1_T = 1_T$
ii. $V_T 1_T = 0$

iii. $U_T y_i = 1_T(1'_T 1_T)^{-1} 1'_T y_i = 1'_T \bar{y}_i$
iv. $V_T y_i = (I_T - U_T) y_i = y_i - 1_T \bar{y}_i = \bar{y}_i$

From the above, we obtained a transformed form of (2):

$$V_T y_i = V_T X_i \beta + \mu_i V_T 1_T + V_T \vartheta_i \quad (3)$$

The regression model stacked by observation becomes:

$$\begin{bmatrix} \bar{y}_1 \\ \vdots \\ \bar{y}_n \end{bmatrix} = \begin{bmatrix} \bar{X}_1 \\ \vdots \\ \bar{X}_n \end{bmatrix} \beta + \begin{bmatrix} \bar{\vartheta}_1 \\ \vdots \\ \bar{\vartheta}_n \end{bmatrix}$$

and the within group fixed effects estimator is obtained as follows:

$$\hat{\beta} = \left(\sum_{i=1}^{n} (V_T X_i)' \, V_T X_i \right)^{-1} \sum_{i=1}^{n} (V_T X_i)' \, V_T y_i$$

However, V_T is idempotent, hence $\hat{\beta}$ and the corresponding variance (Baltaji (2005)) become

$$\hat{\beta} = \left(\sum_{i=1}^{n} X_i' V_T X_i \right)^{-1} \sum_{i=1}^{n} X_i' V_T y_i$$

and

$$\mathrm{var}(\hat{\beta}) = \sigma_\vartheta^2 \left(\sum_{i=1}^{n} X_i' V_T X_i \right)^{-1}$$

We direct readers to [16]-[18] for details on panel data models.

3. RESULTS AND ANALYSIS

3.1. Trend of MMR

Table 1 provides the descriptive statistics for MMR by period. The average MMR rose from 220.27 in 2002-2005 to 202.56 in 2006-2008 and later dropped to 171 in 2009. Also, it is very indicative from the Table 1 that, the ratio in the three different periods were not significantly skewed since the coefficients of Skewness were neither smaller than -1 nor bigger than +1. Similarly, none of the values of the kurtosis for the ratio in the three periods were less than -3 or bigger than +3. Hence the ratio for the three periods were not significantly heavy tailed. The 95% confidence intervals for the average MMR in the population in 2002-2005, 2006-2008, and 2009 were (181.34, 219.80), (183.10, 222.02), and 142.76, 199.24) respectively as shown in Table1.

Table 1. Summary Statistics of MMR in Ghana for 2002-2005, 2006-2008, and 2009

Variable	Period		
	2002-2005 (Intro. FEP)	2006-2008 (Impact FEP)	2009 (Impact of NIP)
Average	200.57	202.56	171
Standard Deviation	62.05	54.39	45.55
Skewness	0.59	0.29	0.82
Kurtosis	0.43	-0.37	-0.73
95% CI for the Mean of MMR	(181.34, 219.80)	(183.10, 222.02)	(142.76, 199.24)

The distributions of MMR for the three periods are shown in Figure 1. MMR were more spread out in 2002-2005, followed by 2006-2008, and then 2009 as indicated by the upper whiskers of the boxplots.

These confirm that the standard deviation for MMR decreased monotonically from 2002-2005 to 2009 (see Table 1). The general trend in the boxplots indicated that MMR declinedduring the periods under observation (see Figure 1). It is important to mention thatFigure 1 shows potential outliers in the MMR data set for the periods 2002-2005 and 2006-2008.

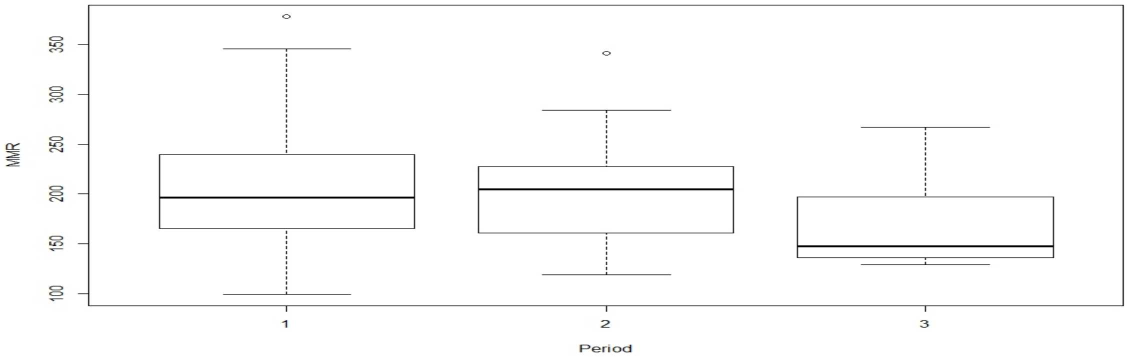

Figure 1. Distribution of MMR in Ghanafor 2002-2005, 2006-2008, and 2009

3.2. Post Policy Effects

Table 2 displays the estimated parameters with their corresponding standard errors, t-values and p-values. The estimated parameters were obtained by using the within fixed effects estimator. Data in Table 2 indicate that both FEP and NIP were found to be statistically significant in predicting MMR when the level of significance was set at 5%. For instance, MMR dropped significantly by 45.22 (t = -2.456, p-value < 5%) after the introduction of FEP. Similarly, MMR decreased markedly by 51.43 (t = -2.369, p-value < 5%) after the introduction of NIP. In addition, Table 2 shows that SD was a significant predictor of MMR, while DR, NR, ANC, PNC, and FPA were not.

Table 2. Estimated coefficents for predictors of MMR in Ghana for 2002-2005, 2006-2008, and 2009

	Coefficient	Standard Error	t-Value	P-Value
DR	0.001	0.001	0.499	.619
NR	0.004	0.021	0.206	.838
ANC	-1.280	1.135	-1.127	.264
PNC	-0.079	0.887	-0.089	.929
SD	-3.430	0.688	-4.984	.000***
FPA	0.219	0.725	0.302	0.764
FEP (Post Policy Effect)	-45.215	18.409	-2.456	.017**
NIP(Post Policy Effect)	-51.425	21.708	-2.369	.021**

*** P-Value 1%, ** P-Value 5%, and * P-Value 5%

4. DISCUSSION AND CONCLUSION

The finding of the present study that the FEP resulted in a significant decline in MMR is consistent with that of [9] even though the latter was not statistically significant.Specifically, [9] reported that delivery-related MMR in two regions of the country decreased after the introduction of FEP. Cross *et al.* [13] also reported a decline in direct maternal deaths post FEP.

Data in the present study indicated that the NIP had a significant impact on MMR—MMR declined after the introduction of the policy. This supports the assertion that health insurance coverage positively impacts maternal health [14].

Another finding of the current study was that supervised delivery was a significant predictor of MMR after the introduction of both the FEP and NIP. This finding is consistent with previous studies [4],[19] that reported the role of skilled delivery in reducing MMR. As [20] noted, stakeholders in the Ghanaian health sector need to mitigate the social factors that prevent many expecting mothers from seeking skilled delivery.

The study utilized Panel Data to investigate theimpact of the fee-free delivery and the national health insurance policy exemptions on maternal mortality ratio in Ghana.The introductions of both the FEP and NIP resulted in significant decline in MMR.The present study utilized data at the national level;future research should investigate the effects of FEP and NIP on MMR in the regions.

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