

The Economic Determinants of Child Mortality in the Philippines: A Panel Analysis of 16 Regions

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ABSTRACT

This paper investigates the impact of the economic determinants affecting child mortality in 16 regions of the Philippines. To make the analysis effective, the researchers used panel data consisting cross-sectional and time series to run a panel regression for 16 regions from 2009-2013. Fixed effects panel data regression models were utilized to examine the effects of the determinants to child mortality. The results from the food price inflation rate and child mortality exhibited an insignificant relationship. However Out-of-Pocket and Government Expenditures were proven to be statistically significant in the reduction of child mortality. The result indicated that the following expenditures helped to lower the number of child deaths.

Keywords: child mortality, food price inflation, government expenditures, out-of-pocket expenditures

INTRODUCTION

Child mortality is one of the socioeconomic issues affecting the economic development of a country that was measured by the probability of child's death before reaching the age of 5 out of 1,000 births. Most of the child deaths took place in the developing countries, such as the Philippines. (Razum and Breckenkamp, 2007) From the years between 1990 and 2011, the under-5 mortality annual rate reduction in Philippines was 3.8%. Responsive activities to diverse disparities were needed to improve the health care of children who mostly lived in the poorest and rural areas.

For the past two decades, the under-five mortality rate in the Philippines was reduced by half. Recently, UNICEF reported that child mortality rate in year 2011 had dramatically decreased where only 25 under the age of five out of 1,000 live births died. The rate declined to 55% from the 57 deaths of under-five age in the year 1990. The United Nation's target for 2015 was to reduce it by two-thirds. This research aims to study the impact of food price inflation, government expenditures on health and out-of-pocket expenditures on child mortality. Furthermore, this study will provide the feasible courses of action that must be taken by the government to reduce child mortality in the country especially in the rural areas.

The data retrieved by the researchers from the Department of Health (DOH) determined the highest under-5 mortality rate among the regions was concentrated in the urbanized National Capital Region while the lowest rates were from ARMM in the year 2009 and 2012. According to the DOH, the top 3-leading causes of child death in the Philippines were Pneumonia, Diarrheas and Gastroenteritis of presumed infectious origin and Congenital anomalies. Majority of the population who suffered were those who resided in remote rural areas. These underlying-causes of child death restricted the child's ability to enjoy his right of living at its fullest extent.

It was well-recognized that the government intervention to improve the health of being could create a desirable impact for economic development. Meanwhile, the Philippine Institute of Development Studies (2009) investigated that adequate allocation of budget for health was not sufficient. Giving proper assurance of resources that should be given to a segment of population must be observed where intervention was mostly needed.

The public health sector was expected to allocate funds on health to ensure the welfare of the citizens. Therefore, the role of the government was essential to transform the social welfare system by amending the allocation of funds (Cevik and Tasar, 2013). It was a challenge to the government of the Philippines to provide the necessities of a fast growing population with a congested poor urban setting. Giving attainable quality healthcare services to these areas were not that easy for the government to interfere. Unfortunately, the average total government expenditures percentage in the year 2012 allocated on health was 30.4% according to the World Bank Data and a total expenditure on health as percent of Gross Domestic Product (GDP) is 4.4. Consequently, in 2013, the Senate of the Philippines expressed that health authorities remarked that at least 5% of its GDP from government expenditures shall be spent on health.

From the previous years, increase in food prices had steadily remained high, plotting threat to children's health that led to child mortality. According to Lee et al. (2013), children were easily affected by food insecurity due to several reasons such as high food prices, insufficient food intake, and unstable nutritional pattern that may affect their physical and mental growth. Consequently, this may lead to developing disorders and diseases among children. As a result, these factors increased the child mortality in the long run. Brinkman et al. (2010) stated that high food prices harmed by undoing much of the progress made concerning to achieve the MDG 4. The computed average food price inflation rate in Philippines recorded in 2012 was 2.31%. Across the region, the highest food price inflation rate was experienced in Region VII and its lowest was in Region III. Food price inflation in Philippines was reported by the National Statistics Office of Philippines.

Out-of-pocket-expenditures (OOP) have also been considered as one of the factors affecting the increase of child mortality. It has been defined as any direct outlay by households to health practitioners whose primary purpose was to contribute to the restoration of the health status of an individual. According from National Statistical Coordination Board, the Philippines' OOP was about 55.92 (% of total expenditure on health) as of 2011. Country's OOP continue to rise despite of the health financing system policy reforms.

REVIEW OF RELATED LITERATURE

2.1 Child Mortality

One of the most important indicators that form a serious challenge for the development of nation is child mortality. Child mortality significantly measured social inequality because it indicated the group's success for providing life. It was also important to determine the factors of increasing mortality such that it signaled socio-economic development of a country whereas high rates of mortality would mean a poor economic development. (Suwal, 2001; Franz and FritzRoy, 2006)

A set of time-bound targets, which was called Millennium Development Goals (MDGs), were agreed upon by 189 countries for economic development were established at the United Nations Millennium Summit in 2000. One of the eight MDGs was to reduce the under-five mortality by two-thirds by the year 2015. Reduction in mortality was less widely agreed upon because of the confounding socio-economic determinants of child survival within-and-between country. Recently, the global spotlight has strongly focused more on child mortality on which it advances to achieve MDG 4. (Alkema, 2014 ; Franz and FritzRoy, 2006)

Suwal (2001) said since child mortality was conventional among the poor, the children's chance to survive did not only rely to the availability of public health services alone. The capacity to access and afford economic goods that depend on income level must be considered.

2.2 Food Price Inflation to Child Mortality

Current economic crisis and rise of food prices may have created an impact on the nutritional and health status most especially in the developing world. From the past few decades, gains in child survival were likely to be at risk. The strong effect of such economic situation on mortality was less well known yet an increase in number of people experiencing hunger has been assessed. Anriquez et al. (2013) stated that food price increase affecting welfare was likely to be diverse upon the price changes on commodity and the structure of the economy.

The coping capacities of many households across the developing world have been threatened and diminished by high food prices. Brinkman et al. (2010) said there was a strong effect on child survival as relative prices continue to rise in lower levels of income. The situation may also compel the household to forego other spending to sustain food intake that the child needs. Continuity of the situation created risks to health which can be an exchange between adequate living conditions, preventive care and food security. Brinkman et al. (2010) indicated that higher food prices result to a decrease in consumption. Most of the population would switch to cheaper food which was less nutritious. There were lesser acquisition of expensive food items and reduction of size and frequency of meals. Within a family, adults would prioritize the food consumption of their children than their own. When there was an inadequate food intake and unfavorable dietary patterns, people were more likely prone to illness and impairment of physical and mental aspects. Long term consequences caused by largely irreversible effects of one's development shall be dealt even in 6 months of inadequate nutrition for the age of 2 years. (Brinkman, et al., 2010; Grigoriou, et al, 2005; Fledderjohann, et al, 2008)

According to Darnton-Hill and Cogill (2010), national economies were affected by the food price inflation, the global financial crisis, and environmental and climate change but the poor were the most affected. Households may surrender their budget for children's clothing, education and healthcare from maintaining food intake which decreased child survival. (Ruel et al., 2010; McKenzie, 2003; Ferreira and Schady, 2008). Fledderjohann et al. (2008) stated that rising food prices appeared to have an impact associated with worse mortality outcomes among young children. Similarly, De Waal et al. (2006) studied the drought from year 2002 and 2003 in Ethiopia where child mortality was higher in affected areas. Although a closer analysis showed that the distinct cause was attributable to chronic conditions such as the household-level demographic factors, food and livelihood security, economic level production of the community, and access to clean water. Yamano et al. (2005) pointed out that food aid reduced malnutrition of children and offset the negative effects of the agricultural problems that could be encountered. Caufield et al. (2004) showed that due to malnutrition, a significant proportion of children died worldwide. On the other hand, the research of Gelaw and Sileshi (2013) on the level of poverty also pioneered to increase with the prices of grains that could affect the consumption of nutritious food intake of the households and children. Moreover, Tomoki (2013) found a negative effect of food price inflation on poverty in the Philippines.

Darnton-Hill and Cogill (2010) indicated that during the Indonesian financial crisis in 1997-1998, there was no increase in child undernutrition, proposing that mothers sustained their children's food intake at their own cost. Black et al. (2008) stated that one million dies annually out of the 20 million children under-five years of age that suffered from malnutrition even before the food, fuel, and financial crisis occurred.

Christian (2010) pointed out that an increase in food prices was not the major reason why there was an increase in child mortality. From the previous years, the current crisis as regards to food prices recently declined. Aside from starvation, an exploration of numerous nutritional pathways was determined on which child mortality could increase. These include increases in childhood wasting and stunting, intrauterine growth restriction and micronutrient deficiencies. This identified how economic crisis and food price inflation may directly or indirectly cause child mortality to increase. Nutritional interventions to vulnerable populations were suitable to create a substantial impact on child mortality.

Lee et al. (2013) proposed that infant and child mortality increased because of high price volatility but it did not have the impact on prevalence of undernourishment. Hikes in food price resulted to a complex food insecurity situation. Population living in poverty, experiencing hunger and struggling from chronic food insecurity may get affected. Anriquez et al. (2013) enumerated the three-interrelated elements embodied in food security which were availability of food supply, the economic capacity to attain food and utilization of food safety and micronutrient sufficiency. Food security was achieved when all people could acquire physical, social, and economic access to sufficient, safe and nutritious food to meet their food preferences for healthy living. (Food and Agriculture 2014).

Fledderjohann et. al (2008) argued that suggesting policies targeting food security was not enough to alleviate food poverty and mitigate the negative effects of increasing food prices on child health.

H1: Increase in food price increases child mortality.

2.3 Government Expenditure on Health

Peralta and Deluna (N.D) stated that Public Health Expenditure was essential in improving health outcomes of the poor for they excessively rely their health status on the public services and facilities provided by the government. According to Cevik and Tasar (2013), the poor were vigorously affected by public health expenditure compared to the rich, for the rich were expected to have access to medical aid when they were ill. The leading causes of child death in the Philippines were Pneumonia, Diarrhea and Gastroenteritis. Although these diseases were curable, most of the children died from the attacks of these diseases. The underlying cause of these may be attributed to poor public health services and facilities provided by the government. Therefore, it was the level of health care spending that could fill the gap between the health status of the poor and the rich (Gani, 2009). Indeed, public health interventions could improve the overall health status of the citizens. (Grembowski, 2010).

Ranj Kumar and Swaroop (2007) used the data of the years 1990, 1997, 2003 to examine the impact of public health expenditure to child mortality, using governance indicators such as corruption index and quality of bureaucracy index. For every increase in public health spending by 1%, there was a reduction of .18% in child mortality. The result of their study proposed two things. First, developed countries had lower child mortality. Second, there was a negative relationship between public health expenditure and child mortality, given that the public health spending was positively correlated with the level of governance. Similar to this, Cevik and Tasar (2013) had examined the effects of public health expenditure on child mortality using cross country data set and OLS regression to explore the factors affecting the health outcomes and significance of public spending on healthcare. The main result presented that an increase of 1% on public health expenditures led to a decrease in child mortality by 33%. The study had concluded that current public health expenditures were not being utilized in low and middle income countries because of ineffective governance and decision-making problems. Wang (2002) concluded that public health expenditure was significant in reducing child mortality using effectiveness analysis. Results had shown that increasing public health expenditure of GDP by 2% decreased child mortality. Kim and Lane (2013) also suggested that increasing the public health expenditure was an effective action to enhance the health status of the citizens. Using instrumental variable on a sample of 127 countries, Bokhari et al. (2007) estimated that an increasing the per capita government health expenditure by 10% reduced the under-5 mortality rate by 5%. Marathappu et al. (2014) explored the role played by government health spending. He used comparative country-level data for 176 countries from 1981 to 2010 to determine the correlation between government health expenditure and child mortality. Using Multivariate regression analysis, the results indicated that reductions in government health expenditure led to a higher child mortality rate, especially in the developing countries. The findings of Novignon et al. (2012) suggested that public health expenditure remained critical factor of the improvement of health conditions in sub-Saharan Africa.

In contrast with the findings above, public health expenditure was insufficient to affect child mortality rate, as reported by Peralta and Deluna (N.D). In line with this, Kaushal et al. (2013) found that the relationship between public spending on health and child mortality was insignificant. The findings of their study have similarities with earlier research. Filmer and Pritchett (1999) also found that there was a small insignificant factor of public health expenditure on child mortality. Increasing public health spending may be ineffective if there was a high level of corruption leading to a relatively small amount of

funds that was actually spent for the health care needs. (Bokhari et al., 2007) Another study by McGuire (2006) confirmed that increasing healthcare spending do not systematically reduced the level of child mortality. Kaushal et al. (2013) further identified the reasons why public health expenditure has insignificant relations to child mortality in India. First, public health spending may be inadequate to finance an effective health system. Moreover, if a large portion of the public health expenditure was allocated to the wages and salary of the health personnel, then there was a possibility that public health spending have no impact on child mortality. Second, the way that public health services were distributed measured the impact of public health expenditure on child mortality. Some health personnel gave medical care to their clients according to their views and perception instead of acknowledging their needs. Lastly, increasing the supply of health services did not imply that child death reduced; the demands for such services should also be considered. For government health expenditure to improve the health outcomes, government spending must build health services that were efficient, and cost-effective. (Filmer and Pritchett, 1999).

To summarize this, some studies have shown that when you increased the public health expenditure, there was a reduction in child mortality rate, given that the country has good governance. On the other hand, some findings have revealed that there was no significant relationship between public health spending and child mortality due to some underlying causes. The reviews of the studies that have been investigated earlier clearly indicated that the impact of public health expenditure on child mortality rate remained to be inconclusive. In addition to that, Hanmer et al. (2003) believed that the assertion that public health expenditure as an effective way of improving the health of children was unproven. Ude & Ekesiobi, (2014) stated that one of the unresolved issues was whether public spending yielded positive outcome for health, specifically in child mortality. Due to these, the researchers assumed that:

H2. Increase in public health expenditure decreases the child mortality.

2.4. Out-of-Pocket Expenditure

Aji et.al (2013) illustrated that out-of pocket expenditures included hospitalization costs, physician fees, clinic charges and traditional healer fees and medicines. The authors have imparted that insurances did not reduce out-of-pocket expenditures. The reason behind the aforementioned situation was that it could be possibly determined from its less comprehensive incentives package without covering the medical treatment which costs were high. Higher out-of-pocket spending may cause beneficiaries to endure covering the said treatments.

A study conducted by Ruger and Kim (2007) stated that informal treatment charges, excessive fees for uninsured services and high cost sharing could be insurmountable where financial barriers limited the capability to access such necessary care especially for the class of lower income. Further research as regards to better understanding between out-of-pocket spending and significant health problems would be useful especially when it estimates how time influenced health status on health care service use and out-of-pocket expenditures.

Mirzazadeh et al. (2012) analyzed the countries Afghanistan, Turkey, Uzbekistan, Pakistan, Iran, Tajikistan, Kyrgyzstan, Kirghizstan and Azerbaijan, using crude regression analysis. The results showed that enhancing Out-of-Pocket health expenditure by 10%

decreased child mortality by 31 cases. While Rehman et al. (2013) proposed that 43% of the mothers were uneducated and would rather choose to consult private doctors. The type of health provided was significant to the level of education of a mother which consequently increased the Out-of-Pocket expense and delaying the child's treatment. Similarly, Barasa et al. (2012) concluded that Out-of-Pocket expenditures were regressive, with a larger difficulty being experienced by low socio-economic households compared to high socio-economic households. Therefore, it hindered child survival.

It has been reported by the World Health Organization that most of the people from developing countries allocated significant amount of money in acquiring health care services from private sector. Huerta et al. (2014) stated that children below 5 years who belong to a family that lack access to health insurance and social security have a higher tendency of obtaining diseases and dying than those children who have higher standards of living. Sambo et al. (2005) investigated the leading causes of illnesses among children under five years of age, their corresponding sources of healthcare, and out-of-pocket expenditure for under-fives in Northern Nigeria. Using a sample population of 324, 41.7% of the respondents acquired medication from patent medicine vendors, 31.3% from public health facilities, and 16.7% from private clinics. Consequently, the out-of-pocket expenditure constituted 43% of all expenditure in Africa, 37% from government, and 25% from donors. (Sambo, 2005).

On the other hand, Muldoon et al. (2011) stated that health resources and health financing with the slightest ability of providing out-of-pocket expenditures decreased child mortality. While the work of Habivov and Fan (2014) showed that it was important to know the system when it was distinguished by chronic underfunding, lack of drugs and supplies, dilapidated facilities, lack of systematic and effective treatments, and high levels of unofficial out-of-pocket expenditures for personnel, otherwise, insignificant effect on child mortality could be expected.

Hopkins (2010) compared the health contribution of public and private sectors in 31 low, middle, and high income countries using cross sectional health expenditure data. This study signified that low and middle income countries relied more on private funding specifically out-of-pocket payments while public funding was more on curative care in low and middle income countries. Odhiambo et al. (2015) used dynamic panel estimation method to estimate panel data for 41 SSA countries from 2000-2009 to examine the effect of health expenditure on child health. The average public and private healthcare spending was US\$ 759 million and US\$ 1,130 million consequently. Although the private health spending was higher than the public health spending, the results have shown that private health spending was positive and insignificant to reduce child mortality.

Novignon et al. (2012) studied the effects of public and private health care expenditure on health in sub-Saharan Africa using panel data from 1995-2010 in 44 countries in SSA. Fixed and random effects panel data regression models were utilized to examine the effects. Unlike the previous study by Odhiambo et al. (2015), the main results suggested private healthcare spending has a negative and significant impact to child mortality. Similar to this, it has been concluded that increasing private health care spending reduced child mortality from the range of 0.07% to 0.08%. (Odhiambo et al. 2015). According to Issa and Ouattra (2012), there was no significant effect on child mortality to low income countries unlike in the case of high income countries for private health expenditures played substantial purpose in decreasing child mortality rate. Ude and

Ekesiobe (2014) agreed that child mortality significantly reduced along with inclined health spending as far that health allocation has been uprightly expounded. A balanced quality health care services or programs must be provided on both rural and urban areas to improve a citizen's health condition in short and long-run.

H3. Higher out-of-pocket expenditure decreases child mortality rate.

Synthesis:

The first proposition of the study illustrated a positive relationship between food price inflation and child mortality rate. Continuous increase in food prices resulted to an increase of child mortality rate. Studies have shown that higher food prices decreased the consumption. Reducing the consumption of food was one of the primary reasons that may put child's health at stake from inadequate food intake and failure to provide the child's nutritional needs.

The second proposition of the study presented that there was a negative relationship between government health expenditure and child mortality rate. It was the government's responsibility to improve the quality of health care services in our country by appropriating adequate funds to support the health needs of the citizens particularly, child health. Given this, increasing the public expenditure in health reduced the rate of child mortality.

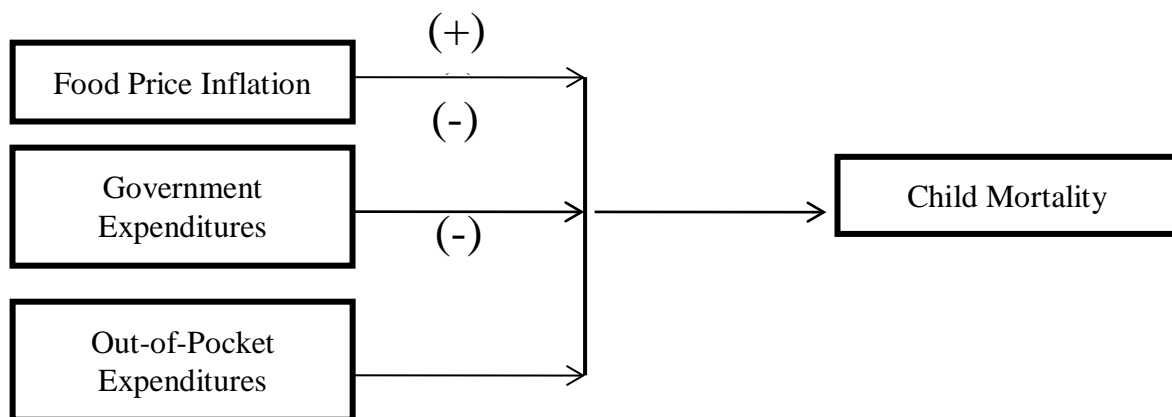
The third proposition of the study illustrated that out-of-pocket expenditure and child mortality rate has a negative relationship. It represented the increasing out-of-pocket expenditure reduces child mortality rate. Higher out-of-pocket expenditures created the capability to access one's necessary needs with quality.

Theoretical Framework:

The Basic Permanent Income Hypothesis Model by Deaton determined that temporary variation in income could be manipulated through smooth consumption. A reduction in the number of meals was one of the indicators as the food price increases. Nutrition was an important health input where intakes could develop health status. A positive impact could be brought on the health situation in the long run or the other way round. The Pitt and Rosenzweig Model outlined the impact of prices on health investments. In lieu, the net effect of food price changed on health depends on the consumption's cross-price effects and inputs in the health production function.

In the Modernization Theory, industrialization and economic development advocated enhancing human well-being which in return, could reduce child mortality. The developmental state theory suggested that government could enhance the population well-being and meet the needs of the poor by allocating educational, health and other social services which could reduce mortality in the first years of life.

Life Cycle Model of Consumption expounded smooth consumption where the marginal utility of money was kept constant over time which it encountered surreal variable expenditures. Aside from lifetime earnings, other households could incline the precautionary saving. The model has also been used to study how income shocks affect health consumptions over the lifetime cycle.

Simulacrum:

The researchers gathered data from different reliable departments related to the economic factors affecting child mortality some of which were National Statistics Office (NSO), Philippine Health Insurance Incorporation (PhilHealth), Philippine Statistics Authority (PSA) and Department of Health (DOH). The dependent variable was child mortality measured by the number of child deaths per region. The explanatory variables were food price inflation rate per annum, government expenditures on health in peso per annum and out-of-pocket expenditures per annum.

Due to unavailability of data, the researchers have projected the deaths of under-five children in MIMAROPA and Davao regions in the year 2010. Deaths of under-five children and government expenditures of 2013 and out-of-pocket expenditures in the year 2009 were also computed by regional.

The researchers used panel data consisting cross-sectional and time series to run a panel regression for 16 regions from 2009-2013. This method was also based from the works of Odhimambo et al. (2015). From the study of Novignon et al. (2012), fixed effects panel data regression models were utilized to examine the effects of the determinants to child mortality such as food price inflation, government expenditures and out-of-pocket expenditures.

Econometric Model:

$$CMR_{it} = \beta_0 + \beta_1 FPI_{it} + \beta_2 GHE_{it} + \beta_3 OOP_{it} + \varepsilon_{it}$$

The following variables denote:

CMR = Annual and Regional Child Mortality Rate

FPI = Annual and Regional Food Price Inflation

GHE = Annual and Regional Government Health Expenditures

OOP = Annual and Regional Out-of-Pocket Expenditures

i = Cross-sectional unit

t = Time Period

ε = Residual Error

To compute the food price inflation, given the data from CPI particularly in food, we used the formula:

$$\text{Food Price Inflation Rate} = \frac{CPI_2 - CPI_1}{CPI_1} \times 100$$

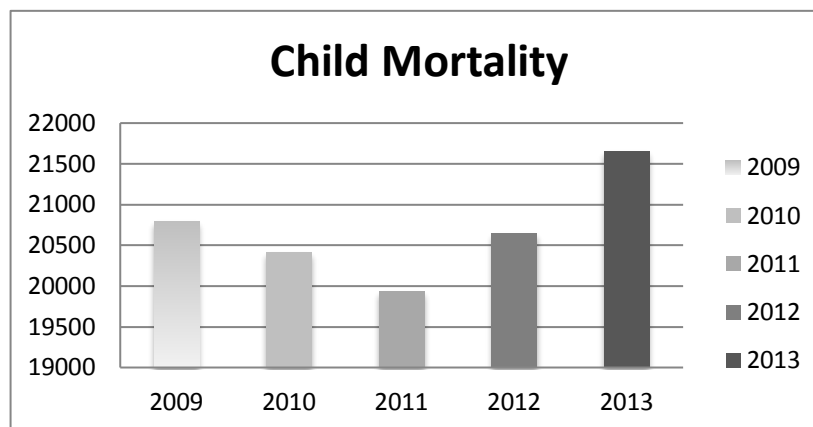
Whereas:

CPI_1 – is the calculated CPI from the previous year

CPI_2 – is the calculated CPI from the current year

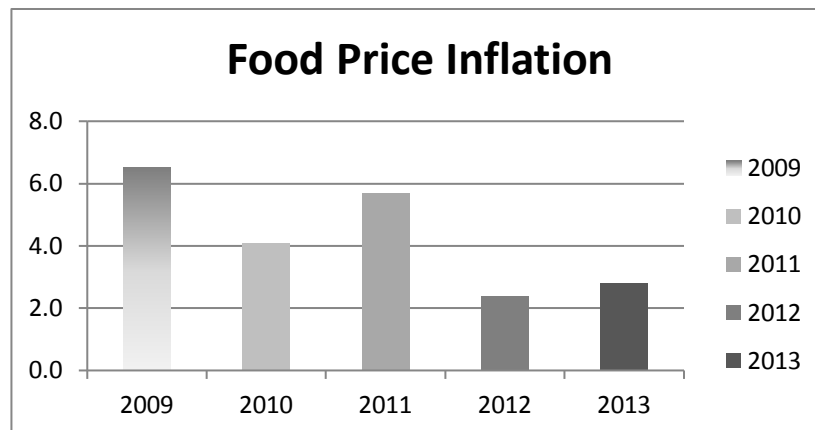
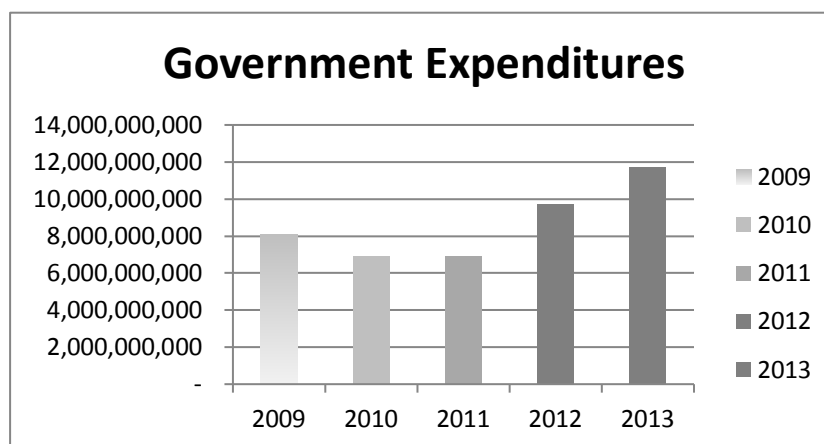
PRESENTATION, ANALYSIS AND INTERPRETATION OF DATA

Figure 1: Child Mortality (2009-2013)



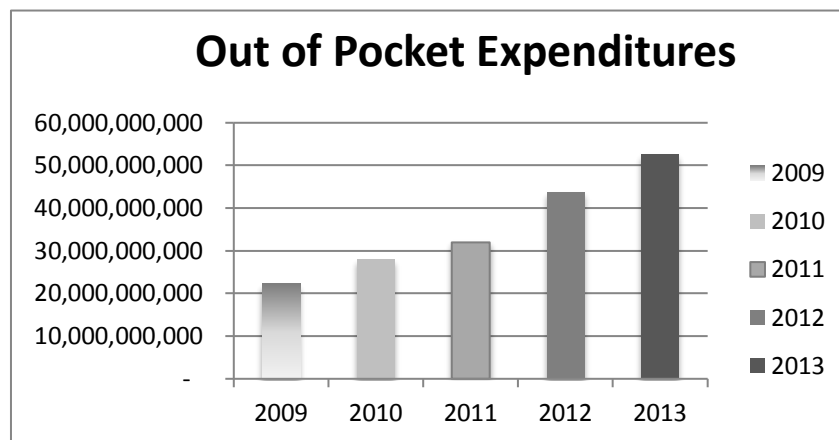
The total number of under-five child death as released by the Department of Health (DOH) shows a fluctuating trend. From 2009 to 2010, the number gradually decreased from 20,798 to 20,416. In 2011, the number of child death in the country further decline to 19,939 deaths. This implied that from 2009 to 2011, child mortality decreased by 4.3%. In 2012, the child mortality gradually increased to 20,647 deaths showing an upward trend up to 2013. In the year 2013, child deaths were projected due to insufficient data. The child mortality again increased by 7.9% from 2011 to 2013.

The food price inflation data of the Philippines given by National Statistics Office showed that there was an inflation rate of 6.5 in the year 2009. Thus, it declined to 4.1 in 2010 yet in year 2011 it grows to 5.7 and fell again to 2.4. In the latest year of data, it reached the 2.8 rate. The food price has a frequent change of +0.9 between a lowest point of 2.4 and reached a peak of 5.7 in year 2009-2013.

Figure 2: Food Price Inflation (2009-2013)**Figure 3: Government Health Expenditures (2009-2013)**

The Total Government Expenditures on Health came from the General Appropriation Act (GAA) released by the Department of Budget and Management which is in Philippine Peso (PHP). The government expenditure went through a trough from 2009-2013, where it decreased from 2009 to 2010, it remained stagnant from 2010 to 2011, and it significantly rose from 2011 to 2013. The highest budget allocated throughout the years was in 2012 and the lowest was recorded in 2011, having an average growth rate of +1.12% from 2009 to 2013.

The total number of expenditures of out-of-pocket measured in peso (Php) was gathered from the Philippine Health Insurance Corporation. The graph shows that the trend analysis of the amount spent has dramatically increased at an average growth rate of 1.24% from 2009-2013. Private health expenditures of Php 31.96B has been reported last 2011 whereas the under-five child mortality rate has dramatically decreased by 25 out of 1000 livebirths in accordance with the United Nations Children's Fund (UNICEF).

Figure 4: Out-of-Pocket Expenditures on Health (2009-2013)

RESULTS AND DISCUSSIONS

To explain further the effects of the selected determinants on Child Mortality, Dynamic Panel Estimation Method and Fixed Effects Panel Data Regressions were used in this research:

Dependent Variable: CMR
 Method: Panel Least Squares
 Date: 10/06/15 Time: 15:03
 Sample: 2009 2013
 Periods included: 5
 Cross-sections included: 16
 Total panel (balanced) observations: 80

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1199.273	179.5445	6.679532	0.0000
FPI	7.162332	17.05776	0.419887	0.6760
GHE	-6.43E-07	3.70E-07	-1.735905	0.0876
OOP	1.75E-07	6.24E-08	2.799987	0.0068

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.973551	Mean dependent var	1293.188
Adjusted R-squared	0.965746	S.D. dependent var	1195.193
S.E. of regression	221.2048	Akaike info criterion	13.83990
Sum squared resid	2984826.	Schwarz criterion	14.40563
Log likelihood	-534.5961	Hannan-Quinn criter.	14.06672
F-statistic	124.7383	Durbin-Watson stat	1.807606
Prob(F-statistic)	0.000000		

The results of the study statistically convey that two of the independent variables, Government Expenditures and Out-of-Pocket Expenditures affecting child mortality are significant determinants that were proven by F-statistics of 0.0876 and 0.0068, respectively. This clarified that the aforementioned variables were negatively related to the criterion. Hence, the Food Price Inflation Rate has an insignificant determinant which means that it does not create a huge impact on child mortality. The researchers used 10% level of significance to determine the statistical significance of the predictors. The Durbin-Watson equivalents to 1.807606 therefore there is no auto-correlation on the conducted study.

ECONOMETRIC MODEL

$$CMR_{(16)(5)} = 1199.273 + 7.162332 * FPI_{(16)(5)} + 0.0000063 * GHE_{(16)(5)} + 0.00000175 * OOP_{(16)(5)}$$

Food price inflation is an insignificant determinant for the increase (decrease) in child mortality that opposes most of the past studies which they said that food price inflation lead to increase in child mortality. (Brinkman et al., 2010; Grigoriou et al., 2005; Fledderjohan et al., 2008) This means that food price inflation on child mortality has no effect in the Philippines. Christian (2010) study about impact of increase in food prices on child mortality pointed out that an increase in food prices is not the major reason why there's an increase in child mortality. Darnton- Hill and Cogill (2010) study indicated that during the Indonesian financial crisis in 1997-1998, there was no increase in child undernutrition, proposing that mothers sustained their children's food intake at their own cost.

Fujii (2013) implied the global food crisis has troubled many across the globe. From 124.7 in June 2006 to 224.1 in just two years, the FAO Food Price Index has increased. Succeeding the financial crisis, the food price has declined to as low as 141.2 in February 2009 but it has increase again rapidly. In February 2011, the index has attained 237.7 exceeding the pre-crisis peak level, showing the crisis is far from over yet. A large number of people have been adversely affected by the food inflation in the Philippines. The general impact of the inflation was not evident, because the increase in food prices may favor the net sellers of food where some of them were poor. Therefore, the inflation of food prices has advantaged at least some of the rural farmers whereas most of the urban poor have been adversely affected. Moreover, Hyun (2008) study shows that effects of rising food prices are different across households.

The assumption of the researchers' is empirically correct that the relationship between Government Expenditure on Health and Child Mortality is negative. Based on the regression result, Government Expenditure was proven to be statistically significant in the reduction of child mortality at 10% level of significance that contradicts the past studies of Kaushal et al. (2013), Filmer and Pritchett (1999), Bokhari et al. (2007), and McGuire (2005) which stated that government expenditure was insignificant to affect child mortality. This signifies that government expenditure decreased the number of child deaths. According to the econometric model, a peso increase in government expenditure can lead to a decrease of .000000643 on the number of child death. It means that P1, 555,209.953 is needed to avoid the death of one child.

In 2009, the Department of Health (DOH) in partnership with the United Nation agencies, as well as the Australian government launched a program called “Joint Program on Maternal and Neonatal Health” from 2009 to 2016. This project aims to address the high maternal mortality rate and infant rate in the country by providing improved health services and equipment as each UN agency cooperate with the government by pooling procurement, equally dividing the costs in service delivery, and training of health workers. It is important to know that these issues concerning maternal health and public health care facilities are being addressed as to decrease the rate of child mortality because the survival of mothers and their new-borns are closely linked. The program would also help in preventing unplanned pregnancy by promoting the natural family planning.

The Philippine government continues to show its serious effort to combat child mortality and to enhance the health status of poor families through the continuing expansion of the Pantawid Pamilyang Pilipino Progam Act of 2010 (4Ps) which was launched by the Department of Social Welfare and Development (DSWD) and operates throughout the 17 regions. One of the objectives of this program is to invest in the health and education of the poor children by conducting health check-ups for pregnant women and children less than five years of age. Specifically, children from zero to five years old will receive free preventive health check-ups and vaccines regularly. Acquiring pre-natal and post-natal care is a requirement for pregnant women. Moreover, a trained professional shall be present during labor and delivery. As of 2015, a high compliance rate of 95.95% was registered for the health check-ups of the pregnant women and children age from zero to five.

Since Philippines is truly committed to excel in the reduction of child mortality, the country paid more attention on providing better quality of healthcare services and solutions that will greatly affect the new-born babies at the crucial point of giving birth and during the first days and weeks after birth. The Philippine government, in collaboration with the Department of Health, signed a declaration of commitment, to join its efforts to further extend the access to life-saving interventions.

In 2012, the Breath of Life program was established which made an impact significantly to two public hospitals namely Philippine General Hospital and Dr. Jose Fabella Memorial Hospital. This program offers to provide highly effective technologies at a low-cost to treat the main causes of child death: respiratory distress syndrome, neonatal jaundice, hypothermia, and infection. Also, it conducts comprehensive training program such as Essential Newborn Care, Advance Care Techniques, and Equipment Use for clinicians, nurses, doctors, and physicians to further utilize the use and maintenance of resources provided by the program. The Breath of Life benefits the hospitals to be fully equipped in managing the new-born, and by enhancing its quality and expanding the healthcare system’s capacity to deliver such births. Such programs have contributed to the decline in the number of under-five deaths in the country.

Contingent on the results of equation, it is statistically proven that Out-of-Pocket Expenditure is a significant variable of child mortality. Out-of-pocket expenditures are direct outlay of households whose principle intent is to contribute money for the resources needed to restore their health status. In order to prevent the continuous increasing of child deaths in the Philippines, people tend to allocate more of their money in acquiring health services to cure a corresponding illness. An improved and inclined health spending significantly affects the reduction of child deaths. (Mirzazadeh et al., 2012; Ude and

Ekesiobe, 2014)

In year 2010, economic growth in the Philippines has risen when President Benigno Aquino III was formally elected to the said position. Private consumption boosted the country's GDP that plays a major role in the country's growth efforts. In conformity with the study of Philippine Development Studies, it has been shown that one of the fastest-growing sectors in the country is a pharmaceutical industry. BMI Research recently reported that 46% of the Filipino households were consumed for the total medical out-of-pocket expenses while a 55% of expenses were spent by the impoverished population. Health services and medicines should be provided to those communities that lack accessibility. Giving attention on providing quality care creates a greater opportunity for the country.

Hence, the coefficient from the regression demonstrated that out-of-pocket expenditure is positively related to the criterion. In lieu, there is a 0.000000175 chance of increasing child mortality as private health expenditures also increases. It can be stated that children who are below under-five in a family who lack access to health services are more prone to obtain diseases than those children who have higher standards of living. Huerta et al. (2014) Out-of-pocket expenditures were regressive with a larger difficulty being experienced by a low socio-economic household compared to high socio-economic household that hinder child survival. Barasa et al. (2012) Financing healthcare is a considerable burden to families. Household spending dragging them below the poverty and paying large share of their income for healthcare services are two contributing factors that evaluate its impact of difficulty. It is also concluded that out-of-pocket expenditures for healthcare financing persist to increase yet dragging Filipino households into poverty. Ulep and Dela Cruz, (2013).

In accordance with the report published by the Asian Development Bank (2007), the private health facilities in the Philippines that are used to give a quality care were mostly used by people who have higher income distribution than the lower ones. People who have low levels of income tend to access low-quality facilities providing low-quality health services such as lack of medical supplies, few staff members to accommodate them, insufficient skills and poor diagnosis. Subsequently, Department of Health Secretary Dr. Enrique Ona (2010) attested that there is an unequal access to healthcare services that set the poor behind including the out-of-pocket spending that makes the lives of many Filipino families impoverished.

As of 2009, the Philippines has the poorest spending for out-of-pocket health expenditures. The insufficient facilities and trained medical staff are hindrances of the program. Moreover, the government inaugurated a National Health Insurance Program to provide healthcare assistance that is more accessible to Filipinos in a context of persistent poverty and financial challengers. Thus, poor people increases their demand for health financing programs to alleviate the burden of out-of-pocket spending and to utilize the health care facilities provided.

CONCLUSION AND POLICY IMPLICATIONS

Child mortality rate was one of the socioeconomic issues which was measured through the probability of child's death before reaching the age of 5 out of 1,000 live births. This has also been one of the main focuses of Millennium Development Goals that

affected the economic development of the Philippines that played a vital role in the economy. Furthermore, the researchers conducted this study to examine how Food Price Inflation, Government and Out-of-Pocket Expenditures affecting child mortality and their significances.

The results from the food price inflation rate and child mortality exhibited an insignificant relationship. It indicated that there was no effect in child mortality if there was an increase in food prices. Even if there was no effect of food price inflation in child mortality, food price inflation should be monitored because of the effect of it to the poor households. According to Hyun (2008), the price changed in food especially staple food items like rice affected most the poor. Caufield et al. (2004) showed that due to malnutrition, a significant portion of children died worldwide.

According to the Department of Health, majority of maternal and new-born deaths happened during labor, delivery, and the first 48 hours post-delivery when skills, equipment, and facilities were inadequate to prevent deaths. The public health facilities and medical services to the poor were still insufficient for further reduction of under-five mortality. To give solution to this problem, the researchers suggested that the government should provide more public health facilities and focus on the utilization and efficiency of these facilities such as hospitals, clinics, and pharmacies by improving the quality of service. The government should also prioritize the maternal and new-born health by giving adequate equipment to be used for labor, delivery, and post-delivery to sustain both the lives of the mother and infant. The hiring of skilled workers in the hospital such as doctors and nurses should also be prioritized to prevent deaths.

Although the results have shown that government expenditure could decrease the number of under-five child death, the country has failed to achieve the Millennium Development Goal 4 – Reduction of Child Mortality by two-thirds. The decline in the rate of under-five mortality has slowed down throughout the years mainly due to the very slow decline of neonatal deaths. The government has emphasized and allocated the funds to Center for Health Development by region. Under these Centers for Health Development improved the areas of enforcement and implementation of regulations, standards, and licensing of health activities. Health operations including TB control, operations, disease preventions and control health promotions was also given concerned. The government should also focus more on local health technical assistance that corresponds in monitoring local health systems development, provision of logistic supports to local health programs and assistance of funds to support quality assurance in Local Government Units. Health Facilities through direct service delivery must be given importance as it contributes to the declination of child deaths. The researchers also believed that maternal education and a higher education for women should be given importance as to bearing a child. The mothers should be educated enough to be more informed about family planning and to be equipped for their pregnancy. Moreover, the health of the mother was a crucial factor that can affect the survival of the child. The researchers also emphasized that the citizens should not fully rely upon the government itself because it was also their decision to avail the services offered by which.

Not only is the budget execution the primary concern of researchers. It has also been studied that lack of planning and poor monitoring are two factors that should be dealt by Department of Health. No clear guidelines are imposed in preparing budget specifically designed for hospitals. Therefore, DOH hospitals must clearly plan their budget efficiently and overall strategize its vulnerabilities and strengths. Moreover, the DOH must frequently

monitor the performance of the hospitals and compile the necessary reports as regards to financial matter for transparency.

Insufficient budget, lack of facilities and equipment in rural and urban areas, passive participation of the government in the national level and unclear systems of accountability were some of the reasons that hinder the progress of the Philippine healthcare system. Providing a sustainable, high quality and cost-efficient healthcare system to all Filipinos was the mission of the Philippine healthcare sector. In lieu, the researchers would like to suggest the enhancement of information and communication technology to ease health access and promotion of national health insurance program.

There are number of laws have been enacted such Traditional and Alternative Medicine Act of 1997 to address the accessibility to medicine and medical services and RA 6675: Generics Act of 1988 and RA 9052: Universally Accessible Cheaper and Quality Medicine Act were the laws that could achieve the United Nations Development Programme's (UNDP) Millennium Development Goals (MDGs) including child mortality.

Based from the results, private health expenditure affected the under-five child mortality rate across the regions. People who have low incomes spent a substantial share of their incomes out-of-pocket for health care. Hence, the researchers suggested a strategy for reform such as setting caps for low-income individuals' financial burden and expanding their benefits. The researchers would likely to recommend the government to conduct more financial resources of their budgets to health expenditure. Moreover, the greater the access to healthcare facilities results to a greater potential to significantly reduce child mortality.

To expand affordability, the researchers also recommended that the Local Government Units (LGUs) to enhance their resource-generating mechanisms or programs rather than depending on the Internal Revenue Allotment (IRA) as their primitive source of funding the provision of public goods. Healthcare providers should heavily concentrate on rural communities to prevent lack of access in medical facilities. The Philippines radically needed professional healthcare workers to provide quality services. In order to attract them to stay and work in rural areas, government should increase their income and give necessary incentives as compensation.

APPENDIX

Table 1.1-1.5 Annual and Regional Under-Five Mortality

Table 1.1 - 2009 (Regional)	
REGION	UNDER-FIVE DEATHS
NCR	5,526
CAR	519
I	575
II	470
III	1,381
IV-A	1,819
IV-B	696
V	1,818
VI	2,107
VII	1,055
VIII	1,195
IX	770
X	788
XI	1,231
XII	355
XIII	493
TOTAL	20,798

Table 1.2 - 2010 (Regional)	
REGION	UNDER-FIVE DEATHS
NCR	4,914
CAR	357
I	620
II	651
III	1,077
IV-A	2,438
IV-B	684
V	2,009
VI	1,812
VII	995
VIII	1,147
IX	874
X	894
XI	863
XII	654
XIII	427
TOTAL	20,416

Table 1.3 - 2011 (Regional)	
REGION	UNDER-FIVE DEATHS
NCR	5,517
CAR	494
I	511
II	485
III	1,387
IV-A	1,697
IV-B	625
V	1,708
VI	1,563
VII	1,312
VIII	1,240
IX	644
X	658
XI	964
XII	600
XIII	534
TOTAL	19,939

Table 1.4 - 2012 (Regional)	
REGION	UNDER-FIVE DEATHS
NCR	5,539
CAR	496
I	795
II	455
III	1,379
IV-A	1,831
IV-B	571
V	1,482
VI	1,862
VII	1,106
VIII	623
IX	897
X	1,074
XI	1,077
XII	1,057
XIII	403
TOTAL	20,647

REGION	UNDER-FIVE DEATHS
NCR	5,890
CAR	592
I	946
II	383
III	1,573
IV-A	1,625
IV-B	522
V	1,273
VI	1,912
VII	1,195
VIII	493
IX	955
X	1,272
XI	1,203
XII	1,416
XIII	404
TOTAL	21,655

* Under-five deaths and mortality rates of MIMAROPA (IV-B) and Davao Region (XI) were estimated in the year 2010. The entire figures of 2013 were also projected due to unavailability of data.

Table 2.1-2.5. Annual and Regional Food Price Inflation Rate

REGION	FOOD PRICE INFLATION
NCR	6.60
CAR	6.67
I	7.19
II	7.80
III	7.14
IV-A	7.39
IV-B	5.59
V	7.68
VI	7.02
VII	2.61
VIII	8.51
IX	2.49
X	6.60
XI	7.13
XII	5.83
XIII	6.15
TOTAL AVE.	6.40

REGION	FOOD PRICE INFLATION
NCR	4.29
CAR	5.51
I	2.18
II	7.32
III	2.62
IV-A	4.82
IV-B	5.94
V	4.08
VI	3.24
VII	4.24
VIII	3.77
IX	2.74
X	4.66
XI	6.26
XII	6.65
XIII	4.62
TOTAL AVE.	4.56

REGION	FOOD PRICE INFLATION
NCR	5.86
CAR	4.68
I	3.95
II	5.24
III	6.18
IV-A	5.05
IV-B	5.68
V	4.82
VI	4.44
VII	5.37
VIII	5.93
IX	8.92
X	6.86
XI	7.52
XII	7.07
XIII	7.55
TOTAL AVE.	5.95

REGION	FOOD PRICE INFLATION
NCR	2.45
CAR	3.95
I	1.52
II	1.71
III	1.24
IV-A	2.08
IV-B	2.65
V	2.95
VI	3.88
VII	5.25
VIII	2.38
IX	2.73
X	1.78
XI	1.99
XII	2.13
XIII	2.71
TOTAL AVE.	2.59

REGION	FOOD PRICE INFLATION
NCR	2.95
CAR	2.51
I	1.95
II	2.66
III	1.87
IV-A	1.90
IV-B	3.21
V	3.70
VI	3.10
VII	5.06
VIII	4.64
IX	2.38
X	3.96
XI	3.83
XII	2.43
XIII	2.84
TOTAL AVE.	3.06

Table 3.1-3.5 Annual and Regional Private Out-of- Pocket Expenditures

Table 3.1 - 2009 (Regional)	
REGION	GOVERNMENT HEALTH EXPENDITURES
NCR	227,927,000.0
CAR	349,099,000.0
I	312,198,000.0
II	314,697,000.0
III	445,641,000.0
IV-A	305,443,000.0
IV-B	137,976,000.0
V	394,550,000.0
VI	456,288,000.0
VII	367,464,000.0
VIII	234,709,000.0
IX	329,947,000.0
X	383,515,000.0
XI	393,564,000.0
XII	186,906,000.0
XIII	175,681,000.0
TOTAL	227,927,000.0

Table 3.2 - 2010 (Regional)	
REGION	GOVERNMENT HEALTH EXPENDITURES
NCR	423,074,000
CAR	440,113,000
I	473,612,000
II	423,321,000
III	587,183,000
IV-A	287,086,000
IV-B	203,267,000
V	542,580,000
VI	518,376,000
VII	697,500,000
VIII	329,114,000
IX	463,821,000
X	480,730,000
XI	512,008,000
XII	256,857,000
XIII	241,204,000
TOTAL	6,879,846,000

Table 3.3 - 2011 (Regional)	
REGION	GOVERNMENT HEALTH EXPENDITURES
NCR	390,312,000
CAR	442,396,000
I	483,273,000
II	429,205,000
III	603,034,000
IV-A	282,310,000
IV-B	187,798,000
V	543,401,000
VI	541,611,000
VII	695,877,000
VIII	327,294,000
IX	466,427,000
X	486,174,000
XI	518,520,000
XII	257,692,000
XIII	247,206,000
TOTAL	6,902,530,000

Table 3.4 - 2012 (Regional)	
REGION	GOVERNMENT HEALTH EXPENDITURES
NCR	590,496,000
CAR	583,714,000
I	657,231,000
II	563,294,000
III	790,804,000
IV-A	432,999,000
IV-B	325,205,000
V	768,242,000
VI	755,388,000
VII	919,136,000
VIII	499,388,000
IX	655,661,000
X	674,526,000
XI	697,450,000
XII	402,802,000
XIII	382,080,000
TOTAL	9,698,416,000

Table 3.5 - 2013 (Regional)	
REGION	GOVERNMENT HEALTH EXPENDITURES
NCR	719,059,974
CAR	678,458,106
I	782,222,071
II	655,198,824
III	924,596,360
IV-A	544,958,524
IV-B	431,802,741
V	927,759,539
VI	921,395,266
VII	1,065,510,358
VIII	629,298,445
IX	790,506,974
X	809,006,685
XI	822,222,707
XII	516,868,466
XIII	491,063,937
TOTAL	11,709,928,977

** The entire figures of 2013 were projected due to unavailability of data.*

Table 4.1-4.5. Annual and Regional Private Out-of-Pocket Expenditures

Table 4.1 - 2009 (Regional)	
REGION	OUT OF POCKET EXPENDITURES
NCR	6,410,298,035
CAR	399,114,940
I	1,145,080,947
II	475,669,801
III	1,692,401,548
IV-A	1,352,595,182
IV-B	1,156,042,241
V	751,462,910
VI	1,171,961,127
VII	1,601,603,960
VIII	419,197,650
IX	458,469,364
X	1,670,675,359
XI	1,820,161,447
XII	1,440,618,758
XIII	314,828,835
TOTAL	22,280,182,103

Table 4.2 - 2010 (Regional)	
REGION	OUT OF POCKET EXPENDITURES
NCR	7,149,458,186
CAR	546,806,602
I	1,554,125,728
II	676,357,895
III	2,316,675,902
IV-A	1,792,984,514
IV-B	1,485,594,344
V	909,837,413
VI	1,723,658,927
VII	1,934,644,409
VIII	575,195,022
IX	618,058,464
X	2,086,130,059
XI	2,239,233,021
XII	1,862,590,161
XIII	433,265,094
TOTAL	27,904,615,741

Table 4.3 - 2011 (Regional)	
REGION	OUT OF POCKET EXPENDITURES
NCR	7,537,016,876
CAR	664,665,415
I	1,655,847,525
II	778,670,685
III	2,935,019,219
IV-A	1,980,763,330
IV-B	1,357,465,862
V	1,007,860,816
VI	3,146,195,388
VII	1,994,019,297
VIII	789,384,412
IX	644,098,427
X	2,512,809,741
XI	2,378,543,828
XII	2,103,714,525
XIII	481,248,731
TOTAL AVE.	31,967,324,077

Table 4.4 - 2012 (Regional)	
REGION	OUT OF POCKET EXPENDITURES
NCR	8,866,609,582
CAR	1,013,319,426
I	2,730,468,470
II	1,317,933,180
III	4,316,908,879
IV-A	3,063,145,706
IV-B	2,248,487,181
V	1,324,099,881
VI	3,511,766,355
VII	2,762,102,195
VIII	1,082,948,154
IX	1,065,371,194
X	3,248,604,983
XI	3,325,831,584
XII	3,063,772,403
XIII	790,035,322
TOTAL AVE.	43,731,404,496

Table 4.5 - 2013 (Regional)	
REGION	OUT OF POCKET EXPENDITURES
NCR	11,153,028,878
CAR	1,191,952,814
I	2,840,512,126
II	1,562,582,750
III	5,125,758,687
IV-A	3,469,809,606
IV-B	2,658,809,676
V	2,015,090,782
VI	3,832,036,162
VII	3,555,916,680
VIII	1,444,540,245
IX	1,377,166,030
X	3,439,547,589
XI	4,020,263,155
XII	4,118,307,724
XIII	884,687,518
TOTAL	52,690,010,421

** The entire figures of 2009 were projected due to unavailability of data.*

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