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# The Impact of Decentralization of the Philippines' Public Health System on Health Outcomes

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## ABSTRACT

In 1991, the Local Government Code of 1991 was constituted to commence, among others, the decentralization of the republic's health care structure from the national administration to local government units (LGUs). This was recognized on the concept that with decentralization, health system in the country would be strengthened. As the directive continued, past researchers concluded a system failure in the country's health sector upon its implementation. To scrutinize the previous scholars' suppositions, this study assessed the impact of the decentralization of the Philippines' public health system on health state of the population. The researchers pursued such analysis by utilizing the econometric model based on the Andrei, T., Mitrut, C., Constantin, D.L., &Oancea, B. (2009) study who dedicated their inquiry on the impact of decentralization of Romania's public health system to Romania's populations' health state, and by using 1980-2012 data series measured by national-level statistics. The researchers found out that total government health expenditure, and bed capacity per 10,000 populations are statistically significant and has a progressive influence to the population health conditions with a decline in infant mortality rate by 1,000 live births. However, the government doctors' population relative to infant death ratio was uncovered to be statistically insignificant.

**Keywords:**Decentralization, Public Health System, Total Government Health Expenditure, Bed Capacity Ratio, Government Doctors' Population, Infant Mortality Rate, Ordinary Least Squares Method



## 1 INTRODUCTION

A well-functioning healthcare system, according to the World Health Organization (WHO), provides even-handed access to quality care regardless of people's aptitude to pay while protecting them against the financial consequences of ailing health. Even the constitutional laws secure this characterization through Section 15, Article II of the Philippines' 1987 Constitution by distinctly conveying the responsibility of the government on fortifying its populaces by protecting and promoting the right to health and inculcating health consciousness among them. Thus, health is a fundamental right guaranteed to all citizens. But according to the conclusion of Solon, F.S., [1] in his study, the abovementioned assertions does not transmogrify in the country's actuality and does not operate well on the Philippine healthcare system. The standard in health care for the Filipinos can be concluded to these observations: disparity in health stays stronger while health state of the Filipinos remains to be weak [2]. Just by the analysis of the health sector's key participants, it implies a system failure. Inadequate budgets, declining involvement of the government at the national level, unclear systems of accountability, insufficient number of health workforce, mainly doctors, and lack of hospital facilities in rural areas are just some of the problems plaguing the Philippines' health care system and national health status [3].

As explained by Atienza, M.E., [4] in her "*The Politics of Health Devolution in the Philippines: Experiences of Municipalities in a Devolved Set-up*", and subsequent to the aforementioned State policy, the Local Government Code of 1991 was enacted to introduce, among others, the devolution of the country's health care system from the national government to local government units (LGUs). This was based on the postulate that with decentralization, health system in the country would be now then reinforced, specifically on the enhancement of quality and equitable delivery of health services - the local government executives would know where the need for such services is dire and would be able to prioritize such needs. Hence, the responsibility for the maintenance of public health, including the operation and maintenance of local health facilities, was transferred from the Department of Health (DOH) to the governors of concerned provinces or mayors of host municipalities and cities.

More than twenty years since its implementation, past re-

 

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searchers concluded that the actual results of this devolution experimentation have run counter to previous expectations [4]. There is unequal and discriminatory access to health care that leaves the underprivileged behind and makes them even poorer; truncated overall government spending on health; high out-of-pocket spending that impoverishes thousands of Filipino families; shortage in human resources for health, particularly doctors, resulting to persisting high maternal and newborn deaths that are among the highest in the Southeast Asian region; high fertility rates among the poorest Filipino women; the continuing challenge of infectious diseases like TB, dengue and malaria; emerging diseases like HIV/AIDS and the interlocking crisis of non-communicable diseases [5]. Evaluations of the health system in the country since the advent of devolution conducted by independent experts have confirmed the "slow decay" in the health scheme [6]. Supporting such claim is the Herrera, Roman [3] study that determined among the problems that hound the devolution of health services comprise: the low priority given by LGUs to health concerns, fragile governance leading to corruption in the procurement of medicines and hospital beds, insufficiently weak and ineffective health information system and denial of benefits of health workers due to incapacity of LGUs to bear.

In the Blöchliger, H., &Vammalle, C. [7] study, contemporary improvement strategy discussions and empirical studies on devolution principally determined on authority and competence, and scarcely on the decentralized health system and health status effects. With the aim of supposedly more effective health security agendas in mind, international organizations are increasingly focusing their inquiry on the decentralization in the authoritative performance and less on the emphasis on the health outcomes [8].

According to Jimenez, D., & Smith, P.C. [9], there is little evidence that countries with a more decentralized health system have resulted to better performance and better health outcomes. So far only a limited number of studies have attempted to measure the magnitude of the effect of public sector decentralization on health outcome indicators. On the whole, these studies find a beneficial effect of decentralization on indicators of health outcomes [10].

As observed by the researchers of this study, almost all existing empirical studies on the relationship between decentralization and health outcomes have used overall indicators of public sector decentralization. Conversely, a precise measure of health care decentralization is however difficult to develop [9]. Health care decentralization is a complex phenomenon embracing a number of political, fiscal and administrative dimensions. Many of these aspects are, as yet, not easy to measure empirically, e.g., who determines the range of the services to be covered, who sets the regulatory framework, or who decides the financing mechanism of the system as a whole [11]. The extensively used quantitative measure of health care decentralization are the fiscal ones: the ratio of sub national health spending and/or the use of total health spending for all the levels of government. In the lack of more analyses by scholars who used other measures of decentralization, the researchers were challenged to trail such route. The researchers' study departs from examining the isolated effect of health sector decentralization with the use of fiscal decentralization analysis. Also, there is an observed uncommonness of researches done in the Philippines regarding the health system decentralization and its effect to health outcomes. With such, the investigators' central objective is to address the lack of formal analysis, and analyze the connection concerning the decentralization and the Philippine health state aside from the fiscal dimension that is frequently used by several academics. Another vital curiosity of this study is to put in the picture the bureaus and agencies of our government in the field of health on the product of partaking a devolved health system in our country's setting for the past years and its general effect on the lives of the Filipinos, more than ever the marginalized. Furthermore, this study is aimed to be significant to the future researchers who want to engage in academic explorations in search for the appropriate and effective health system or how to further develop decentralization or the health outcomes in the Philippines.

## 2 Literature Review

### 2.1 Total Government Health Expenditure

This section provides a review of key studies that have considered the relationship between health financing and health outcomes, using macro-level data. However, in the study of Nixon, J. &Ulmann, P. [12], the evidence for a causal relationship between health care financing and health outcomes remains elusive as problems emerge from the difficulty of isolating the contributions of health status "output" which frustrates attempts to measure the overall effectiveness and efficiency of health care. In order to justify such linkage, the researchers of this study identified potentially suitable economic studies.

Relatively few studies have been successful in finding a link between total government health care expenditure, and health outcomes, such as the predominant use of infant mortality rate, etc. [13]. Some of these analyses are the following:



 

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The study entitled "*The Effect of Public Health Expenditure on Infant Mortality: Evidence from a Panel of Indian States"* baseline specification suggests that an increase in public expenditure on health care by 1 percent will reduce the infant mortality rate by 8 deaths per 1,000 live births. This suggests that Indian states can reduce the infant mortality rate rapidly by increasing what is now an extremely low level of public expenditure on health care [14].

The research work entitled "*Government Health Expenditures and Health Outcomes*" by Bokhari, F.A., Gai, Y., &Gottret, P. [15], provided an econometric evidence linking a country's government expenditures on health and per capita income to two health outcomes: infant mortality and maternal mortality. Using instrumental variables techniques (GMM-H2SL), they estimate the elasticity of these outcomes with respect to government health expenditures and income while treating both variables as endogenous. Consequently, their elasticity estimates are larger in magnitude than those reported in literature, which may be biased up. The elasticity of infant mortality with respect to government expenditures ranges from -0.25 to -0.42 with a mean value of -0.33. For maternal mortality the elasticity ranges from -0.42 to -0.52 with a mean value of -0.50. For developing countries, their results imply that while economic growth is certainly an important contributor to health outcomes, government spending on health is an imperative factor as well.Supporting study results such as Razaei, S., et al. [16] showed that there is a negative significant relationship between public health expenditures with regards to infant mortality rates.

Gavurová, B., &Vagašová, T. [17] led the "*The Significance of Amenable Mortality Quantification for Financing the Health System in Slovakia*" study with the aim of exploring the regression between the Age-Standardized Death Rates (ASDR) per 100,000 populations and Number of Registered Infant Mortality per 1,000 live births in EU countries and per capita total expenditure on health expressed in PPP int.$ in 2012. Determination index ($R^2$) indicates that 81.55% of dependency of their data is explained by power type regression. With the increase per capita total expenditure on health by 1 unit, the lower decrease of ASDR per 100,000 and IMR per 1,000 live births can be expected as 1 unit. The least sum of money on health is given by Romania (872.9), and also the ASDR per 100,000 and IMR per 1,000 live births belong to the highest of EU countries (195.23). On the contrary, Luxembourg (6340.6) contributes the highest amount on health, and its amendable infant mortality performs one of the lowest levels of (ASDR) per 100,000 (61.54).

Jaba, E., Balan, C. B., &Robu, I. [18] piloted a cross-country and time-series analysis concerning the number of registered infant mortality by 1,000 live births by rate and health expenditures. The values of the regression coefficients associated to health expenditures are positive, and there is a significant positive relationship between the two variables for all the four groups of countries. The highest effect of health expenditures on health outcomes is obtained for the lower middle income group, while the smallest effect is obtained for the high income group. The results of the panel data analysis using the fixed effects model revealed that inequalities in health care expenditures explain the different outcomes of healthcare systems, by groups of countries defined according to income level and geographic region. The present research confirms the previous findings on the relationship between health status and health expenditures.

In Soto, V.E., et al. [19] study, they pointed out that fiscal decentralization, through the measurement of total government health expenditure, it owned a negative relationship with infant mortality rates in Colombia for the provision of primary health services to municipalities seemed to lead to more efficient allocation of resources.

Anyanwu, J.C. &Erhijakpor, A.E. [20] postulated in their "*Health Expenditures and Health Outcomes in Africa*" work an economic evidence linking African countries' per capita total as well as government health expenditures and per capita income to two health outcomes: infant mortality and under-five mortality. The relationship is examined using data from 47 African countries between 1999 and 2004. Health expenditures have a statistically significant negative effect on infant and under-five mortality rates.

According to Yaqub, J.O., et al. [21], total government health expenditure has negative effect on infant mortality and under-5 mortalities when governance indicators such as corruption on public health expenditures had not yet been suppressed.

One of the input variables used by Asandului, L., Roman, M., &Fatulescu, P. [22] in their data envelopment analysis study on the healthcare systems in Europe was the total government expenditure allotted to healthcare. The percentage of the government expenditure allotted to health consists of recurrent and capital spending from government (central and local) budgets, external borrowings and grants (including donations from international agencies and nongovernmental organizations), and social (or compulsory) health insurance fund. The percentage of health expenditures has a minimum of 2.45% (Cyprus) and a maximum of 9% in (Denmark and France).



 

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The percentage of public health expenditures has a standard deviation of 1.65% and a coefficient of variation of 25.3%, which means that the sample of 30 states were identified that such health expenditures help in placing the people's health to better state, primarily on the newborns

To highlight the importance of efficiency in health financing when it comes to health systems strengthening, here are related studies that depicts the effect of health expenditure budgeting to health outcomes, specifically on infant mortality rate:

In the "*Decision Rules for Allocation of Finances to Health Systems Strengthening*" of Morton, A., Thomas, R., & Smith, P.C., [23], it was concluded how economic analysis of horizontal programs – of health systems strengthening – can be brought within the scope of analysis using principles that are consistent with standard cost-effectiveness analysis. The logic of the results is as follows: as long as the decision maker has a limited budget, one should fund infant mortality (IMR) reduction projects, because one can get health gains without a large outlay. The study conducted by Kim, T.L., et al. [24] suggests that income inequality is not causing bad outcomes in itself rather the provision of public health services which has a direct and consistent relationship with infant mortality. Some studies suggest specific budget allocation such as that of Hanmer, L., et al. [25]. They suggest to support and have a well established female education for child health in line with health provision if the reduction of IMRs are to be realized. The Shetty, A. & Shetty, S. [26] study demonstrates that the benefits of a declining infant mortality rate accrue when the government health spending is robust, even low income countries which allocate a reasonable proportion of state spending on health enjoy a relatively lower infant mortality rate. Farahani, M., et al. [27] contrasts that richer states tend to spend more per capita also tend to have lower infant mortality rate, however, the key still lies on proper allocation of funds.

Another supporting paper is the study conducted by Balabanova, D., et al. [28] that highlights Bangladesh, Ethiopia, Kyrgyzstan, Thailand, and the Indian state of Tamil Nadu which have achieved good health with low IMR records at low cost and stress the vital role of systems-level elements in delivering success in what can be extremely challenging environments. In the Anyanwu, J. C. &Erhijakpor, A. E. [20] study, it states that using aggregate health expenditures as determinants of under-5 mortality and infant mortality should not be the case rather the proper allocation of funds on primary healthcare than of secondary and tertiary. Another is the Chowdhury, A.M., et al. [29] study entitled "*The Bangladesh Paradox: Exceptional Health Achievement Despite Economic Poverty*" describe how Bangladesh has higher life expectancy and lower infant, under-5 and maternal mortality than its South Asian neighbors, India, Pakistan and Nepal, despite lower per head expenditure. With regards to financial projects in health, Powell-Jackson, T., Mazumdar, S., & Mills, A. [30] Indian study can be used to give justification to the fact that a well-performed health systems strengthening projects will lead to a better infant and maternal health. They have examined the association between one of the world's largest demand-side financial incentive programs and health-related outcomes in India. The study's findings on neonatal mortality show no strong evidence of an effect, although confidence intervals are not sufficiently tight to reject modest effects on infant mortality.

**H1:** *An increase in the total government health expenditure leads to a decrease in infant mortality rate.*

### 2.2 Health Workforce

Human resources for health are evidently a precondition for health care, with utmost medical interventions necessitating the assistances of health workers, particularly government doctors [31]. In turn, with assertion on the Gupta, N. & Dal Poz, M. [32] study, several economic studies employed and understood that health care is one of the determinants of population health, with other determinants including socioeconomic, environmental, and behavioral factors. The researchers believe that these two relations generate a link between health human resources and population health.

Numerous international studies show evidence of a direct and progressive association concerning the number of health workers and population health outcomes. Here, the researchers of this economic research provide literatures to gauge the extent as to which human resources, specifically the population of government doctors, affect population health outcomes throughout and within the globe.

In the study conducted by Andrei, T., Mitrut, C., Constantin, D.L., &Oancea, B. [33] entitled "*The Impact of Decentralization on Public Health System's Results: A Case of Romania*", they examined the impact of decentralization of the public health system on health state of the population by means of an adequate econometric model and data series at development regions level measured by the global indicator, infant mortality rate. Data series for statistical indicators recorded at the eight development Romanian regions level between 1998 and 2005 were used. The results point out that the ratio of doctors by



 

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1,000 inhabitants has a positive contribution to the health state.

The study of Nelson, R. [34] assessed Africa. In Africa, due to large part to government doctors, nurses, and midwives' shortages, only 19% of African countries have at least 80% of their populations immunized for measles. And on average, 910 women die for every 100,000 live births,despite the fact that births attended by skilled professionals can significantly reduce the risk of maternal mortality, infant and under-five-year-old mortality also significantly decrease as the density of health workers increases.In the African region, there is an infant mortality rate of 99 deaths per 1,000 live births, a neonatal mortality rate of 40 deaths per 1,000 live births, and an under-five-year-old mortality rate of 165 per 1,000.

In the New York University Global Health Research publication entitled "*Promising Choices: How Health Workforce Policy Choices Dictate Health Outcomes*" by Middleberg, M.I, Rangarao, S., Hoemeke, L., Powers, M., Stillwell, B., &Tulenko, K. [35], it disclosed a clear-cut result that access to skilled, empowered, and supported government doctors has been shown to affect health outcomes, especially infant mortality, as it is said to be the "foundation for the improvements and access to health gains across countries." The Middleberg, M.I., et al. findings were based on the 2010, 2011, and 2012 World Health Reports released by the World Health Organization. The Bhutta, et al. [36] study entitled "*Global Experience of Community Health Workers for Delivery of Health Related Millennium Development Goals: A Systematic Review, Country-Case Studies, and Recommendations for Integration into Health Systems*" was used to support the hypothesis of the Middleberg, M.I., et al. study. It described the positive impact of the health worker ratio, and quality on infant, child, and maternal survival. The result of the study also indicates that across the assessed countries, increases in doctors, nurses, and midwives (DNM) density account for improvement in rates of the infant, under-5, and maternal mortality, top leading diseases like cardiovascular diseases and decreases in the costs of TB and malaria.

One of the major points raised in the Bhutta, et al. study was the certainty of the evident prevalence of scarcity of medical practitioners in most parts of the world, especially in the Asian developing countries. In recent decades, according to Hangoro, C., &McPake, B. [37], global concern about the shortage of government doctors, nurses, and midwives has been growing. The estimated shortage is about 4.3 million government doctors, nurses, midwives and support workers worldwide [38] and is considered as a 'global health crisis' [39] because it affects not only the developing countries but also the developed countries, forcing them to implement new policies in order to train, sustain, and retain the health workers. In the study of Gupta, N., et al. [40] entitled "*Human Resources for Maternal, Newborn, and Child Health: From Measurement and Planning to Performance for Improved Health Outcomes*", the authors identified that most (78%) of the target countries face acute shortages of highly skilled doctors, nurses, and midwives, and large variations persist within and across countries in the workforce distribution, skills mix, and skills utilization. Furthermore, the study also concluded that too few countries aptly plan for, authorize and support nurses, midwives, and government doctors to deliver essential maternal, newborn and child healthcare interventions that could save lives. In Ghana, for example, 52% of the population is urban, but 87% of general practitioners live in urban areas [31]. Educational institutions lack the capacity to produce number of qualified health professionals needed to provide essential care [41]. Moreover, emigration of trained professionals from Asian countries to other countries, like Europe, stymies the growth of the health sector, limits the availability of doctors, nurses, and midwives in the government hospitals, and frails the quality of health care [42]. In addition, according to Dubois, C.A., & McKee, M., [43] study, there is growing international recognition that human resources for health have been a neglected component of health systems development in low-income and middle-income countries.

Another work that was utilized to support the Middleberg, M.I., et al. analysis was the Anand, S., &Bärninghausen, T. [44] econometric study where it examined the relationship between doctors, nurses, and midwives (DNM) density in government hospitals and infant mortality, under-five mortality, and maternal mortality. Controlling for the effects of income, female adult literacy, and absolute income poverty, they found a significant, negative relationship between DNM density and all three mortality rates. Moreover, four cross-sectional studies that have studied the effect of health workers on health outcomes have reached unpredicted conclusions and use government doctor density ratio to account for mortality outcomes. Robinson, J., &Wharrad, H. [45] found that a density of government doctors has no beneficial effect on maternal, infant, and under-five mortality. Later, the two researchers pondered attendance at birth and maternal mortality rates. This effect is what the authors called 'invisible doctors".Following such, Cochrane, et al. [46] showed doctor density had an adversative outcome on maternal mortality (they call it a doctor anomaly), but no effect on infant mortality. Conversely, Kim, K., &Moddy, P.M. [47], recorded no significant association between doctor density and infant mortality, and Hertz E., Hebert J.R., & Landon, J. [48] did not note an



 

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association between doctor density and either infant or maternal mortality. All these four studies also investigated the link between doctor density and health outcomes, and all recorded a doctor invisibility—in other words, no association between doctor density and maternal mortality, infant or under-five mortality, and infant mortality. All four studies used national income per person as one of the independent variables, but they all measured national income in US$ at market exchange rates rather than in international dollars at purchasing power parity (PPP) rates. None of the four cross-sectional studies included absolute poverty as an explanatory variable, which has been shown to have an effect on health outcomes independent of average income per person. Furthermore, all four studies used stepwise regression to choose their independent variables from a larger set of variables, which might, concurring to the authors, be relevant.

Research literatures like the "*Reassessing the Relationship between Human Resources for Health, Intervention Coverage and Health Outcomes*" study by Speybroeck, N., Kinfu, Y., Dal Poz, M.R., & Evans, D.B. [49] tackle the scope of health interventions. The study demonstrated a significant positive relationship between the doctors, nurses, and midwives in the government hospitals and both measles immunization coverage and use of skilled birth attendants in Geneva. Following this, another Anand, S., &Bärninghausen, T.[50] study can be used to support such scope. It examined the relationship between the health worker density and both measles vaccination, along with prevention from infant deaths, diphtheria, pertussis, and tetanus (DPT3) vaccination, poliomyelitis (Polio3) vaccination. However, when the effects of government doctors and nurses were assessed separately, the researchers found that nurse density was significantly associated with coverage of all vaccinations and infant deaths prevention, but government doctor density was not. Female adult literacy was positively associated, and land area negatively associated, with vaccination coverage and infant deaths prevention. For the interpretation of the statistical results, the scholars affirmed that a higher density of doctors increases the availability of vaccination services over time and space, making it more likely those children will be vaccinated, hence, effectivity of infant deaths prevention. As for the concluding results of the authors' study, they affirmed that doctors, nurses, and midwives can be a major constraining factor on vaccination coverage and infant mortality prevention in developing countries.

In a longitudinal econometric examination of the relationship between health sector resources and infant impermanence, Farahani, M., Subramanian, S.V., & Canning, D. [51] found a substantial, negative effect in the short run and an even larger negative effect in the long run. In this study, doctor density alone was used as a proxy for all health sector resources, as data for nurse and midwife density and other health sector inputs were not available over a sufficiently long time period to measure long-run effects. The study developed a negative impact on infant mortality rate.

**H2:** *An increase in the number of government doctors lead to a decrease in infant mortality rate.*

### 2.3 Bed Capacity Ratio

The health sectors throughout the globe contend with several challenges accompanied with new requirements, namely; customer dissatisfaction, increasing cost of the health services [52]. According to the Yadav, P., [53] study, such constraints enumerated above depict the foremost crisis in the health sector - the poor availability of hospital beds. These considerations pressed the health organizations to adopt a system that can meet these requirements, dealing with the continuous changes, technology, increase in the health services costing, increase in competitive position and public health [54]. Evidently, there is an amassed need to promote the innovation of health care through the adoption of supply chain management[55] [56]. To cognize the concept of the term, two of the various well-known definitions from distinguished authors in Health Economics study for 'supply chain management' are as follows:

*Supply chain management (SCM) deals with different categories of flows; namely, flows of goods, flows of information and flows of funds within and among supply chain partners in order to satisfy consumer needs in the most efficient way* [57].

*Supply chain administration is controlling the information, materials, services and money through any activity in a way that promotes the quality of an organization's operations; it also has to do with introducing new methods and adjusting or enhancing old ones, adhering to the fact that efficiency is doing things right, and productivity is doing the right things* [58]

Such definitions ascertain that voluminous of researchers have conducted supply chain literatures that focused mainly on employing material flows to best match supply and demand [59] and a few on the impact of supply chain operations to health outcomes[60]. In Bigdeli, M., et al. [61] analysis, he stated that the relationship between health supply chain and population health outcomes are not given sufficient consideration. Since the goal of this research is to observe whether a conceivable association concerning the health supply chain and health outcomes exist in the Philippines, the authors at-



 

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tempted to provide a substantial number of international SCM literatures, mainly on the bed capacity ratio to support the researchers' hypothesis conceiving a possible relationship with infant mortality rate.

In the study conducted by Andrei, T., Mitrut, C., Constantin, D.L., &Oancea, B. [33] entitled "*The Impact of Decentralization on Public Health System's Results: A Case of Romania*", they examined the impact of decentralization of the public health system on health state of the population by means of an adequate econometric model and data series at development regions level measured by the global indicator, infant mortality and life expectancy. Data series for statistical indicators recorded at the eight development Romanian regions level between 1998 and 2005 were used. The results point out that the number of hospital beds per 1,000 inhabitants has a positive contribution to the infant mortality rate.

Research studies like "*The Impact of Financial Resources on Health Services Performance: Ministry of Health, Khartoum State*" by Al-Taher, A., [62] conceived a negative relationship between hospital bed ratio and infant mortality rate. In conclusion, the drawbacks in the adequacy of financial resources reflected in the deprived accessibility and availability of hospital beds in relation to infant mortality.

According to Belciug, S., &Gorunescu, F. [63], clinical observational data have suggested that bed occupancies above 85% could adversely affect safe, effective hospital function and that there is sufficient evidence to support the contention that bed-occupancy rates provide a useful measure of a hospital's ability to provide high-quality infant care. Same observations but focused on the analysis of volume-outcome relationship in critically ill patients in relation to the ICU-to-Hospital bed ratio, the Sasabuchi, Y., et al., [64] research identified that there's an inverse relationship between hospital volume of ICU patients and infant mortality was seen only when the ICU-to-hospital bed ratio was sufficiently high. Regionalization and increasing the number of ICU beds in referral centers may improve patient outcomes. Another related research is the "*Intensivist-To-Bed Ratio: Association with Outcomes in The Medical ICU*" study conducted by Dara, Sl., &Afessa, B., [65] and found out that differences in intensivist-to-ICU bed ratios, ranging from 1:7.5 to 1:15, were not associated with differences in ICU or hospital mortality, as such are the neonatal and maternal deaths. However, a ratio of 1:15 was associated with increased ICU LOS.

There are some studies like the Mckee, M., [66] that pinpoint why there are reductions in bed supplies in hospitals, factors like ambulatory services. Between 1991 and 1993, almost 10% of acute hospital beds in Winnipeg, Manitoba, were eliminated. A study of this process concluded that access to hospital was not adversely affected, since it led to increases in ambulatory surgery and earlier discharges. Quality of care (as measured by infant mortality within three months of admission), readmission rates (within 30 days of discharge), and increased contact with physicians did not change, nor did the health status of the Winnipeg population, as measured by premature mortality.

**H3:** *An increase in the bed capacity leads to a decrease in infant mortality rate.*

### 2.4 Synthesis

All the aforementioned economic journals and analyses served as study guides and main references to help the researchers lead an inquiry and an examination as to how:

(***i***) *appropriations of total government expenditure on health*;
(***ii***) *adequacy of hospital beds*; and
(***iii***) *availability of government doctors*

in the country affected the infant mortality occurrence. And with that, authors of this economic manuscript tested the hypotheses that establish linkages between the explanatory variables and the health outcomes as shown in Figure 1.

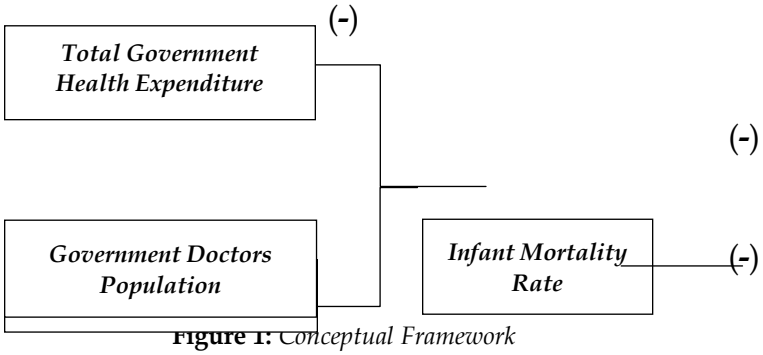


**Figure 1:** *Conceptual Framework*

*Hypotheses:*
**H1:** *An increase in the total government health expenditure leads to a decrease in infant mortality rate.*
**H2:** *An increase in the number of government doctors lead to a decrease in infant mortality rate.*
**H3:** *An increase in the bed capacity leads to a decrease in infant mortality rate.*

## 3 Research Method

It is the goalmouth of this investigation to present demon-



 

strated and satisfactory statistical data, interpretations, and conclusions that will be able to define a well-defined streak on the impact of the decentralization of the Philippines' public health system to the health outcomes. With such argument, the authors decided to trail the Andrei, T., Mitrut, C., Constantin, D.L. &Oancea, B. (2009) study who focused their inquiry on the impact of the decentralization of Romania's public health system to Romania's population health state.

In this study, the researchers decided to modify the fiscal variable the Andrei, T., et al., [33] study utilized due to the unavailability of complete data for health indicators in the country. Instead of setting one of the indicators as total government health expenditure as to GDP per capita at the development regional level appropriations, the researchers used total government health expenditure expressed in million Philippine Peso, at current prices since the study seeks answers in a national level.

On the inference of health workforce variable, DOH potential source of time-series indicator was identified for this variable and was used in this study, specifically the government doctors' population relative to medical practitioner population measurements. For the primary indicator of supply chain, the bed capacity per 10,000 populations was used to measure this variable with its possible association to population health outcome, which was measured through the use of the number of registered infant mortality per 1,000 live births by rate measurement. The said variables were the identical gauge used by Andrei, T., et al., (2009) study.

On the overall, the statistics for this research is secondary. The investigators sourced their figures to the following agencies: Philippine Statistics Authority, National Statistical Coordination Board, and Department of Health. In aiding the building up of data, Philippine heath system reviews, health outlook forums, regional policy simulation reports, national demographics and health surveys, WHO handbooks, health knowledge hubs, working papers, sholarly articles, and health journals was also used.

In view of the fact that the study involves modeling a number of variables, multiple regression analysis was used to allow the researchers evaluate the relationship linking the independent variables along with infant mortality rate. The multiple regression model is:

*(Eq. 1)* IMF = Y (TGH, BC, HW)

*(Eq. 2)* $IMF = \beta 0 + log(\beta 1 TGE) + log(\beta 2 GD) + \beta 3 BC + \mu$

*where:*

**IMF** = *Number of Registered Infant Mortality Rate per 1,000 live births*

**TGE** = *Total Government Expenditure on Health (in Php at current prices)*

**BC** = *Bed Capacity per 10,000 Population*

**GD** = *Government Doctors Population*

**μ**=*error term*

The researchers undergone the Ordinary Least Squares Method. 1991 was the start of decentralization in the country [4]. thus, the utilization of 1980-2012 data for the abovementioned indicators were imperative. With the said year range, the authors were able to give truthful assessments about the impact of the decentralization scheme of the country's public health system over the past 20 years since its implementation.

## 4 Results and Discussion

### 4.1 Assesment of the Total Government Expenditure on Health

On the overall, total health care expenditure has increased steadily from 1980 to 2012 (Table 1.0). In reference to this, the data gathered by the researchers from the National Statistics Coordination Board (Table 1.1) depicts a steady increase from the start of decentralization of the health system by using the years 1995 to 2005 with an annual growth of 8.2%. In real terms, however, health expenditure per capita has grown by only 2.1% per year, suggesting that increases in nominal spending have been mostly due to inflation rather than service expansion. The Philippines allotted 3.0-3.6% of its gross domestic product (GDP) to health between 1995 and 2005 (Table 1.1). According to NSCB, this share rose slightly to 3.9% in 2010 but remains relatively low, compared with the WHO Western Pacific Region 2009 average of 6.1%.

In the Philippines, there are three major groups of payers of health care: (1) national and local governments, (2) social health insurance, and (3) private sources. Government accounted for 29-41% of total health expenditures in the period 1995-2005. According to National Statistics Coordination Board, health as a share of total 34 government spending in the same period was about 5.9%, lower than in Thailand (10%), only slightly higher than Indonesia (4.1%) and comparable to Viet Nam (6.3%).

The government, as a whole, spent more on personal health care than public health care each year from 1995 to 2005 (Table 1.2). More detailed expenditure accounts indicate that spend-

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ing on hospitals dominated the government's personal health care expenditures. The government also allots a much larger share of its resources to salaries of employees compared to maintenance and operations and capital outlay (Table 1.3). The share of capital outlay both by national and local governments to total health expenditures is negligible.

### 4.2 Assesment of the Health Workforce

There are 22 categories of health workers trained in the Philippines. Some health worker categories do not correspond to international classifications as they have emerged because of demands within the Philippine health care system. Here, the researchers' focus is on the major internationally-recognized professional categories, namely nurses, midwives, dentists, physical therapists, and specifically on doctors. At present, there is no actual count of active health workers, and these data are not regularly collected. Some studies, such as that in 2008 by the Pharmaceutical and Health Care Association of the Philippines (PHAP) attempted to document the number of active doctors by specialization, but these were estimates.

On the trends in health care professionals, the largest category of health workers in the Philippines are nurses and midwives due to overseas demand for Filipino nurses. With the oversupply of nurses in the country, many newly graduated or licensed nurses are unable to find employment. Conversely, there is an underproduction in other categories such as doctors and dentists (Figure 2.0). In terms of health worker to the population ratios, nurse, medical technologist and occupational therapist ratios have constantly increased over the years, while ratios for the government doctor professionals to the population have fluctuated. To support such claim, as seen in Table 1, there is an observable dramatic decrease for the years 1993 and 1994. Such decline reflects changes in local supply of particular health worker categories.

Since data on the actual number of health professionals in the private sector is not readily available, the minimum number of health workers required by the DOH for hospitals to be licensed is used to describe distribution (assuming that hospitals should have the minimum human resources for health (HRH) requirements before they can be licensed). As shown in Table 2.0 there are clear differences in government and private sector distribution. More hospital-based doctors, nurses, PTs and OTs are in the private sector than in government. The table also shows that the positions in government and private hospitals for PTs/OTs and dentists are only in Levels 3 and 4 facilities. The inadequate number of government positions are largely due to the inability of government to create enough positions in the bigger hospitals. In terms of health worker density, although Philippine density is comparable to selected countries, it should be noted that the Philippine ratios are computed based on "ever-registered" health professionals. Figure 2 show the density of government doctors in the country compared to other countries within the Asian region. In the last two decades, the density of doctors in the Philippines rose sharply, and then slightly decreased to 1.14 per 1,000 populations in 2004 (Figure 2). This large increase was mainly due to the high demand for nurses in other countries. The World Bank's 1993 Development Report suggested that, as a rule of thumb, the ratio of nurses to doctors should be 2:1 as a minimum, with 4:1 or higher considered more satisfactory for cost-effective and quality care. In the Philippines, for government and private health workers in hospitals in 2006, the nurse-to-physician ratio was 3:1, while the midwife-to-physician ratio was 2:1.

### 4.2 Assesment of the Hospital Bed Capacity

Traditionally, government hospitals in the country are larger and have more beds compared to private hospitals; however, there are more private hospitals. Over the years, the difference between government and private hospital beds has decreased as shown in Figure 3. From 1997 to 2007, the average number of beds totaled to 43,846 in government hospitals and 41,206 in private hospitals. The average bed-to-population ratio for the country for the 10-year period was 107 per 100,000 populations. Although this ratio meets the standard set by DOH for the country (1 bed per 10,000 population), ratios across regions, provinces and municipalities vary. Figure 3 also shows the increasing gap between population size and the supply of hospital beds.

Hospital beds are not classified according to the patients' level of care, whether acute or chronic, but rather according to the hospitals' service capability. In terms of the mix of beds, there are more Level 2 and Level 4 hospital beds in the government sector. Level 1 (or primary) government and private hospital beds are almost equal in number. About 40% of beds in all hospitals are found in teaching/training hospitals. According to Bureau of Health Facilities and Services of Department of Health it is worth noting that DOH classifies government acute chronic and custodial psychiatric care beds and facilities as Level 4 facilities, leaving only private psychiatric care beds and facilities in these categories.

Based on Republic Act 1939 (1957), government hospitals are mandated to operate with not less than 90% of their bed capacity provided free or as 'charity'. For private hospitals, the



 

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DOH through AO 41 (2007) required all private hospitals to identify not less than 10% of the authorized bed capacity as charity beds. This was issued as a requirement for hospital licensure.

In terms of distribution, inequities are evident in the distribution of health facilities and beds across the country. The hospital beds in these two regions account for 36% of the total for the country (Table 3). Of the regions, Region XIII and ARMM have the least number of health facilities and hospital beds.

### 4.3 Empirical Findings

The researchers progressed with Ordinary Least Squares as the approach for the model. For the initial regression as shown in Table 4, a result of 0.71 R-squared means that it is reliable as the desired model. The Durbin-Watson of 1.38 indicates non-autocorrelation since it is within the standard critical values (1.244 - 1.650) for a study with 32 observations and three variables. Autocorrelation was not confirmed by the Heteroskedasticity ARCH Test for it resulted to 0.79. However, in Table 4.1, the Breusch-Godfrey Serial Correlation LM Test confirmed an evidence of positive autocorrelation by having the result of 0.02 p-value for the probability Chi-Square which rejects the null hypothesis of homoskedasticity.

In order to solve the problem of heteroskedasticity, the researchers used "log" transform. Table 4.4 and Table 4.5 verifies the methodology that the researchers undergo through the use of BG LM Test and BPG Heteroscedasticity test.

It is most expected that "log" transformation will give the examination a better regression model. With such, it was also noted by the researchers that the used variables are considered significant corresponding to the probability values (Table 4.3). The result of the regression showed a negative relationship between TGE and infant death ratio which leads us to an understanding that for every 1% increase in the total government health expenditure, there is a decrease of 0.43 in the number of infant mortality by 1,000 live births. As for the bed capacity per 10,000 populations on infant death ratio, the regression showed a strong inverse relationship between bed capacity and infant death ratio which leads us to an evaluation that there is a reduction of 6 infant deaths by 1,000 live births whenever the bed capacity per 10,000 population increases by 1%, therefore null hypothesis is accepted.

For the health workforce indicator, the influence of government doctors' population on number of infant mortality by 1,000 live births is found to be statistically insignificant. Such results can be explained by the analyses done by Kim, K., &Moddy, P.M. [24], Robinson, J., &Wharrad, H. [45], Hertz E., Hebert J.R., & Landon, J. [48], and Anand, S., &Bärninghausen, T.[50] who recorded no significant association between government doctor population and infant mortality rate. These studies realized that the nurses' density ratio relative to the doctors' population ratio is greater in the health sector across countries. They also determined that "doctor invisibility" and "doctor anomaly" incidence is present in some countries since there is underproduction for government doctors and physicians, and there exists an oversupply of nurses which happens to be the same health sector setting the Philippines is currently experiencing (Hartigan-Go, 2014).

## 5Conclusion and Recommendations

The goal of the study is to determine whether the decentralization of the Philippines' public health system affects the population's health outcomes. The effects of two out of three independent variables were parallel to what the researchers have hypothesized. The researchers found out that an increase in total government expenditure on health, and bed capacity per 10,000 populations are statistically significant and has an inverse relationship with infant mortality rate per 1,000 live births. The government doctor population relative to infant mortality was found out to be statistically insignificant.

Based from the results of this study, the researchers recommend (***i***) to efficiently manage health expenditures for the purpose of expansion of healthcare services especially on the public sector. The public sector makes a higher demand in healthcare thus should be supplied the same. (***ii***) provide job opportunities for medical practitioners and encourage our nurses to pursue a higher education in the field (doctors) to fill the gap for the lack of the latter. At the same time, this will ease the process for the government to provide job opportunities for them during the transition; (***iii***) since there is still inadequacy in bed capacity, there is a need to reassess and redirect the distribution of beds across the country so that the demand for the former will be met efficiently according to per region's needs. The government should make a policy that addresses on the surplus of nurses and shortage of doctors. This policy will be redirecting surplus nurses to pursue medical schooling and have a doctor degree with the help of government financing. This will lessen brain drain and will promote integration which will fill the shortage of doctors in the country.

The researchers also endorse to the government the evaluation of the six building blocks of the fortification of the Philippines' health system identified by the World Health Organization in 2007. The question to be asked is how can health sector reforms be implemented using these building blocks in health



 

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system strengthening? And how will these reforms address health inequities and structure universal health care (not just simply coverage)?

*Governance:* Wanted: A creative, visionary leader/manager who understands the complex issues which affect the delivery of health services, thinks progressively and systemically, has the courage to implement unpopular yet rational solutions and the moral fiber to withstand parochial and senseless lobbying from all sides. This leader, not necessarily a medical doctor, will be expected to rally the bureaucracy, as well as outside partners, to work together to improve health services for all citizens.

*Regulation:* The weakened regulatory system must be strengthened with improved science and better-equipped laboratories in order to register better products and medicines. This sector has to be educated and armed with the right tools to perform difficult task of protecting the health of society at large. It needs to be protected from both political interference and industrial capture. Quality of services and goods cannot be sacrificed for political and economic expediency.

*Financing:* The current government is concentrating on achieving universal health insurance coverage. Those who are already members should be educated on what their coverage entitles them to. In the meantime, the health insurance system should be reviewed and reformed to be better able to respond to the needs of members, both in-patient and outpatient, both clinical needs balanced with public health preventive programs and to be able to spend available resources most efficiently and to benefit the most number of people, fairly and equitably, not to be transactionally abused. Solidarity is not a strong point of our society and government has an opportunity to influence the public at large on this concept through education and action.

*Human Resources in Health:* An integrated approach is needed to strengthen basic science education and research capacity at all levels. The internal urban misdistribution and the external out-migration of health professionals need to be systematically addressed through legal, economic, socio-civic and developmental solutions.

*ICT in Health:* The use of information technology in health can translate to improved cost-efficiency and transparency. Ideally, ICT in health would be managed by IT experts knowledgeable in health concerns. However, due to the lack of such hybrid professionals, the cost-efficient use of IT in health is still a futuristic vision blocked by some reluctant stakeholders. This is an area where the government provides a good policy for standardization and utilization while allowing the private sector to drive technology and innovations.

*Service Delivery:* Notwithstanding devolution, newer models for health intervention have slowly been developing. The key is in the leadership, whether municipal and provincial leaders will adopt health as a major agenda and spend the necessary funding to improve services. Nevertheless, the private sector will continue to fill in the gap to provide for the health needs of society at large. But, this comes at a steep price to the patients.

While it is true thathealth is only one concern that any government must face, it is a major issue which will affect other issues. A Whole-of-Government approach must be sought and sustained. We continue to muddle along long past the point when we can afford to. It is time for us to prioritize and exert consistent, unrelenting effort and political will to safeguard our nation's health outcomes.

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## 7 APPENDIX

***Table 1.0:*** *Indicators and Statistics Used by the Researchers, 1980-2012*

| Year | Infant Mortality Rate per 1,000 live births | Total Government Health Expenditure* | Bed Capacity per 10,000 Population | Government Doctors |
|---|---|---|---|---|
| 1980 | 6.2 | □1,622 | 18.2 | 7259 |
| 1981 | 6.1 | □1,734 | 13 | 7378 |
| 1982 | 6.1 | □2,136 | 17.5 | 7605 |
| 1983 | 6.3 | □2,485 | 16.3 | 8282 |
| 1984 | 5.9 | □2,308 | 16.9 | 8315 |
| 1985 | 6.1 | □2,802 | 15.5 | 8524 |
| 1986 | 5.8 | □3,570 | 15.9 | 8817 |
| 1987 | 5.8 | □4,100 | 15.1 | 8817 |
| 1988 | 5.5 | □5,564 | 16.8 | 9137 |
| 1989 | 5.4 | □6,488 | 14.1 | 9546 |
| 1990 | 5.1 | □8,623 | 14.4 | 7431 |
| 1991 | 4.7 | □10,158 | 12.8 | 7328 |
| 1992 | 4.9 | □35,861 | 13.7 | 7107 |
| 1993 | 4.8 | □39,597 | 10.7 | 6913 |
| 1994 | 4.7 | □47,358 | 10.9 | 2486 |
| 1995 | 4.8 | □54,602 | 11.8 | 2029 |
| 1996 | 4.9 | □62,205 | 11.7 | 3119 |
| 1997 | 4.7 | □76,206 | 11.4 | 2582 |
| 1998 | 4.8 | □87,078 | 11.1 | 2848 |



 

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| | | | | |
|---|---|---|---|---|
| 1999 | 4.7 | □93,521 | 11.2 | 2948 |
| 2000 | 4.8 | □103,424 | 10.6 | 2943 |
| 2001 | 4.9 | □113,454 | 10.1 | 2957 |
| 2002 | 4.9 | □117,180 | 10.6 | 3021 |
| 2003 | 4.8 | □148,660 | 10.4 | 3064 |
| 2004 | 4.9 | □165,247 | 9.9 | 2969 |
| 2005 | 5.1 | □180,772 | 10.2 | 2967 |
| 2006 | 5.1 | □216,413 | 10.7 | 2955 |
| 2007 | 5 | □234,321 | 10.5 | 3047 |
| 2008 | 5.1 | □288,243 | 10.4 | 2838 |
| 2009 | 5.2 | □342,164 | 10.6 | 2901 |
| 2010 | 5.2 | □379,322 | 10.6 | 2682 |
| 2011 | 5.3 | □416,480 | 10.7 | 2944 |
| 2012 | 5.3 | □471,108 | 10.5 | 2983 |

*Source: Department of Health*

***Note:** Total Government Health Expenditure is expressed in Million Philippine Peso (at current prices)*

***Table 1.1:** Trends in Health Care Expenditure, 1995-2005*

| SELECTED INDICATORS | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| THE per capita (in Php at current prices) | 961 | 1099 | 1226 | 1288 | 1397 | 1493 | 1484 | 1461 | 1804 | 1978 | 2120 |
| THE per capita (in Php at 1980 prices) | 411 | 431 | 454 | 435 | 442 | 453 | 425 | 405 | 472 | 494 | 507 |
| THE (as % of GDP) | 3.4 | 3.5 | 3.6 | 3.5 | 3.5 | 3.4 | 3.2 | 3.0 | 3.4 | 3.4 | 3.3 |
| Health Expenditure by source of funds (as of % of THE) | | | | | | | | | | | |
| *Government* | 35.0 | 36.0 | 38.0 | 39.1 | 39.2 | 40.6 | 36.2 | 31.0 | 31.1 | 30.7 | 28.7 |
| *National* | 19.2 | 19.7 | 20.3 | 20.8 | 20.7 | 21.2 | 17.1 | 15.8 | 15.2 | 15.7 | 15.8 |
| *Local* | 15.9 | 16.2 | 17.6 | 18.4 | 18.5 | 19.3 | 19.1 | 15.2 | 15.9 | 15.0 | 12.9 |
| Social Insurance | 4.5 | 5.0 | 5.1 | 3.8 | 5.0 | 7.0 | 7.9 | 9.0 | 9.1 | 9.6 | 11.0 |
| *Philhealth (Medicare)* | 4.2 | 4.7 | 4.8 | 3.5 | 4.8 | 6.8 | 7.7 | 8.8 | 8.6 | 9.4 | 10.7 |
| *Employees' Compensation (SSS & GSIS)* | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.2 | 0.2 | 0.2 | 0.5 | 0.3 | 0.4 |
| Private Sources | 59.6 | 58.1 | 56.1 | 56.1 | 54.5 | 51.2 | 54.5 | 58.6 | 58.6 | 58.5 | 59.1 |
| *Out-of-Pocket Payments (OOP)* | 50.0 | 48.3 | 46.5 | 46.3 | 43.3 | 40.5 | 43.9 | 46.8 | 46.9 | 46.9 | 48.4 |
| *Private Insurance* | 1.8 | 1.7 | 0.9 | 2.0 | 2.2 | 2.0 | 2.5 | 2.9 | 2.3 | 2.5 | 2.4 |
| *HMOs* | 2.0 | 2.3 | 2.5 | 2.9 | 4.0 | 3.8 | 3.1 | 3.6 | 4.7 | 4.3 | 3.9 |
| *Employer-based Plans* | 4.9 | 5.0 | 4.4 | 4.0 | 4.0 | 3.7 | 3.9 | 4.1 | 3.4 | 3.6 | 3.2 |
| *Private Schools* | 1.0 | 0.9 | 0.8 | 0.9 | 1.0 | 1.1 | 0.2 | 1.3 | 1.3 | 1.2 | 1.2 |
| Others | 0.8 | 0.9 | 0.9 | 1.0 | 1.3 | 1.3 | 1.3 | 1.4 | 1.2 | 1.2 | 1.2 |
| THE (in BilionPhp at 1995 prices) | 65.7 | 70.5 | 76.0 | 74.6 | 77.6 | 81.5 | 78.0 | 76.0 | 90.3 | 96.5 | 101.0 |
| GDP (in Billion Php at 1995 prices) | 1906 | 2017 | 2122 | 2110 | 2181 | 2312 | 2352 | 2457 | 2578 | 2742 | 2878 |
| Total Government Spending (as % of GDP) | 19.9 | 22.1 | 23.2 | 23.9 | 23.2 | 19.8 | 19.8 | 17.8 | 18.0 | 17.1 | 16.7 |
| Government Health Spending (as % of Total Government Spending) | 6.1 | 5.8 | 5.9 | 5.8 | 5.9 | 7.0 | 5.9 | 5.1 | 5.9 | 6.1 | 5.7 |
| Government Health Spending (as % of GDP) | 1.2 | 0.3 | 1.4 | 1.4 | 1.4 | 1.4 | 1.2 | 0.9 | 1.1 | 1.0 | 1.0 |



 

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***Source**: Philippine National Health Accounts, 2005, NSCB*

***Table 1.2:** Government Health Expenditure, by use of funds (% of THE), 1995-2005*

| Year | National | | | Local | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|
| | *Personal* | *Public Health* | *Others* | *Personal* | *Public Health* | *Others* | *Personal* | *Public Health* | *Others* |
| 1995 | 10.7 | 3.7 | 4.8 | 4.3 | 7.9 | 3.7 | 15.0 | 11.7 | 8.4 |
| 1996 | 11.7 | 4.4 | 3.6 | 4.4 | 7.9 | 3.9 | 16.1 | 12.3 | 7.5 |
| 1997 | 11.0 | 4.4 | 4.9 | 4.5 | 9.0 | 4.2 | 15.5 | 13.4 | 9.1 |
| 1998 | 12.8 | 4.3 | 3.7 | 5.0 | 8.9 | 4.4 | 17.8 | 13.3 | 8.1 |
| 1999 | 13.3 | 4.0 | 3.5 | 4.9 | 8.7 | 4.8 | 18.1 | 12.7 | 8.4 |
| 2000 | 13.5 | 4.5 | 3.3 | 4.7 | 9.3 | 5.3 | 18.2 | 13.8 | 8.6 |
| 2001 | 10.1 | 4.4 | 2.6 | 5.0 | 9.2 | 4.9 | 15.1 | 13.6 | 7.4 |
| 2002 | 9.8 | 3.4 | 2.6 | 3.7 | 6.9 | 4.6 | 13.5 | 0.3 | 7.2 |
| 2003 | 9.7 | 2.7 | 2.8 | 4.3 | 7.6 | 4.1 | 13.9 | 10.3 | 6.9 |
| 2004 | 9.5 | 3.3 | 2.9 | 3.8 | 6.8 | 4.4 | 13.3 | 10.1 | 7.3 |
| 2005 | 8.5 | 5.1 | 2.2 | 3.3 | 6.0 | 3.6 | 11.8 | 11.1 | 5.8 |

***Source**: Philippine National Health Accounts, 2005, NSCB*



***Table 1.3:** Government Health Expenditure, by type of expenditure (% of THE), 2005*

| **Expenditure Item** | National | | Local | Total by Type |
|---|---|---|---|---|
| | DOH & Attached Agencies | Other NGO Agencies | | |
| *Salaries* | 3.87 | 1.9 | 8.87 | 14.63 |
| *Maintenance & Operating Expenses* | 3.71 | 1.45 | 3.73 | 8.89 |
| *Capital Outlay* | 0.04 | 0.01 | 0.27 | 0.33 |
| *Total by Source* | 7.61 | 3.37 | 12.87 | 23.85 |

***Source**: Philippine National Health Accounts, 2005, NCSB*

***Note**: Excludes expenditure on foreign assisted projects (FAPS), which could not be disaggregated by expenditure type. FAPs were 4.87% of THE in 2005. Total by type in 2005 including FAPs is 28.7.*

 

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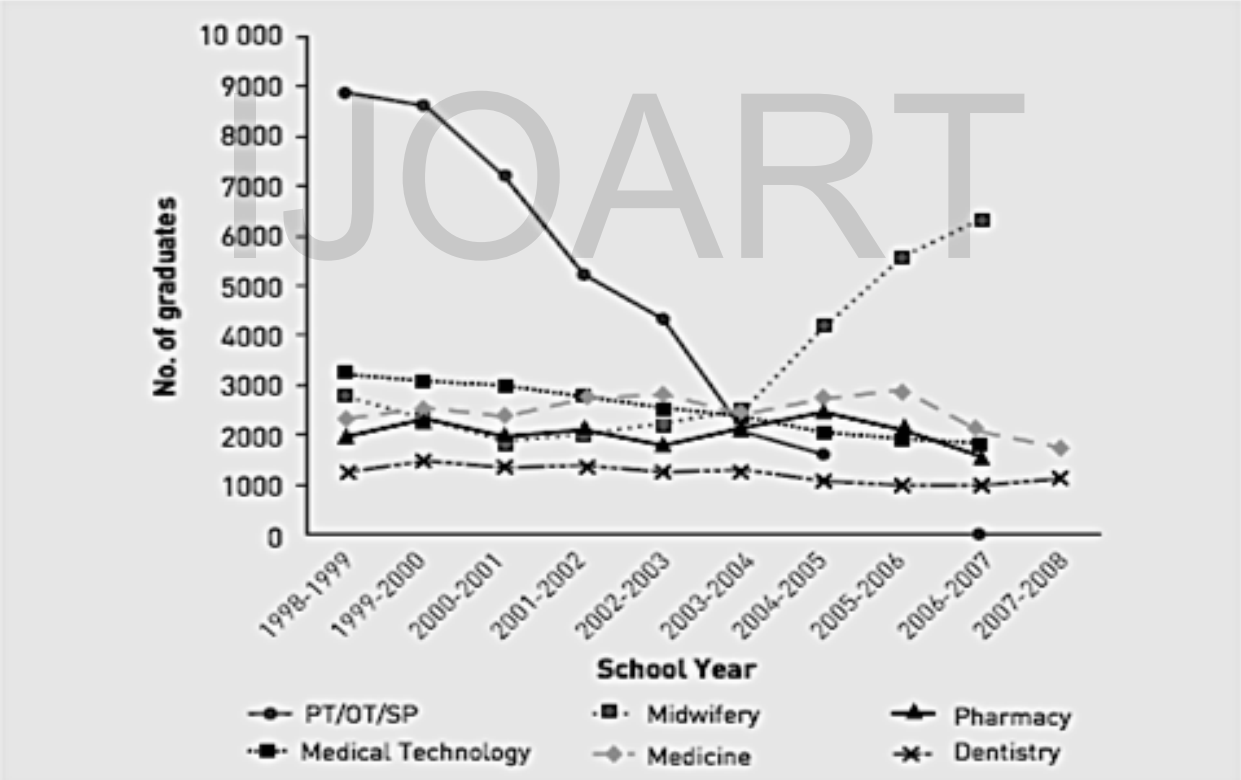
***Figure 2:*** *Trends in the Number of Graduates of Different Professions in the Philippines, 1998-2008*






***Source:*** *CHED, 2009*
***Note:*** *PT = Physical Therapist; OT = Occupational Therapist; SP = Speech Pathologist*

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***Table 2.0:*** *Minimum number of Health Workers required in Government & Private Hospitals based on DOH-BHFS Licensing requirements, 2010*

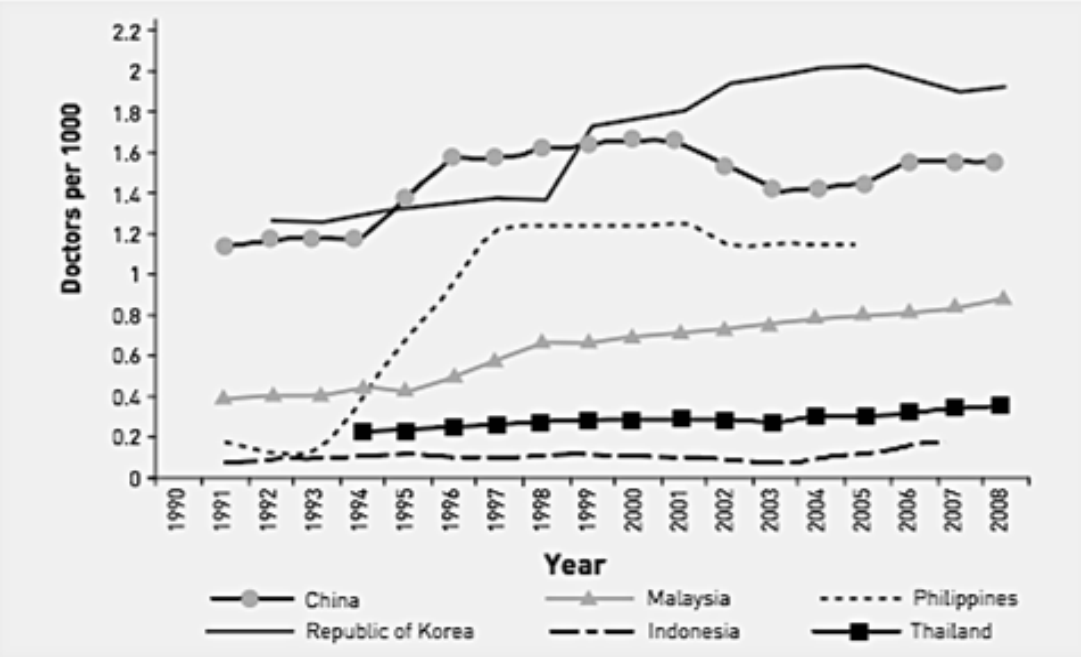
| Health Worker Type / Level of Health Facility | Government | | Private | |
|---|---|---|---|---|
| | *No.* | *%* | *No.* | *%* |
| ***A. Physicians*** | 4818 | 100 | 5676 | 100 |
| Level 1 | 666 | 14 | 878 | 15 |
| Level 2 | 1798 | 37 | 1541 | 27 |
| Level 3 | 526 | 11 | 1952 | 34 |
| Level 4 | 1828 | 38 | 1305 | 23 |
| ***B. Nurses*** | 19349 | 100 | 19584 | 100 |
| Level 1 | 2172 | 11 | 1960 | 10 |
| Level 2 | 5338 | 28 | 4193 | 21 |
| Level 3 | 1816 | 9 | 6405 | 33 |
| Level 4 | 10023 | 52 | 7026 | 36 |
| ***C. PTs/OTs*** | 54 | 100 | 67 | 100 |
| Level 1 | 0 | 0 | 0 | 0 |
| Level 2 | 0 | 0 | 0 | 0 |
| Level 3 | 0 | 0 | 0 | 0 |
| Level 4 | 54 | 100 | 67 | 100 |
| ***D. Dentists*** | 86 | 100 | 236 | 100 |
| Level 1 | 0 | 0 | 0 | 0 |
| Level 2 | 0 | 0 | 0 | 0 |
| Level 3 | 32 | 37 | 169 | 72 |
| Level 4 | 54 | 63 | 67 | 28 |

***Source****: Department of Health, 2010*



***Note:*** *The computation here is based on the authorized bed capacity indicated in the following: DOH A0 No. 70-A Series of 2002; DOH A0 No. 147 Series of 2004; and DOH A0 No. 29 Series of 2005.*

***Figure 2:*** *Ratio of Government Doctors per 10,000 Population, 1990-2008*



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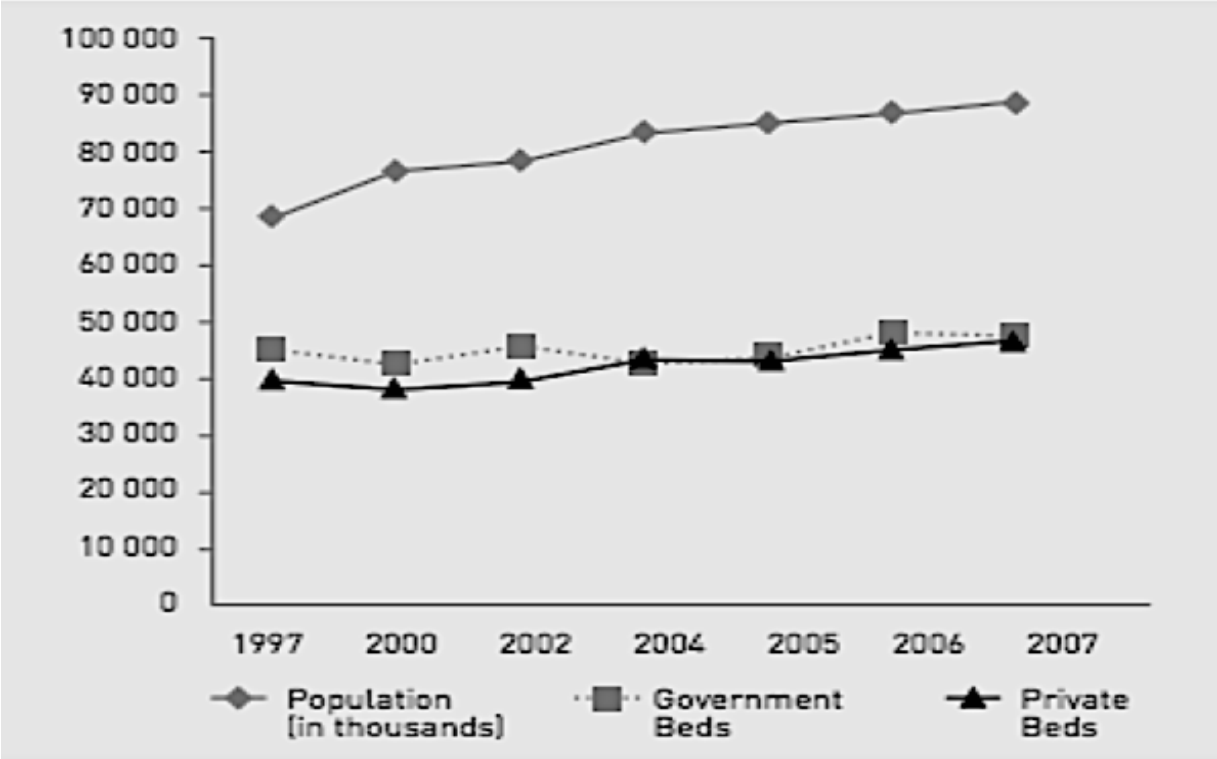


***Source***: *Philippine National Health Accounts, 2009, NSCB*
***Figure 3:*** *Number of Beds in Government and Private Hospitals and Total Population, 1997-2007*



***Source***: *Department of Health*

***Table 3:*** *Distribution of Licensed Government and Private Hospitals and Beds by Region, 2007*

| Region | *Popl'n.* | Primary Care Hospitals | Secondary Care Hospitals | Tertiary Care Hospit- | Total Hospit- | Total |
|---|---|---|---|---|---|---|

 

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| | | | | | | als | | als | Beds |
|---|---|---|---|---|---|---|---|---|---|
| | | *Government* | *Private* | *Government* | *Private* | *Government* | *Private* | | |
| ***Philippines*** | ***88.6*** | ***272*** | ***395*** | ***26*** | ***111*** | ***61*** | ***85*** | ***695*** | ***43670*** |
| NCR | 11.6 | 18 | 58 | 8 | 14 | 24 | 32 | 55 | 12972 |
| CAR | 1.5 | 11 | 8 | 0 | 0 | 1 | 0 | 37 | 1451 |
| Ilocos (I) | 4.5 | 15 | 28 | 1 | 6 | 6 | 5 | 39 | 2030 |
| Cagayan Valley (II) | 3.1 | 17 | 10 | 0 | 3 | 2 | 0 | 35 | 1649 |
| C. Luzon (III) | 9.7 | 38 | 77 | 1 | 16 | 6 | 6 | 58 | 3628 |
| CALABARZON (IV-A) | 11.7 | 31 | 83 | 3 | 23 | 2 | 9 | 66 | 2794 |
| MIMAROPA (IV-B) | 2.6 | 13 | 6 | 0 | 0 | 0 | 0 | 34 | 1553 |
| Bicol (V) | 5.1 | 16 | 18 | 2 | 10 | 4 | 2 | 50 | 2411 |
| W. Visayas (VI) | 6.8 | 29 | 7 | 2 | 3 | 3 | 8 | 59 | 3085 |
| C. Visayas (VII) | 6.4 | 24 | 14 | 0 | 8 | 4 | 9 | 60 | 3250 |
| E. Visayas (VIII) | 3.9 | 15 | 10 | 1 | 1 | 1 | 1 | 47 | 2030 |
| Zamboanga Peninsula (IX) | 3.2 | 7 | 13 | 0 | 4 | 1 | 1 | 28 | 1274 |
| N. Mindanao (X) | 4 | 12 | 21 | 3 | 9 | 2 | 5 | 34 | 1775 |
| Davao Region (XI) | 4.2 | 5 | 17 | 2 | 6 | 2 | 4 | 16 | 1053 |
| SOCCSARGEN (XII) | 3.8 | 7 | 20 | 0 | 5 | 3 | 3 | 25 | 1165 |
| CARAGA (XIII) | 2.3 | 8 | 3 | 3 | 3 | 0 | 0 | 32 | 990 |
| ARMM | 2.8 | 6 | 1 | 0 | 0 | 0 | 0 | 20 | 560 |

***Population Source:*** *http://www.ncsb.gov.ph/sectat/d_popn.*
***Hospital Data Source****: Bureau of Health Facilities, DOH, 2009*



***Table 4.0****: Initial Regression Results*

Dependent Variable: IMR
Method: Least Squares
Date: 11/07/16 Time: 09:25
Sample: 1980 2012
Included observations: 33

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 2.663889 | 0.384923 | 6.920580 | 0.0000 |
| TGE | 1.63E-06 | 4.95E-07 | 3.299593 | 0.0026 |
| BC | 0.173566 | 0.037838 | 4.587106 | 0.0001 |
| GD | 4.15E-05 | 3.73E-05 | 1.112605 | 0.2750 |

| | | | |
|---|---|---|---|
| R-squared | 0.727775 | Mean dependent var | 5.239394 |
| Adjusted R-squared | 0.699614 | S.D. dependent var | 0.508638 |
| S.E. of regression | 0.278772 | Akaike info criterion | 0.396364 |
| Sum squared resid | 2.253693 | Schwarz criterion | 0.577759 |
| Log likelihood | -2.540006 | Hannan-Quinn criter. | 0.457398 |
| F-statistic | 25.84317 | Durbin-Watson stat | 1.333395 |
| Prob(F-statistic) | 0.000000 | | |

***Table 4.1****: BG Test (Initial)*

Breusch-Godfrey Serial Correlation LM Test:

| | | | |
|---|---|---|---|
| F-statistic | 5.960874 | Prob. F(1,28) | 0.0212 |

 

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| | | | |
|---|---|---|---|
| Obs*R-squared | 5.792220 | Prob. Chi-Square(1) | 0.0161 |

***Table 4.2**: Heteroskedasticity ARCH Test (Initial)*

Heteroskedasticity Test: ARCH

| | | | |
|---|---|---|---|
| F-statistic | 0.070107 | Prob. F(1,30) | 0.7930 |
| Obs*R-squared | 0.074606 | Prob. Chi-Square(1) | 0.7847 |



***Table 4.3**: Regression Results* (LOG)

Dependent Variable: IMR
Method: Least Squares
Date: 11/07/16 Time: 09:47
Sample: 1980 2012
Included observations: 33

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 18.95047 | 4.993110 | 3.795324 | 0.0008 |
| TGE | 3.65E-06 | 4.92E-07 | 7.430272 | 0.0000 |
| BC | 0.453948 | 0.211725 | 2.144046 | 0.0412 |
| GD | -2.22E-05 | 2.99E-05 | -0.744228 | 0.4632 |
| LOG(TGE) | -0.437473 | 0.070840 | -6.175548 | 0.0000 |
| LOG(BC) | -6.023467 | 2.985596 | -2.017509 | 0.0537 |

| | | | |
|---|---|---|---|
| R-squared | 0.891873 | Mean dependent var | 5.239394 |
| Adjusted R-squared | 0.871849 | S.D. dependent var | 0.508638 |
| S.E. of regression | 0.182083 | Akaike info criterion | -0.405743 |
| Sum squared resid | 0.895164 | Schwarz criterion | -0.133650 |
| Log likelihood | 12.69475 | Hannan-Quinn criter. | -0.314192 |
| F-statistic | 44.54109 | Durbin-Watson stat | 1.914776 |
| Prob(F-statistic) | 0.000000 | | |

***Table 4.4**: BG Test* (LOG)

Breusch-Godfrey Serial Correlation LM Test:

 

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| | | | |
|---|---|---|---|
| F-statistic | 0.003219 | Prob. F(1,26) | 0.9552 |
| Obs*R-squared | 0.004086 | Prob. Chi-Square(1) | 0.9490 |

***Table 4.5**: Heteroskedasticity ARCH Test* (LOG)

Heteroskedasticity Test: ARCH

| | | | |
|---|---|---|---|
| F-statistic | 0.020313 | Prob. F(1,30) | 0.8876 |
| Obs*R-squared | 0.021653 | Prob. Chi-Square(1) | 0.8830 |



 