FISCAL ARCHITECTURE IN NEPAL: AN ASSESSMENT OF ALLOCATIVE AND TECHNICAL EFFICIENCY OF PUBLIC HEALTH SPENDING

Shiva Raj Adhikari*

Abstract

Background: Despite the public spending is being one of the instruments to ensure the broad based economic growth and poverty reduction, misallocated public spending, inter alia by substituting for private expenditure can lead to increase income inequality and poverty. The allocative and technical efficiency of public spending could lead a higher steady- state growth rate for the economy.

Objectives: The paper seeks to provide necessary inputs to better understand the allocative and technical efficiency in use of public resources with an example of health sector in Nepal.

Methods: The study utilized two sets of information: secondary information including annual budget and expenditure, red books, economic surveys and primary information including surveys of state-owned enterprises, local bodies and donors. Economic and statistical tools were used to analyze allocative efficiency among the target groups and priorities. Production function approach and econometric tools were applied to measure the technical efficiency.

Results: All sources of funding kicked in to increase public expenditure on health in terms of the ratio with GDP 1.6 to 2.1 percent and real per capita expenditure in Nepalese Rupees 290 to 438 in the given fiscal years. Public spending on the first priority programmes (almost 72 percent); public health services (almost 70 percent) and rural focused programmes (almost 60 percent) ensured the allocative efficiency; however, some of the areas such as primary health care did not provide a clear picture of allocative efficiency. An increase of public expenditure leads to

* PhD, Associate professor of Economics, Department of Economics, Patan Multiple Campus, Tribhuvan University, Nepal

improve in coverage, access to health care services and health status. The coefficients and elasticity from the econometric analysis suggested satisfactory results in technical efficiency.

Conclusions: Increasing public expenditure on health does not ensure the allocative and technical efficiency. It requires institutional capacity to design fiscal architecture and needs to know how public spending can improve the health status and equity in health.

Key words: public spending, Nepal, allocative efficiency, technical efficiency, health

1. Introduction

Evidences from the developing countries have established a strong relationship between the composition of public spending and economic growth (Devrajan et al, 1996). The right mix of public spending could lead a higher steady- state growth rate for the economy and a greater equality between the poor and non-poor (Sinnathambu, 2004). The 'better value for money' that is, more efficient and result oriented use of resources, is more important in order to have a significant and sustainable impact on improvement of the sector's outcomes and economic growth (Meier, 1990). However; some of the studies found conflicting results about the effects of public spending on sector's outputs or economic growth, for example, Tazi and Zee, (1997) found no contribution of public spending on economic growth.

Public spending provides an enabling environment for the private sector. There is a crucial link between public spending and poverty reduction (Fan et al, 2003). Public expenditure typically affects poverty through three channels –growth, employment and wages. It also helps to increase national productivity which in turn helps to increase wages and employment (Fan, 2008). Some of the economists argue that the economic growth may be possible due to the results of invisible hand, where the role of government is limited in economic activities and it provides incentive to the private sector to promote the economic efficiency (Meier, 1990). On the other hand, some of them emphasized the government leadership to improve economic status of the countries. The government spending corrects the market failure and supports to reduce poverty. A large body of researches on the determinants of economic growth confirmed that the government investment is necessary in certain areas such as infrastructure, health and education. Given the stock of labour and capital, the improvement in health and education status of the

population can lead a higher output. A recent study showed the association between human capital and aggregate economic performance (Adhikari et al, 2002). The government spending does not necessarily mean better economic outcomes. The public financing method chosen is the critical importance because it determines the risk-pooling arrangement and the distribution of the cost burden (Hsiao, 2007). Therefore, the analysis of government spending is imperative to better understand the allocative and technical efficiencies, particularly in the developing countries.

Fiscal architecture of public spending can provide necessary inputs to better understand the right mix of public spending. The frame of the fiscal architecture allows us to analyze sources of funding for public spending, allocative efficiency and technical efficiency. Literally, allocative efficiency means'doing the right thing' and technical efficiency means 'doing it the right way' in the process of public spending. It is, thus, imperative to undertake the public spending analysis for providing information on sources of funding, their allocations and production efficiency. The frame of fiscal architecture provides insights on how to get better value for money and patterns of spending. The public expenditure refers in this paper to spending of public funds by public authorities at all levels, including the expenditures made by different ministries of the Government of Nepal, local bodies, state-owned enterprises, the external development partners (EDPs) and among others.

The objective of this paper is to provide a fresh look to better understand the allocative and technical efficiency in use of public resources by utilizing two sets of information secondary and primary sources. The paper examines the patterns of public spending on health in order to gain an overall picture of the allocation of public expenditure and assesses the technical efficiency using health production function approach. The difference between budgeted expenditures and actual expenditures has also been analyzed in order to identify the absorptive capacity of the health sector. Overall analysis of public spending on health in Nepal provides quite encouraging results in both allocative and technical efficiencies; however, the allocation of public spending in regular and capital expenditure is not satisfactory.

2. Methods and materials

2.1 Research Design

The paper adopted descriptive as well as analytical methods to review the fiscal architecture of public health spending on health by utilizing primary and secondary sources of information. Two sets of information include: i) details of expenditure, functional classification,

red books, various publications of Ministry of Finance, National Planning Commission, Ministry of Health and Population and other Ministries and ii) data collected through a survey of selected state-owned enterprises, EDPs and local bodies. The study attempted to bring out the status and trend of public expenditure in the health sector as a whole.

2.2 Collection of data

The paper used multiple sources of information for such as annual report of Department of Health Services (DoHS), annual report of Auditor General and Financial Management Information System, red book, and survey of EDPs. The researchers consulted various experts, such as government officials, account officers, policy makers among others, to redefine and agree on the definition of various terms used in policy and budgetary documents, to identify organizations for interview, questionnaire design, and result interpretations. There was a practice of allocating budgets based on sources (government, foreign grants and loan); however expenditures are not in accordance to the sources in the red books. It is difficult to get source wise expenditure on health in the red book and in other sources as well. All allocated budgets were not spent during the fiscal year. Again, total commitments of foreign aids were not constituted in the given period. The expenditure data reflected in the red books are overlapped with the government's and donors' contribution. There is a possibility of double counting by using different sources of data, for example: government expenditure and donor expenditure. Based on existing data sources, avoiding possibility of double counting of the expenditure is challenging and it not straightforward. However, the paper minimizes/avoids the possibility of double counting by using specific methods based on current practice. For example, there are three possible conditions in the allocated budget and expenditure: first, expenditure is equal to allocated budget; second, allocated budget is higher than expenditure and third, expenditure is higher than allocated budget. There may not be any problem in source wise categorization of expenditure if the first condition is satisfied; however there might be some problems of determining source wise expenditure if remaining two conditions persist. In the second condition, generally government budget is allocated for recurrent or regular expenditure. The allocated budget for regular expenditure has been spent almost 100 percent. Therefore, total expenditure minus the allocated budget from government source gives us donor contributions. In the third condition, the government can reallocate some amount of money from one sector to

another, one programme to another or one ministry to another, under the condition of existing rules and regulation. However, the donor contributions are less likely to be higher than their commitments. Therefore, total expenditure minus allocated donor source gives us the government contribution.

A short structured questionnaire had been developed to capture the sources of funding and expenditure patterns of local bodies, universities and state owned enterprises. The survey covers more than 15 out of 36 state-owned enterprises of the country. More than 50 district development committees (DDCs), fifty village development committees (VDCs) and more than 11 municipalities are covered through the channel of Ministry of Local Development. Similarly, a separate donor survey was conducted to capture the direct expenditure made by the donors. Some of the amount of money from the total contribution of donors was reflected in red book and remaining amount of money is not made available in public domain. The average expenditure patterns based on ecological belts derived from the sampled local bodies were used for extrapolation to represent the national figures. For analysis of technical efficiency, data from almost two decades (FYs 1989/90 - 2007/08) to show the relationship between inputs - particularly expenditure on the health sector - and health outcomes were used; however, almost a decade data (FYs 2000/01 to 2008/09) were used to analyze the allocative efficiency.

2.3 Data analysis

The collected data were triangulated and verified from different sources of information. Economic and statistical tools such as trends, figures, percentages, rate, means, and proportions among others were used to analyze allocative efficiency of public spending on health. The health policy governs the magnitude of public health expenditures, which is eventually reflected in health outcomes. As suggested by Filmer and Pritchett (1999), Adhikari and Maskay (2004), the technical efficiency is measured using input- output matrix and ordinary least squares method. . The following conceptual equation for the "health production function", is:

$$\ln(M_i) = \beta_1 \ln\left(\frac{GDP_1}{N_1}\right) + \beta_2 \ln\left(\frac{H_1}{GDP_1}\right) + \beta_3 \ln\left(\frac{H_1}{TGE_1}\right) + \beta_4 (X_i) + \varepsilon_i \quad \ldots\ldots (1)$$

This equation relates the dependent variable, "M", which is taken to be either that of child mortality rate, infant mortality rate, crude birth rate or life expectancy rate. Independent variables are the log of mean per capita income, the log of the share of public health as a fraction of total government budget and the log of the share of public health as a fraction of GDP. "X"

are independent variables such as health care providers, bed services, skilled manpower; however, these are treated as control variable. Regression analysis illustrates the causal relationships between input and output variables. Both STATA software and excel were used to analyse the data.

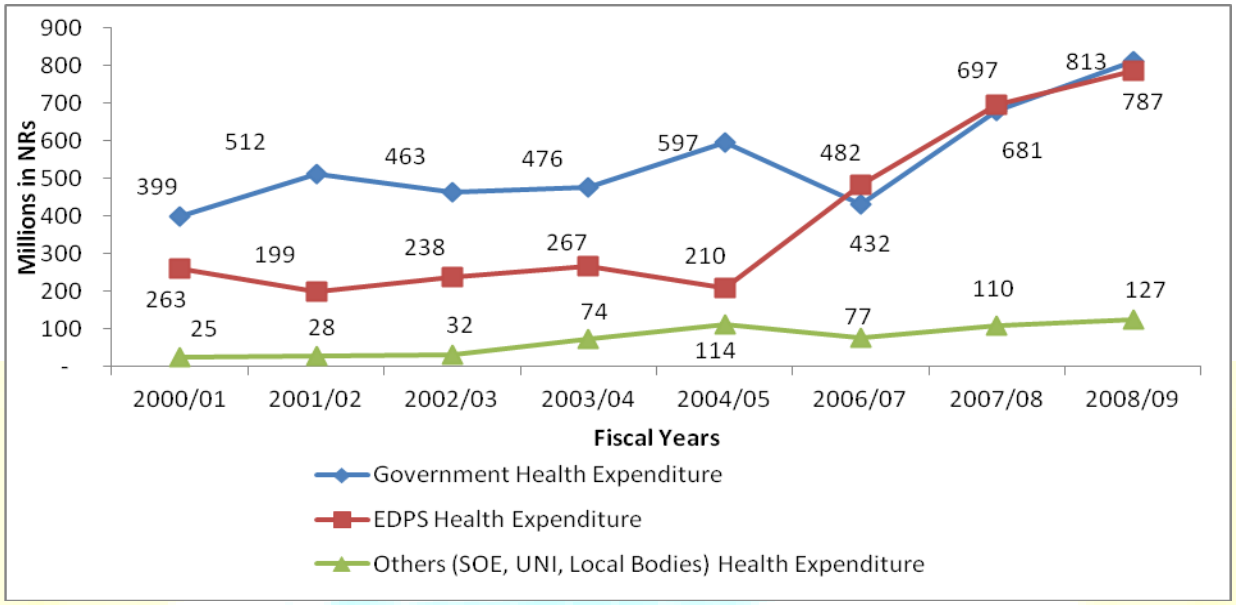
3. Results

3.1 Sources of funding

The sources of funding include mobilization of government revenue, foreign grants and loans, local bodies, state owned enterprises and autonomous universities. The government revenue is the primary source of funding followed by the foreign grants and loan, which comes through bilateral and multilateral commitments.

The paper has grouped three main sources of funding for public expenditure on health viz. government, EDPs and others. Almost 45 percent out of total public expenditure on health is contributed by the government. The results showed that almost equal contribution with the government to the total expenditure is made by the EDPs. State-owned enterprises, local bodies and autonomous universities contributed almost 6 percent to the total public expenditure on health from their own or internal sources. The trend lines of sources funding for public expenditure for the given fiscal years (FYs) are shown in the figure 1. The sources of government and EDPs have increasing trends over the years; however, other sources including SOEs, autonomous universities and local bodies are almost constant over the years.

Figure 1 Trends of sources of funding

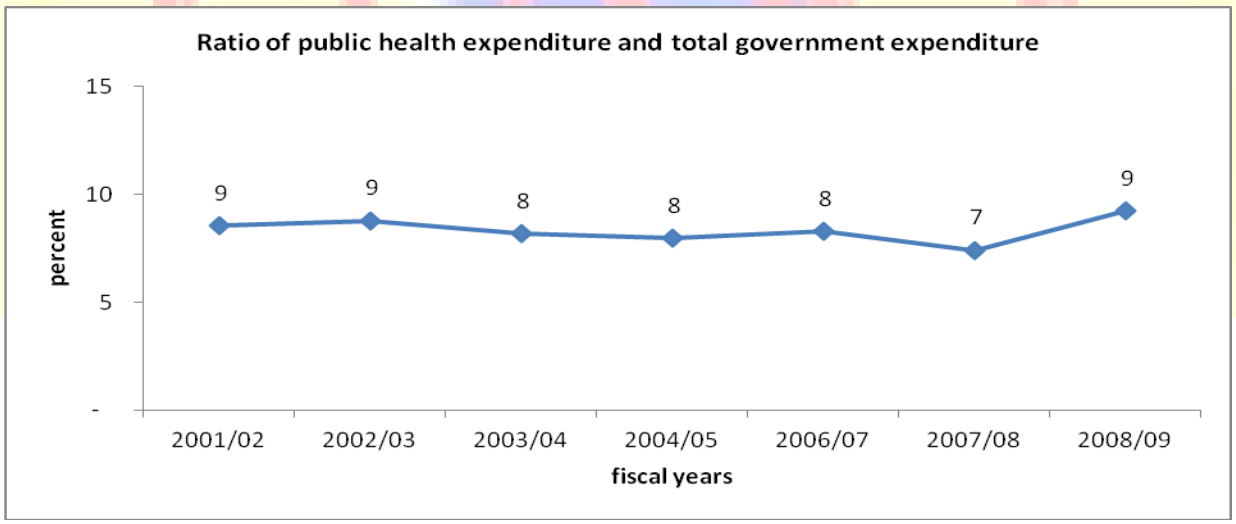


Sources: estimated

3.2 Trends of public expenditure

Total public spending on health increased during the last three-year period with 74 percent, increase from Nepalese Rupees (NRs) 9911 million to NRs 17263 million. The ratio of total public health expenditure and total government expenditure was almost constant, that was 8 percent, over the fiscal years.

Figure 2. Comparison of total government expenditure and health expenditure



Sources: estimated

The per capita public health expenditure has increased from NRs 290 for FY 2000/01 to NRs 438 in real term for 2008/09 with almost 51 percent of annual average growth rate (figure 3). In US$ term, it increased from almost 4 USD in FY 2000/01 to almost 10 USD in FY 2008/09.

Figure: 3 trends of per capita public expenditure

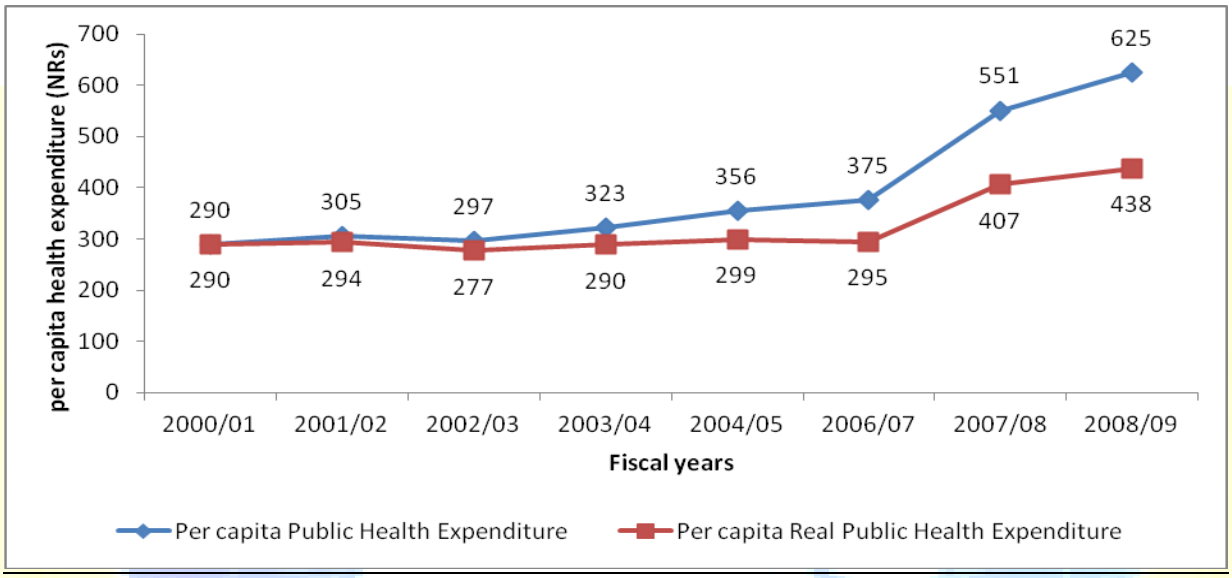


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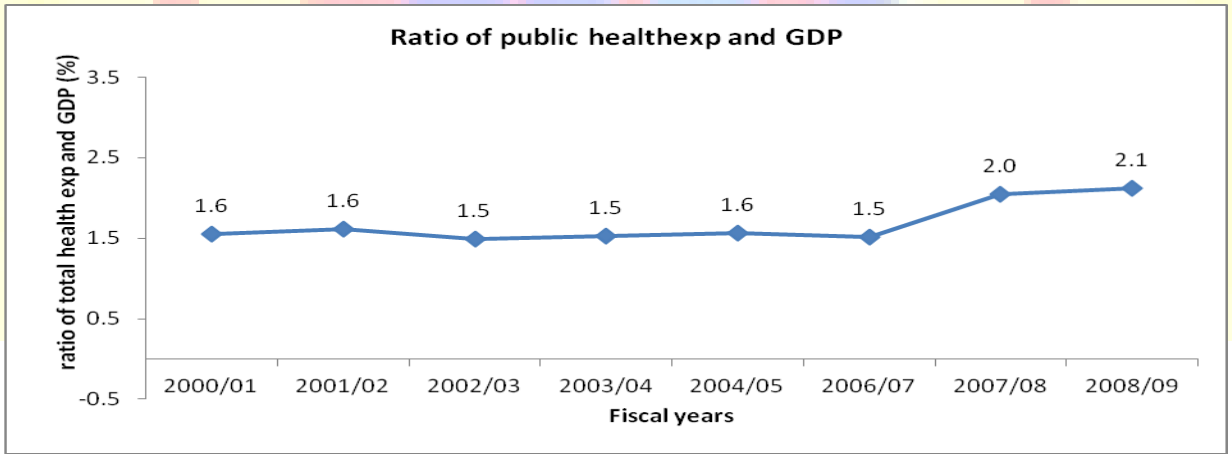
Figure: 4 Ratio of total public health expenditure and Gross domestic products (GDP)



Sources: estimated

The ratio of public expenditure on health with gross domestic product (GDP) shows almost constant until FY 2006/07. There is an increasing trend of the ratio after FY 2006/07.

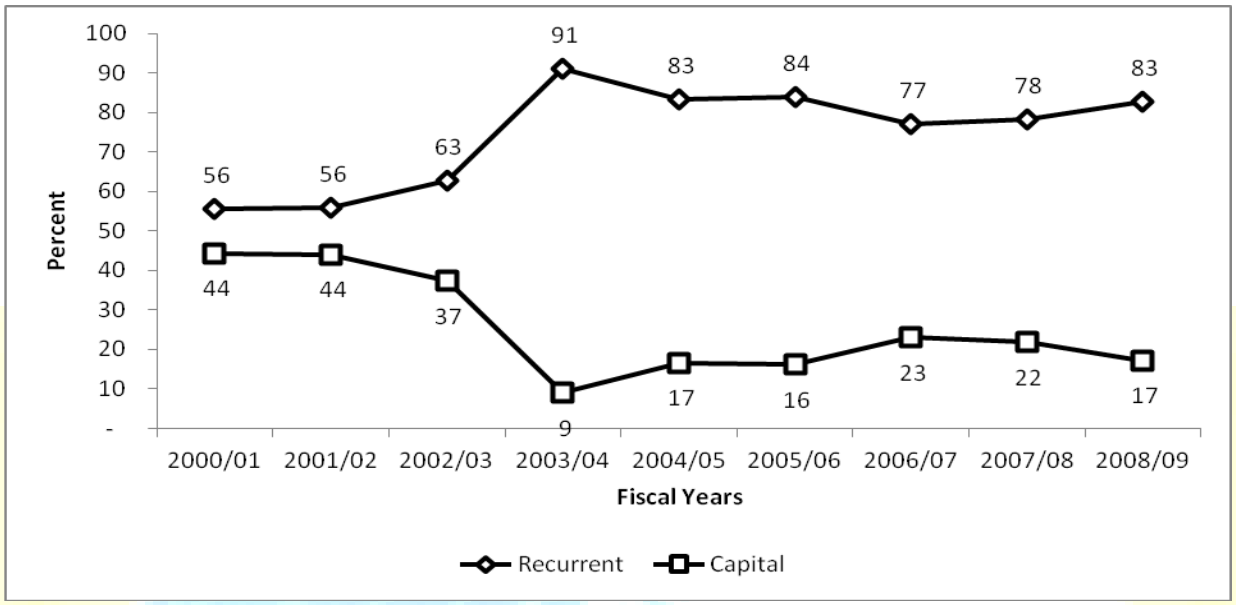
There are a number of reasons to have a higher ratio of public expenditure on health during last two years. First, the growth rate of government expenditure has significantly increased over the fiscal years. In the review period, the growth rate of GDP at current price is lower than growth rates of public expenditure on health and total government expenditure. Second, in the review years, the absorptive capacity of health sector has been increased in both capital and recurrent expenditure. As the result of this, the public expenditure on health has an increasing trend during the review years. Third, the Ministries other than MOHP have increased the expenditure on health related activities and added health related programmes, for example, Ministry of Public Administration has established a new hospital in Kathmandu, Ministry of Defense and Ministry of Home Affairs have also increased the expenditure on their hospitals.

3.3 Capital and recurrent expenditure

In recent years, public expenditure is classified into recurrent, capital expenditure and debt payment. Before 2003/04 it was classified into regular and development expenditure. The present review confined to recurrent and capital expenditure only. This was slightly different in the category; but to avoid the confusion, we used capital and recurrent expenditure for before FY 2003/04 too. Recurrent expenditure is related to maintaining and sustaining service delivery and other regular characters. Capital cost is the investment that accumulates capital in the health sector. The recurrent expenditure has an increasing trend throughout the review periods; however, capital expenditure has a fluctuating trend and lies near to horizontal axis.

Surprisingly, recurrent expenditure captured up to 91 percent of total public expenditure on health. Before 2003/04 it was satisfactory because capital cost shared almost 40 percent of the total public expenditure on health. The results clearly suggest that a huge amount of money is spent on maintaining existing inputs such as stock of human resources, health facilities, and laboratory equipments among others. The capital expenditure that has power to shift the health production, is very low throughout the review period. The health system inputs cannot meet the demand for health care in the public facilities. Due to lack of sufficient inputs such as beds, space or rooms, human resources, equipments etc in the facilities, some of the health care services, for example, maternal health care create the crowding out effects to the other health care services.

Figure 5 Percentage distributions of capital and recurrent public expenditure

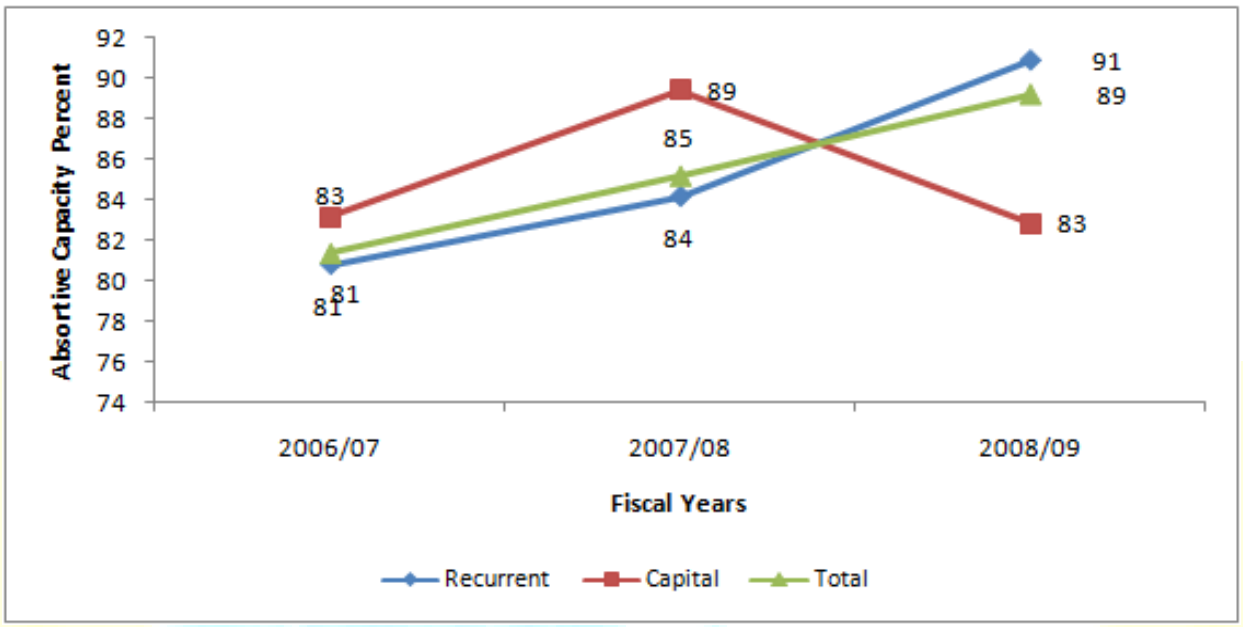


Sources: estimated

3.4 Absorptive capacity

The amount of budgeted indicates the commitment of the government, whereas actual amount of expenditure measures the capacity of utilization of resources. The capacity of utilization of resources is called absorptive capacity of the health system. It is observed that there is a huge gap between the budgeted amount and utilized amount, particularly in capital expenditure. Recent years, the political situation is getting better; consequently, the absorptive capacity in both regular and capital budget has been improved. In FY 2008/09, it has reached to almost 90 percent.

Figure 6 Absorptive capacities of MOHP

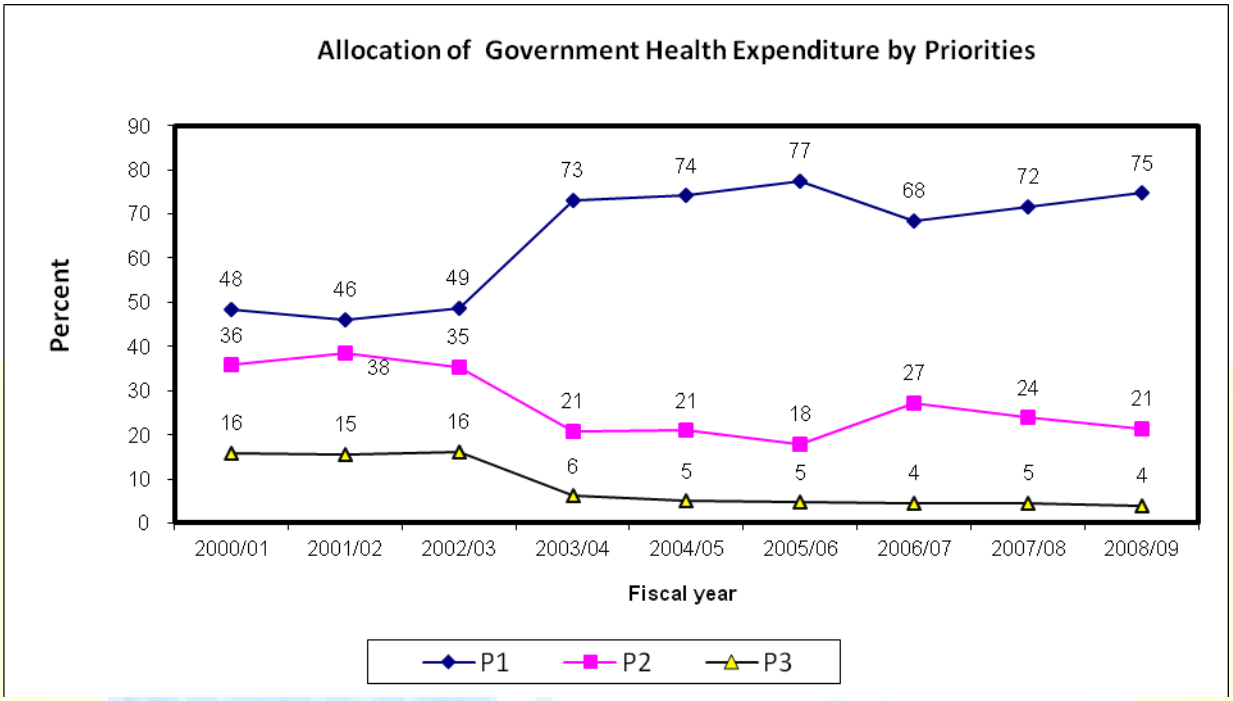


Sources: estimated

3.5 Allocative efficiency

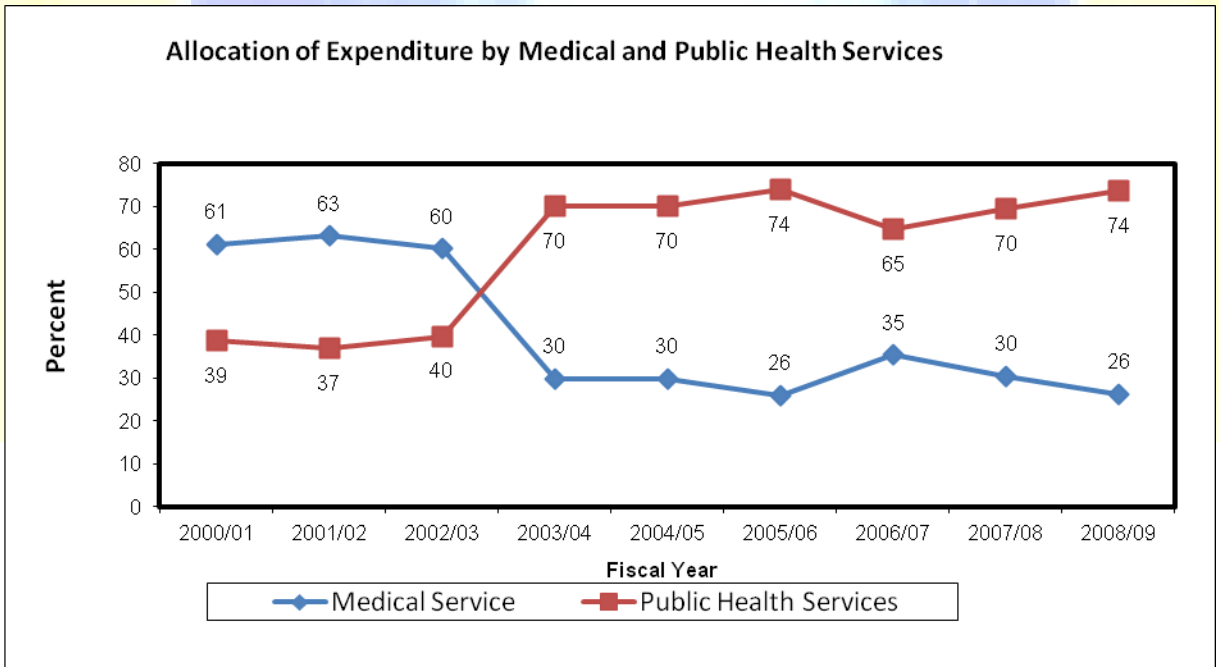
Allocation of resources determines the level of health outputs. If the resources are allocated more efficiently, it will be possible for obtaining optimal level of health outputs/outcomes. Efficient allocation of resources reduces the inequality of health outputs and outcomes. Allocation of resource based on priority programmes is one of the indicators of efficient allocation of resources. The government has scored the priority areas, for example, first priority (p1), second priority (p2) and third priority (p3) programmes and projects. The budget has paid attention to allocate based on the priority of the projects. The trend lines suggested that priorities were set based on expenditure as well. First priority projects shared more than 70 percent of total expenditure on health since 2003/04. It reached 81 percent in FY 2008/09. This was followed by the second priority projects. There was an increasing trend of the expenditure on the first priority; however, there were decreasing trends of expenditure on the second and third priorities.

Figure 7 Allocation of expenditure by priorities



Sources: estimated

Figure 8 Allocation of expenditure by medical care and public health services



Sources: estimated

In recent years, there has been an increasing trend in public health expenditures. The expenditure on curative services was noted to be decreasing over the period; on the contrary the expenditure on public health services showed an increasing trend. After introduction of sector wise approach (SWAP), the priorities are clearly defined and budgeted accordingly. It is very difficult to review the allocative efficiency of total expenditure based on age groups. It is not clear about which age groups will benefit from the allocated expenditure on the programmes. It would be very interesting and useful if the review provides allocation of expenditure based on geographical location or regions. It is not possible to analyze the expenditure based on geographical location due to various reasons such as time limitation, identification of the programmes based on geographic regions; however, the paper analyzed expenditure based rural urban category. The results demonstrate that the government has given priority to the rural areas where the incidence of diseases disproportionately falls and the people frequently face problem of access to health care services.

The policy makers frequently discuss on allocating the resources to the primary care. Secondary and tertiary cares are primarily designed for the people who can pay for that care. The health of the people who visit secondary and tertiary cares is treated as an individual good; however, the primary health care is related to public good. The primary care has a greater spillover effects to the society. Therefore, the government has given priority to the primary care with allocating more amount of money as compared to the secondary and tertiary care.

3.6 Efficiency of Public Expenditure

A simple mechanism or a channel of public expenditure on health to health outputs/outcomes is that an increase in public expenditure leads to improve in coverage and access to health care services. Public expenditure is the pivot element of the health system that creates the movements or mobilizes all programmes, and inputs. Other building blocks of the health system cannot work if the financing system is weak (WHO, 2010). When all the programmes or activities and inputs are in their functions, there is improvement in coverage and access to health care services. The coverage and access to health care services leads to improvement in health indicators.

3.6.1 Input- output matrix

All inputs are measured in monetary terms, for example, growth rate of public expenditure on health, per capita public expenditure and ratio of public expenditure to gross domestic product (GDP) in the table 1. Indicators of access to health services, coverage of health services, and health output/outcomes are presented here from various surveys report.. The matrix suggests that the public expenditure on health has power to improve the health indicators. It is clear that increase in public expenditure on health leads to an improvement in health indicators.

Table 1: Input output matrix

Fiscal Years	Inputs[a]			Access[b] to and coverage [c]of health services								Output/outcomes[c]			
	Public exp. real growth rate	Per Capita real public exp. (in NRs)	Ratio of Public exp. to GDP	Survey years	Accessto health centre%	Survey Years	BCG vaccine	All vaccines	Antenatal care from skilled provider	Delivery by skilled provider	Delivery by the health facility	Total fertility	Mortality		
													Infant	Child	Under five
-	-	-	-			1991-95 (1996FHS)	76	43	-	-	-	4.6	79	43	118
2000/01	-	289.78	1.56	1995/ 96NLSS	44.8	1996-2000 (2001DHS)	85	66	28	11	9	4.1	64	29	91
2001/02	3.47	293.64	1.61		-										
2002/03	-3.67	277.12	1.49	-		-	-	-	-	-	-	-	-	-	-
2003/04	4.80	283.54	1.49	2003/ 04NLSS	61.8										
2004/05	5.66	292.64	1.53			2001-2005 (2006DHS)	93	83	44	19	18	3.1	48	14	61
2005/06	13.77	326.62	1.68												
2006/07	36.11	434.69	2.18		-	-	-	-	-	-	-	-	-	-	-
2007/08	29.97	552.66	2.67												
2008/09	2.75	553.80	2.63	Change in %											
2009/10	-			2010/ 11NLSS	73.8	2006-2010 (2011DHS)	96	87	58	36	28	2.6	46	9	54

Sources: a: estimated; b: NLSS 1995/96, 2003/04, and 2010/011; c: FHS 1996, NDHSs 2001, 2006 and 2011

3.6.2 Regression analysis

To empirically examine the linkages between health indicators and public spending on health, we constructed a panel dataset for almost two decades 1990/91 to 2007/8 (Adhikari, 2010). The health status of the population is captured through aggregate indicators such as average life expectancy, the infant mortality rate, etc. Out of pocket payment for health is almost 60 percent in Nepal; therefore, private sector contribution is also important to improve the health indicators. In addition to per capita income, coverage of health services, number of beds, and skilled human resources were also used as control variables in the health production function. The paper presents an input output matrix to understand the association between some of the variables used in the study. This is followed by the specification of the econometric model.

Table 2: Regression analysis and interpretations

Dependent variable	Real GDP per capita	Ratio of health budget to total government budget	Ratio of health budget to GDP	Number of people served by the health care providers	Number of people served by a bed	Number of people served by skilled manpower
IMR	-0.7180	-0.1850	-0.0093	0.1099	0.4132	0.2222
Interpretations (overall model significant at 1% level with high Squared (0.9684)	Significant at 1% with expected sign	Expected sign but not significant	Expected sign but not significant	Expected sign but not significant	Significant at 10% with expected sign	Significant at 5% with expected sign
CBR	0.1085	-0.4653	0.0470	0.1083	0.4914	-0.0873
Interpretations (overall model not significant)	not significant	not significant	not significant	not significant	not significant	not significant
CMR	-1.0733	-0.4457	-0.0093	0.0607	0.4605	0.1913
Interpretations	Significant	Significant	Expected	Expected	Expected	Expected

(overall model significant at 1% level with high Squared (0.9591)	at 1% with expected sign	at 10% with expected sign	sign but not significant	sign but not significant	sign but not significant	sign but not significant
LER	0.1975	0.0615	-0.0028	0.0053	-0.1032	-0.0180
Interpretations (overall model significant at 1% level with high Squared (0.9666)	Significant at 1% with expected sign	Significant at 10% with expected sign	not significant	not significant	Significant at 5% with expected sign	not significant

Sources: Adhikari, 2010

Regression analysis demonstrates that government health expenditure has the power to change health outcomes, particularly CMR and life expectancy. However, it has a little power compared to per capita income. The elasticities of the given variables determine how sensitive the input variables are while changing the outcome variables.

Table 3: Elasticity of health outcomes with respect to health inputs

Variable	IMR	CMR	LER
Real per capita income	-0.718	-1.07	0.198
Ratio of health budget to government total budget	-	-0.45	0.062
Number of people served by a bed	0.413	-	-0.103

Note: This employs a double log model

Sources: Adhikari, 2010

The elasticities provide encouraging results to the researchers and policymakers. If the real per capita GDP increases by 10 percent, it will decrease the IMR by almost 7 percent, CMR by 11 percent, and increase LER by almost 2 percent. Similarly, if we increase the ratio of health budget to the total budget by 10 percent, CMR will decrease by 4.5 percent and LER will increase by 0.6 percent. If we increase the number of beds in hospitals, the ratio of people to number of beds will be reduced. If we reduce the ratio of people to total beds by 10 percent (in other words, increase the number of beds), it will reduce IMR by 4 percent and increase LER by 1 percent. The literature provides indicative results based on empirical evidence about extra spending that leads to changes in health outcomes. The World Bank has written about health expenditure effectiveness, "in countries with "good" policies and institutions, an extra 10 percent of GDP in aid has been estimated to lead to a decline in infant mortality of 9 percent. By contrast, in countries in which policies are only average, the impact is just 4 percent. The policies may be inappropriate, if the effect on IMR is not statistically significant effect (Wagstaff and Claeson, 2004, page 56). Thus, the Nepalese health system can be expected to have average results; however, there is a lot of room for improvements.

4. Discussion and Conclusions

The analysis of this paper is important for several reasons. First, there is no denying that the public spending on health contributes to economic growth. Improvements in health, when directed at the poor, can contribute directly to poverty reduction and serve as an element of a 'pro-poor' growth strategy. The poor bears a disproportionately higher burden of illness and disease than the rich. Second, it helps to look at the financial power to reform public health system to deliver efficient and effective services. The public financing method holds the key for it to achieve equitable and efficient public services for all. Unfortunately, there have been a few recent attempts at examining the public spending with relation to health in Nepal (Adhikari et al, 2002). This paper attempts to review allocation and patterns of public health expenditure including recurrent and capital expenditure, expenditure on priority areas, expenditure on medical and public health services; and to examine the technical efficiency using health production function approach.

There are some limitations of this study; for example, due to changes in programmes of various Ministries, budget line items, definitions of programmes and coverage, the task of

reviewing and maintaining consistency with previous data are challenging. Some of the budget items and programmes introduced by different Ministries have partial impact on health, for example, expenditure on water and sanitation, allowances for different groups, expenditure on Avenue influenza made by Ministry of Agriculture and Co-operative; however, the estimation of shared expenditure is not straight forward. Two channels, direct and indirect, of expenditure on health made by the EDPs are practiced in the country. The direct channel of EDPs expenditure can be captured through red books, white books, FMIS, various Ministries' publications; however, it is difficult to capture indirect channel of expenditure made by EDPs through donor expenditure surveys because of low response rate of EDPs

The results suggested that the public expenditure on health was increased by 68 percent. The share of MOHP in the total public expenditure on health is about 58 percent. The ratio of public expenditure on health to total government expenditure has significantly increased in last three years. Recently, the ratio of public expenditure to GDP has increased from 2.18 to 2.63 percent. Due to improving political situation, , the absorptive capacity of MOHP is getting better The result showed that recurrent expenditure on health was almost 80 percent. It means that a huge amount of money was spent on maintaining the existing inputs of health system. Low capital spending constraints the creation of new health infrastructure and thus hinders the health production function and quality of services.

Health indicators such as life expectancy, infant/child mortality, and maternal mortality in Nepal have significant improvement over the past decades. Money matters in health sector. If the government increase the budget in health sector, no doubt, the outcomes will be increased. For example, if we increase the ratio of health budget to the total budget by 10 percent, CMR will decrease by 4.5 percent and LER increase by 0.6 percent. However, out of pocket expenditure is the principle source of financing in Nepal. IMR will fall by 7 percent if the per capita income increases by 10 percent. On the other hand, an increase in out of pocket expenditure on health reduces the consumption of other goods and services consequently reduce the economic welfare (Adhikari et al, 2009).

The results suggested that total public spending on health has increased over the years; however, an increase of public expenditure on health sector is necessary condition to improve the health indicators, but it does not guarantee efficient, equitable and effective health care services. Allocations of resources, utilization of resources and better use of money have power to improve

the health indicators of various population groups including marginalized and disadvantaged communities.

In conclusion, health care financing has a power to reform health care delivery and provide incentives to providers to deliver efficient and effective health care. Money matters to the health care system in Nepal, but it does not guarantee efficient, equitable, and effective health care services.

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Conflict of interest: None

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