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The efficiency of the healthcare sector: Evidence from Mongolia

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Abstract. This research aims to investigate the efficiency level of Mongolia's healthcare sector using statistical analysis. Based on previous research, the following three hypotheses are made: (i) The financing of the healthcare sector has no strong impact on healthcare sector efficiency; (ii) There is a statistically significant relation between the general indicators of the healthcare system; (iii) Compared to the healthcare systems of other countries that are based on unity, the operations of financial revenue collector and allocation organizations of Mongolia's healthcare sector are inconsistent. In this research, the DEA method is used to determine the efficiency of Mongolia's healthcare sector. The research results show that the efficiency rate of Mongolia's healthcare sector is 94.55%, with the most influential factor being the number of doctors. The research determines the relation between 11 general indicators of the healthcare system. Total expenditure on healthcare as a percentage of GDP is not significantly related to the health sector's general indicators. The health sector's budget expenditure is insufficient. The analysis of the third hypothesis in the research shows no coherence in the activities of financial collector and allocation organizations of Mongolia's healthcare sector. There is no independent accumulative entity and there is no unified system for allocating the multiple sources of funding. However, a comparative study on the healthcare systems of two countries, Kazakhstan and Bangladesh, shows that financial allocation done by a single organization is fundamental for increasing the efficiency of the healthcare sector. Therefore, a single buyer system is advised for Mongolia.
Keywords: healthcare sector efficiency, health care financing, health insurance system, data envelopment analysis, life expectancy, number of doctors, hospital beds, HALE, infant mortality rate

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Introduction

Many factors that determine a country's development, such as its level of development, economic strength, and living standards, are more or less related

to human capital, or the health of every citizen. Hence, many countries pay special attention to its health sector. At this current time, with the world facing the COVID-19 pandemic, the healthcare sector is becoming increasingly important for countries.

In this research, we have only considered financial sources such as the state budget, the Health Insurance Fund, the operational income of health organizations, and external financing to determine the efficiency of Mongolia's healthcare sector. As of 2020, about 70 percent of the healthcare sector is funded by the state budget, more than 26 percent is funded by the Health Insurance Fund, and the remaining 4 percent is funded by other sources.

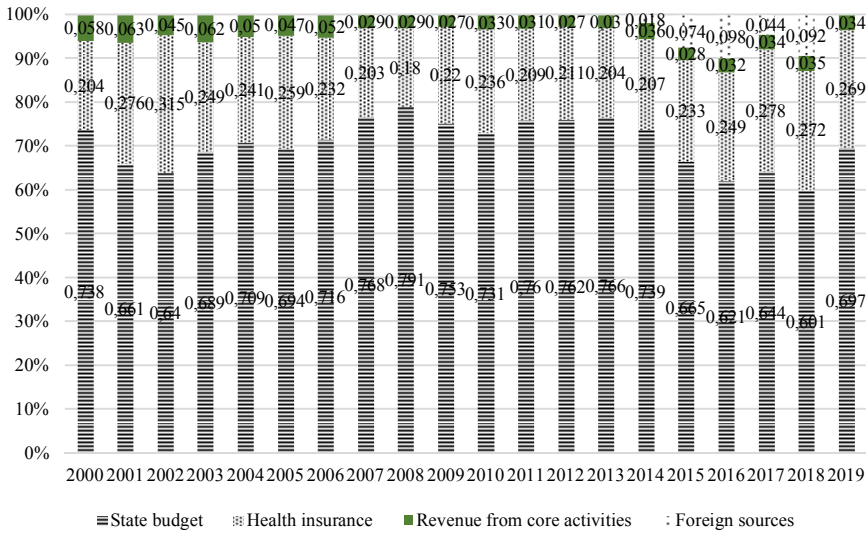


Fig. 1. Structure of healthcare sector expenditure funding sources (%) [1].

Therefore, we believe that the findings of a study of the financing system of Mongolia's healthcare sector and its efficiency will have an important impact on the further development of this sector.

Research hypotheses:

The research tries to investigate the following hypotheses:

1) The financing of the healthcare sector has no strong impact on efficiency;

2) There is a statistically significant relation between the general indicators of the healthcare system;

3) Compared to the healthcare systems of other countries that are based on unity, the operations of financial collector and allocation organizations of Mongolia's healthcare sector are inconsistent.

Research Objectives: The aim of this research is to determine the factors that affect the efficiency of Mongolia's healthcare sector and analyze its efficiency over the past 19 years.

Literature Review

Laura Asandului et al. [2] assessed the efficiency of Europe's healthcare sector using 2010 statistics from 30 European countries. The researchers selected life expectancy at birth, health adjusted life expectancy, and infant mortality rate for output variables and the number of doctors, the number of hospital beds, and public health expenditure as percentage of GDP for input variables. The results of their study showed that there were a number of developed and developing countries on the border of efficiency, and most of the countries included in the sample were inefficient.

Martine Audibert et al. [3] used the Data Envelopment Analysis (DEA) model to examine the efficiency of China's rural hospitals and provided recommendations for health insurance system reforms. The results of the study showed that technical efficiency of China's rural hospitals had decreased over the previous years and concluded that the amount of funding had no positive effect on increasing technical efficiency. Martine Audibert et al. [4] emphasized that the results of the DEA method can be used practically.

Rising costs have mainly hit the insurance sector, which now takes up a larger share of payments for health care than government. Government spending as a proportion of the total expenditure on health declined from 30 percent to 20 percent between 1980 and 1988; labour insurance comprised 32 percent, but the largest contribution (36 percent) came from self-financed, fee-for-service payments. The majority of these are made in rural areas where most people do not have health insurance [5].

Laurene Petitfour [6] evaluated the efficiency of Mongolia's healthcare sector from 1995 to 2014 in her research. She identified potential factors that could increase the efficiency of the healthcare sector in Ulaanbaatar, Mongolia, by about 30 percent. Nonparametric efficiency models and the introduction of environmental variables in efficiency analyses were used in the research.

R. A. Mozir Ahmetov [7] explored the healthcare information of Uzbekistan, a country which is nearly identical to Mongolia. The Soviet model of allocating state funds to public organizations is determined by a strict detailed budgeting process, with almost no flexibility to shift funds between different sectors, which leads to consistency. In 1999, Uzbekistan's government confirmed a new decree with major changes to the budgeting of public organizations. These changes aimed to improve the efficiency and effectiveness of budgetary allocations through increased organizational independence in management and decision-making. The new mechanism introduced a single budget line, with four subcategories.

Although researchers are studying the issues facing Mongolia's healthcare sector, there has yet to exist a significant study evaluating the sector's efficiency. Thus, our research will be the first to evaluate the efficiency of Mongolia's healthcare sector. We believe that this will be an important contribution to the further development of the sector.

Methodology

Data Envelopment Analysis (DEA) method

When it comes to the field of health economics, analysis of hospital efficiency is of utmost importance [8]. Currently, there are two methods to conduct this analysis: a parametric approach (stochastic frontier analysis) and a non-parametric approach (free disposal hull and data envelopment analysis). Farrell [9] was the first to utilize a frontier method that used the distance between the decision-making unit's observed level of outputs and inputs and the best practice production frontier to evaluate the decision-making unit's efficiency. This later on served as the basis of the DEA model, which uses linear programming to determine the best practice production frontier, first proposed by Charnes et al. [10].

The efficiency score is measured between 0 to 1, which represents 0 to 100 percent. Less than 100% indicates inefficiency compared to other units (packages). For each decision-making unit, the input and output are represented by the following variables:

$$Input = v_1 x_{10} + \cdots + v_m x_{m0}$$
$$Output = u_1 y_{10} + \cdots + u_s y_{s0}$$

In order to determine weight, the objective function below is maximized. This determined weight is unequal and will be different for each decision-making unit. As the data will be used to measure the efficiency of each decision-making unit, optimization will be done for each decision-making unit.

Objective function:

$$\frac{Output}{Input} = \frac{u_1 y_{1o} + \cdots + u_s y_{s0}}{v_1 x_{1o} + \cdots + v_m x_{m0}} \to \max \quad (1)$$

Constraints output:

$$\frac{u_1 y_{1j} + \cdots + u_s y_{sj}}{v_1 x_{1j} + \cdots + v_m x_{mj}} \leq 1 \qquad (j = 1, \ldots, n) \quad (2)$$

$$v_1, v_2, \ldots, v_m \geq 0, \; u_1, u_2, \ldots, u_s \geq 0 \quad (3)$$

We reduce that problem to next the general fractional linear constrained problem:

$$F(x) = \frac{u_1 y_{1o} + \cdots + u_s y_{s0}}{v_1 x_{1o} + \cdots + v_m x_{m0}} \to \max \quad (1')$$

Linearized constraints:

$$u_1 y_{1j} + \cdots + u_s y_{sj} - v_1 x_{1j} - \cdots - v_m x_{mj} \leq 0 \qquad (j = 1, \ldots, n) \quad (2')$$

$$v_1, v_2, \ldots, v_m \geq 0, \; u_1, u_2, \ldots, u_s \geq 0 \quad (3')$$

The fractional programming equation was solved using the 'fmincon' package of MatLab.

Results

Current state of Mongolia's healthcare system

Mongolia implements the Bismarck model, which is based on the principle of solidarity in health financing. The Bismarck model is also referred to as the social health insurance model.

In this research, the following indicators will be considered.

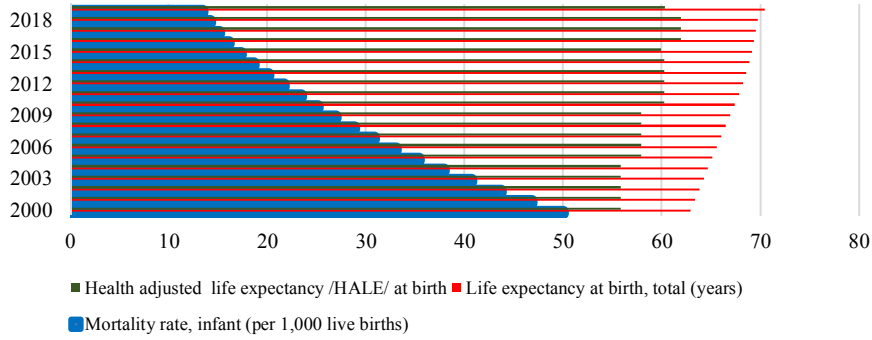


Fig. 2. Indicators of Mongolia's healthcare sector[1]. Source: WHO. Retrieved from: https://www.who.int/data/gho/indicator-metadata-registry/imr-details/66 (Accessed: 08.02.2021)

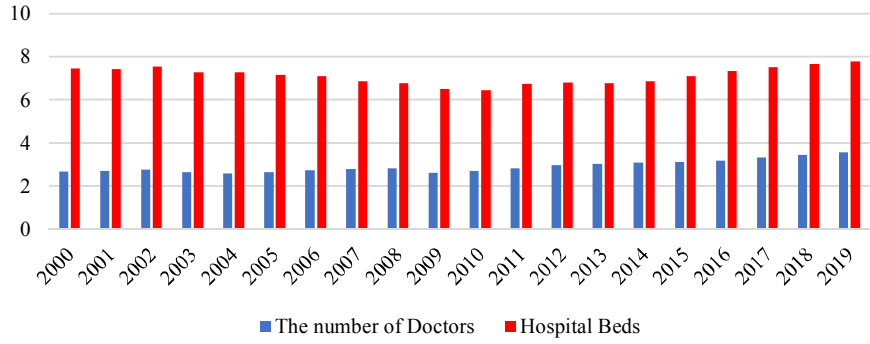


Fig. 3. Indicators of Mongolia's healthcare sector[2]. Source: NSO of Mongolia. Retrieved from: https://www.1212.mn/tables.aspx?TBL_ID=DT_NSO_2100_005V1 (Accessed: 05.02.2021)

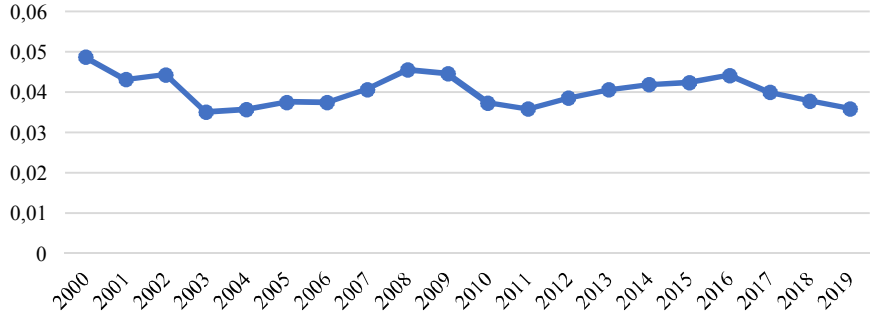


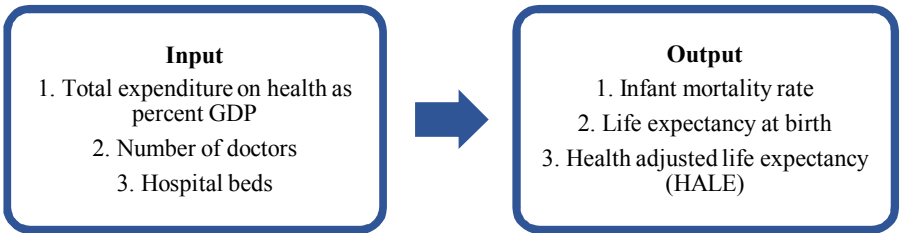
Fig. 4. Total expenditure on health as percentage of GDP. Source: World Bank. Retrieved from: https://data.worldbank.org/indicator/SH.XPD.CHEX.GD.ZS?locations=MN (Accessed: 12.02.2021)

[1] Input variables.
[2] In both cases, statistical data are calculated for 10,000 inhabitants.

Our study of some important indicators of the healthcare sector showed that between 2000 and 2019, life expectancy increased by 1.1 times, infant mortality decreased by 3.5 times; the number of hospital beds and doctors increased from 2000 to 2019. These results can be considered as a sign of certain progress made in the healthcare sector between 2000–2019.

Data Envelopment Analysis

As mentioned in the methodology, when performing a DEA, the input and output variables of decision-making units are determined and the efficiency factor is derived. The efficiency factor value of less than 1 indicates that it is inefficient compared to other units. Using the DEA method, the following input and output variables were used to estimate Mongolia's healthcare sector efficiency.



The first input variable refers to ***the percentage of GDP allotted to healthcare***. It 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 funds.

The second input variable describes the human resource most valuable in healthcare system: ***the number of doctors***. ***Hospital Beds*** are also included in the model as the third input variable. In both cases, statistical data are calculated for 1,000 inhabitants.

Health adjusted life expectancy **(HALE)** (also called disability-free life expectancy) measures the number of remaining years that a person of a certain age is supposed to live without disability. It is a solid indicator to monitor health as a productivity/economic factor.

Infant mortality rate represents the ratio of the number of deaths of children under one year of age during the year to the number of live births in the same year. The value is expressed per 1,000 live births.

The indicators above were based on data from 2000 to 2019, which were collected from the World Health Organization, the World Bank, the National Statistical Office of Mongolia, and healthcare sector statistics.

Numerical Results

Correlation tests of the input and output variables indicate that there is no significant relationship between the input variables. They also indicate that there is a significant correlation between life expectancy and health adjusted life ex-

pectancy (HALE). However, the tests show that infant mortality rate is inversely related to life expectancy and health adjusted life expectancy.

Table 1. **Correlation between input and output variables**

	y_1	y_2	y_3	x_1	x_2	x_3
y_1	1	-0.99486	-0.94182	0.2507	-0.79756	0.115375
y_2		1	0.942089	-0.22762	0.837324	-0.06193
y_3			1	-0.19189	0.778286	-0.07926
x_1				1	-0.10262	-0.0107
x_2					1	0.44602
x_3						1

Source: Authors' calculations.

The DEA method was used for the problem (1') - (3').

Linearized condition:

$$u_1 \cdot y_{1j} + u_2 \cdot y_{2j} + u_3 \cdot y_{3j} - v_1 \cdot x_{1j} - v_2 \cdot x_{2j} - v_3 \cdot x_{3j} \leq 0;$$
$$j = \overline{1,20}; \quad \textit{(2000-2019 years)}$$

Objective function:

$$F(x) = \frac{u_1 \cdot y_{10} + u_2 \cdot y_{20} + u_3 \cdot y_{30}}{v_1 \cdot x_{10} + v_2 \cdot x_{20} + v_3 \cdot x_{30}} \rightarrow \max;$$

where $y_{10}, y_{20}, y_{30}, x_{10}, x_{20}, x_{30}$ as the 20-year averages of the input and output variables.

The optimal solution of the fractional programming problem:

$x = y_{10}, y_{20}, y_{30}, x_{10}, x_{20}, x_{30}$) = (0.018731782; 0.000421753; 0.036154706; 0.042588062; 0.013061740; 0.391389701) and F_{max} =0.945516894.

The value of the objective function showed that the selected input variables had a 94.5 percent effect on the selected output variables, indicating that the input variables were efficient. It should be noted that the selected input variables had the greatest impact on HALE, as evidenced by the optimal solution.

Among the selected input variables, the number of doctors had the strongest impact on the output variables, while the number of hospital beds had the least. Additionally, the total expenditure on healthcare as a percentage of GDP had a moderate impact, confirming our first hypothesis – financing of the healthcare sector has no strong impact on efficiency.

In the case of Mongolia, infant mortality has declined over the last 10 years. In 2019, the death rate per 1,000 live births reached a record low of 13.3. As of 2019, 1,041 cases of infant mortality were registered, of which 841 cases or 80.8 percent were hospital deaths. Of the registered hospital deaths, 25.2 percent were deaths of infants with a hospital length of stay less than 24 hours. The average mortality rate of infants with a hospital length of stay less than 24 hours in the last 10 years was 28.6 percent. In 2019, this rate decreased by 3.4 percent from the 10-year average and by 0.1 percent from the previous year. Perinatal morbidity accounted for 71 percent of these deaths. Research shows that increasing the number of doctors is the most effective way to reduce infant mortality.

Similar to the research done by Agnieszka Bem et al. [11], the Pearson correlation coefficient methodology was used on Mongolia's healthcare sector data to test the relationship between the general indicators of the healthcare system.

For Mongolia's case, statistical data from 2000–2018 (for some indicators, there was no data for 2019) of the following variables were used to test the correlation between total healthcare expenditure and healthcare indicators. These include:

Table 2. **Pearson's correlation coefficients matrix**

	z_1	z_2	z_3	z_4	z_5	z_6	z_7	z_8	z_9	z_{10}	z_{11}
z_1	1	-0.03	0.00	-0.36	-0.06	-0.15	-0.11	-0.18	0.19	-0.37	-0.48
z_2		1.00	0.99	0.81	0.99	0.95	0.96	0.93	-0.93	0.81	0.56
z_3			1.00	0.75	0.96	0.95	0.96	0.94	-0.93	0.82	0.56
z_4				1.00	0.88	0.79	0.79	0.79	-0.78	0.76	0.60
z_5					1.00	0.92	0.93	0.90	-0.89	0.79	0.55
z_6						1.00	1.00	1.00	-1.00	0.91	0.67
z_7							1.00	0.99	-0.99	0.89	0.64
z_8								1.00	-1.00	0.93	0.70
z_9									1.00	-0.93	-0.71
z_{10}										1.00	0.90
z_{11}											1.00

Source: Authors' calculations.

According to Pearson's matrix (Table 2), there is no statistically significant relationship between total healthcare expenditure as percentage of GDP (z1) and main healthcare sector indicators. This indicates that the budget for Mongolia's healthcare sector is too small and therefore insufficient.

However, z_2, z_3 are strongly correlated to the average life expectancy of the population, regardless of gender (z_6, z_7, z_8), and are inversely related to z_9, infant mortality rate per 1,000 births. Additionally, z_2 and z_3 are directly correlated to z_{10} /potential years of life lost (PYLL), all causes, female population/. However, they are not correlated to z_{11}. The next interesting finding is that z_5 /out-of-pocket expenditure on health per capita, USD PPP/, although strongly correlated with average life expectancy of the population, is not related to z_{10}.

Discussion

Differences in healthcare sector financing mechanisms in developing countries and Mongolia

Although each country has a different healthcare financing system, the general financing mechanism has three main steps: revenue collection, accumulation, and distribution. On the basis of these steps, it is possible to provide medical services to the population through both the public and private sectors.

Figure 5 shows the benchmarks of the financing systems of developing countries. It illustrates that, although there are many sources of financing, such as taxes, fees, and mandates, they are all accumulated in a single fund and distributed within the framework of specific goals and directions.

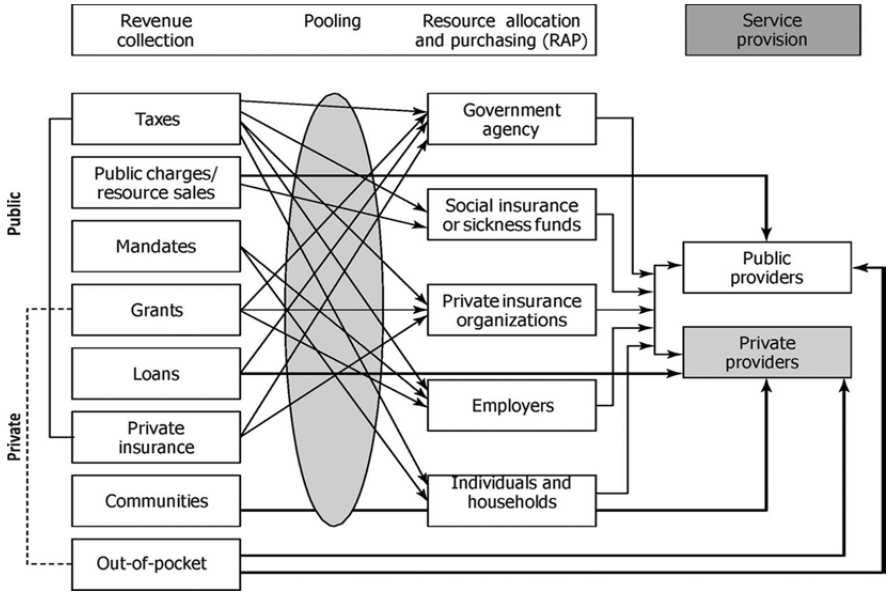


Fig. 5. Interactions among different sources of healthcare financing and service delivery. Source: [12], Retrieved from: https://bmjopen.bmj.com/content/4/12/e006806 (Accessed: 01.03.2021)

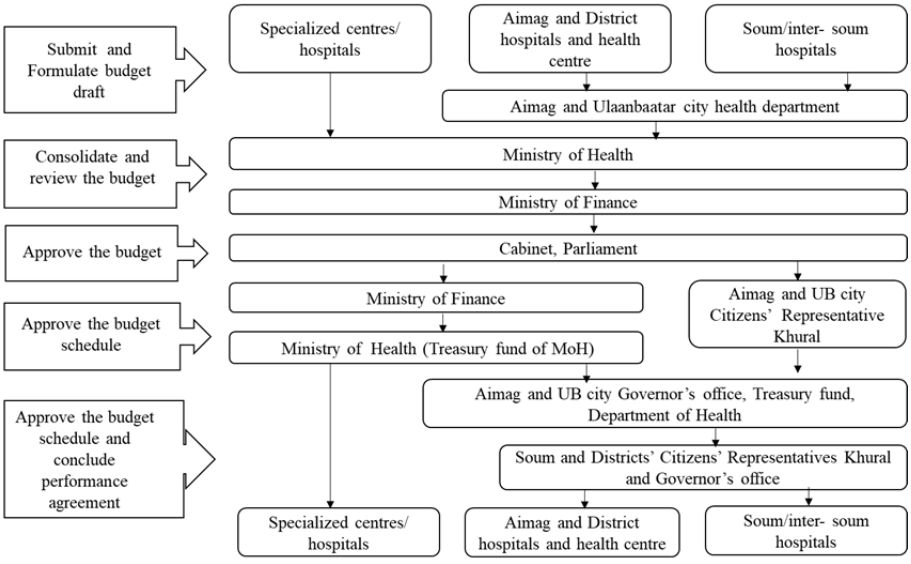


Fig. 6. Distribution/flow of the financing for Mongolia's healthcare sector Source: [13], Retrieved from: http://meh.mn/wp-content/uploads/2020/05/Strategic-purchasing-report-edited-WHO-comment-MN.pdf, (Accessed:18.02.2021)

The benchmark shown in Figure 5 has a single accumulative body that combines the multiple sources of funding. Davidson R. Gwatkin [14] found that an indirect

approach to providing healthcare is inappropriate in cases where the World Bank's Corruption Perceptions Index is less than 50. As Mongolia's Corruption Perceptions Index (CPI) is 35 [15], a direct approach to providing healthcare is more appropriate. The direct approach to providing healthcare means one organization would be in charge of both financing healthcare and providing it to the population. Therefore, there should be one participating organization to combine revenue. However, Mongolia does not have a consolidation component and instead has many participants, which makes the management of healthcare financing different from those of other developing countries.

Under the previous centralized Semashko system model, Mongolia's health care delivery system was state-owned, hierarchically organized, and the health care providers are paid from the general tax fund as an economy-based income-based budget form. The Semashko model funding and service delivery system creates a number of inefficiencies at all levels of healthcare [16].

Comparative analysis

According to the World Bank classification, Mongolia is a below average income country. Two other countries in this category, Kazakhstan and Bangladesh, were selected in order to comparatively study how the difference in financing impacts the efficiency of the health sector.

Rationale for choosing Kazakhstan and Bangladesh:

1. In both Kazakhstan and Mongolia, prior to 1990, the government was solely responsible for financing the health sector and provided free healthcare to citizens. However, with the transition from a socialist to market economy, it was no longer possible for the state to finance healthcare provision on its own. Hence, Kazakhstan was chosen because the initial conditions for the transition to a health insurance system and the political situation at the time were similar.

2. There are many different policies that can be developed and implemented in the health sector, but they are limited by financing. Funds can be raised not only from the domestic market, but also from foreign loans and grants. However, loans and aid from other countries are closely linked to the country's economic situation. For example, in 2011, the number of healthcare projects implemented by the World Bank in Rwanda was four times more than those being implemented in Mongolia. The amount of funding from the domestic market also depends on the economic capacity of the country. For example, in 2015, Switzerland spent 12% of GDP on health, while low-income countries spent 5%. Therefore, in order to compare Mongolia to a country with similar income levels, Bangladesh was chosen.

Kazakhstan has the largest territory, Bangladesh has the largest population and the highest average life expectancy, and Mongolia has the fastest population growth. Let us compare the main healthcare sector indicators of these countries.

For the selected countries, some healthcare sector variables for 2003 and 2019 are shown in Table 4.

Table 3. **General comparison of the chosen countries**

Country name	Mongolia	Bangladesh	Kazakhstan
Territory	1564116 km^2	148460 km^2	2724900 km^2
Population	3,296,866	157,826,578	18,556,698
Life expectancy	70.4	74.4	73.1
GDP per capita	4295$	4200$	9731$

Source: Trading economics, 2019.

Table 4. **Comparison of main healthcare sector indicators**

Indicators		Mongolia	Bangladesh	Kazakhstan
Life expectancy	2003	64.2	58.4	68.3
	2019	70.4	74.5	73.1
Infant mortality (per 1,000 children)	2003	40.7	99.7	44.4
	2019	13.4	28.2	10.1
Spending (Percentage of GDP)	2003	3.5	2.7	4.2
	2019	3.6	2.6	3.9
Number of doctors (per 1,000 people)	2003	2.6	0.3	13.7
	2019	3.6	0.8	6.8
Number of beds (1,000 people)	2003	7.3	0.2	4
	2019	7.8	0.5	3.6

Source: World Bank, 2020.

Average life expectancy in these three countries increased faster than that of developed countries. Bangladesh had the highest increase in average life expectancy since 2003. Infant mortality decreased 3 times in Mongolia, 3 times in Bangladesh and 4 times in Kazakhstan. Healthcare expenditure as a percentage of GDP had a relatively less change in Mongolia and Bangladesh, however, Kazakhstan had high expenditures in 2003 due to political influence. While the number of doctors and hospital beds (per 1,000 people) increased during the mentioned period in both Mongolia and Bangladesh, it decreased in Kazakhstan.

Table 5. **Healthcare financing in Mongolia, Bangladesh, and Kazakhstan**

	Mongolia	Bangladesh	Kazakhstan
Source of income	Government employee, 2%; employer, 2%	Other countries, out-of-pocket payments, government	Government, 60%; out-of-pocket employee, 1%; employer, 2%
Accumulation	Health insurance fund	Insurance fund Ministry of Finance	Ministry of Finance, Ministry of Health, Planning organization
Distribution	Ministry of Finance, Social Insurance Fund	Fund	Planning organization
Implementer	Public, 80%; private, 20%	Public, 70%; private, 30%	Public, 70%; private, 30%

Source: WHO, 2020.

Features of Mongolia's healthcare sector

Prior to 1990, the Mongolian government solely financed citizens' social security matters, specifically those relating to public health. After its transition to a market economy, three participants – the government, the employer, and the insured – started participating and deciding cooperatively. In other words, the social insurance system has been in place since 1995 and is still being implemented.

Mongolia introduced its Budget Expenditure Reform in 2002 for the second time since the transition to a market economy in 1990. Within the framework of this reform, the Law on Public Sector Management and Finance was re-approved and a system of product and service or performance-based financing of all budgetary entities was implemented for a period of 10 years from 2003 to 2012 [17].

In order to implement this reform, the Mongolian government received financial and technical assistance from international financial institutions. An example of this was the Public Sector Management and Financing Reform project jointly implemented by ADB and the GOM**.** "Defining a public entity's product and service is important in planning which products to supply and the budget and resources required to meet the objectives set for the planning period" [18]. The model template is used to determine how it relates to products and services at the local and sectoral levels.

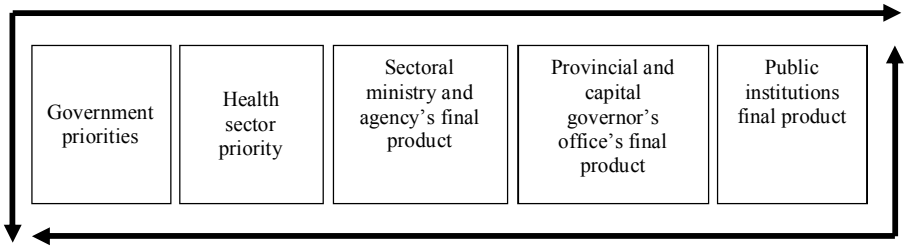


Fig. 7. The model template to determine public products and services. Source: [19]

This budget expenditure reform was implemented unsuccessfully. Since 2012, program-based budgeting has been implemented. In 2016–2020, the Government of Mongolia aims to reform the health insurance system, to fully cover citizens with health insurance, to create an environment for every insured person to receive high-quality healthcare services regardless of their income state, without any financial difficulties, and to double the health sector financing step by step[1].

Although some new steps have been taken at the policy and system level in the field of health insurance, risks to health of the citizens still have not been covered.

The health sector financing and the health insurance system face the following challenges.

[1] Action Plan of the Government of Mongolia for 2016–2020.

Payment share of citizens for healthcare service is increasing. Mongolia's health sector financing system is mixed. It consists of: (1) state budget financing, (2) Health Insurance Fund, (3) individual payments. Currently, 40% of health financing is provided by the state budget, 20% by the Health Insurance Fund, and the remaining up to 40% is provided by citizens. According to the World Health Organization, if the healthcare financing amount paid by an individual exceeds 25 percent, poverty and income-related inequality will increase.

Both state financing for healthcare service and government contributions as a fee to the Health Insurance Fund are too low.

a) The World Health Organization reckons that it is appropriate when developing countries spend 5 to 6 percent of GDP on the health sector, but Mongolia spends an average of 4.0 percent (see Figure 4) and it has a tendency to decrease in recent years.

b) Health insurance fee paid by citizens whose insurance is covered by the government is set too low. According to the 2019 budget revenue structure, income from fee paid by employed insured people is 65.5%, and income from fee paid by the insured whose insurance is paid by the government is 20.6%. Government is in charge of fee of 58.8% of all insured people.

The Health Insurance Fund does not cover health risks.

Although health insurance is based on the principle of solidarity, it must also share the risk when an insured person faces health risk. But there is a smaller opportunity to get the health insurance service when citizens who pay a 4 percent fee (2% from the employer, 2% from the employee), especially young people and middle-aged people face risk. On the one hand, the healthcare service package does not fully cover the healthcare service which meets the needs and requirements of the insured; therefore, if it is not included in the specified healthcare service list, insured people make payments from their own pockets. On the other hand, due to the limited availability of the healthcare service and the high workload, queues in public hospitals, they do not receive the public hospital service but face an option in which they will have to pay for service in private hospitals, which do not have service with insurance.

The health insurance system depends on one ministry and the participation and control of the insured are low.

Although the first step towards an independent system was made by separating the Health Insurance Fund from social insurance and establishing the General Authority for Health Insurance in 2017 with the status of an implementing agency, it did not become a perfect restructuring. Also, management of the fund was directly dependent on government and especially on the Ministry of Health that receives certain amount of financing from the fund.

According to many researchers, developing the health sector based on the principle of solidarity is the right choice, but how to function with effective management still remains a concern. The payment method for financing health care providers to deliver a package of services related to the system is an important strategic procurement tool that can balance revenues and expenditures by providing incentives to service providers to increase quality and efficiency. This ultimately allows coverage to be expanded within existing resources [20].

In case of Mongolia, there are two functioning organizations: the buyer of the healthcare service (the Health Insurance Fund) and the service deliverer (the Ministry of Health). Therefore, it is recommended to separate the activities of these two organizations and transfer the right to control the service provider to the insured.

S.D. Erdene [21] cited that a reform to increase the responsibility of the state, business entities, and individuals, and to create an appropriate financial and economic structure is needed to ensure an equal and effective health care service for the health of the population. The following actions must be taken: to update civilian health insurance for market relationships; to create an integrated health data system; to concentrate the united health or service funding in uniform funds. It is important that Mongolia transforms the current system of two health care service buyers, the health sector budget administrator and the health insurance fund administrator, into a single buyer health care provider system. This means that the procurement of services will be separated from the provision of services and the Health Care Fund will be centralized to a single administrator. With one combined fund and a single customer, health funds will be concentrated in one fund to improve resource allocation, reduce inefficient spending, eliminate fragmented financing, increase the financial power and capital resources of one buyer, and eliminate bureaucracy thus it will be possible to create a performance-based incentive system.

Features of Bangladesh's healthcare sector

According to Islam Anwar [22], although the Ministry of Finance and the Health Insurance Fund are accumulating organizations for Bangladesh's health sector financing, distribution is done by the Health Insurance Fund alone. As compared to other countries, the income comes from multiple sources, which means it receives significant amount of loan and aid from other countries and international organizations. There is also a lot of private financing of citizens.

In 2012, the total health sector financing consisted of 23% of government funding, 8% of other countries' funding, 5% of voluntary healthcare fee, and 65% of individual financing (out-of-pocket money). Most of the out-of-pocket money (65%) was spent on medicine bills, and 11% of it was spent on general outpatient care and services. There is a lot of inequality in health financing in this country, though the richest 20% of the population contribute 43% of the total cost of healthcare service, but the services they receive are lower than the rest. The poorest 20% of the population contribute 9 to 13% of total financing and receive 30 to 40% of the services. As per service level, out of total financing, 40% is spent on the primary level, 38% on the secondary level, and 22% on the tertiary level. Due to the large number of poor people, it is almost impossible to make everyone have health insurance, and the government contributes to the insurance on behalf of those 20% of the poor people [23].

Features of Kazakhstan's healthcare sector

In 1995–1999, Kazakhstan had a vertical structure which accumulated the health sector financing by implementing a compulsory health insurance system.

At that time, the Ministry of Health was in charge of accumulation and procurement. In 1999–2004, a decentralization process was carried out using a horizontal accumulation structure. It reduced regional equity, as each region was too small to establish a separate risk fund. In 2005, a single payer model was brought into use. The government contributes for 60% of total health sector expenditures, and the private sector for 40% [24].

Researchers reckon that Kazakhstan's transition to a single-pay system by doing a health sector reform was a step towards further development [1, 25].

Although each selected country has a different healthcare system and financing sources, there is a single buyer which means one organization is solely in charge of distribution in both Bangladesh and Kazakhstan.

Conclusion

According to the DEA, the efficiency of Mongolia's health sector is 94.5%, which is efficient. It also means first hypothesis of our study is supported. Correlation between important indicators of the health sector was calculated using Person's correlation matrix and from there it could be seen that the amount of financing is not relevant to most of the sector's indicators. If results of these two analyses are combined, the amount of financing for the health sector does not have a significant impact on the efficiency of the sector.

The comparative analysis of Kazakhstan and Bangladesh was conducted in order to determine correspondence, accordance of the sector's financing accumulator and distributor organization's functioning, which is a third hypothesis. Although the revenue of these two countries for financing the healthcare service comes from multiple sources, the distribution is made by one organization, which has become the basis for integrating those sources and putting them into efficient use. Therefore, we conclude that it is appropriate for Mongolia to introduce a single buyer system rather than having a system with multiple participants.

In a developing country, the financing mechanism of the healthcare system is in the order of collecting, accumulating, distributing, and delivering service. It is reckoned that Mongolia's having no independent accumulating organization but having many other types of participants is one of the issues that shall be reformed.

Recommendations

1. The number of doctors per 1,000 people, the number of beds, and the amount of financing are sufficient for the entire population of Mongolia currently. However, as we can see from the results of the research, thenumber of doctors has the greatest impact on the efficiency of the sector, so it is important to focus on increasing the number of doctors in order to increase efficiency in the future. The number of beds per 1,000 people can currently be considered sufficient.

2. Budget financing is being insufficient as seen from not having a correlation with key indicators of the sector.

3. In order for the population to have health insurance as fully as possible, while keeping the principle of solidarity or equalization, it is reckoned that it would be appropriate to continue implementing the principle in which both the insured and the employer equally pay the fee, and the government pays for the insurance fee for vulnerable groups of society such as children and elderly people.

4. It seems expedient to implement a visionary and consistent policy based on non-multiple participants but a single buyer system in the health financing system. By doing so, division of healthcare package will be eliminated.

5. Having an independent organization responsible for the integrated accumulation of revenues from multiple sources is the basis for the efficient spending of funds in line with long-term goals. Therefore, this type of accumulative organization is needed.

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