

# Comparative Study of Health Care System in Three Central Asian Countries: Kazakhstan, Kyrgyzstan, Uzbekistan

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**Background:** The objectives of the study are to find out the effect of the implementing reform in three Central Asian countries, identify its impact on health status and health care delivery systems. This study address to identify strong and weak points of the health systems and provide a recommendation for further health care organization.

**Methods:** A comparative analysis was conducted to evaluate the effects of implemented policy on health care system efficiency and equity. Secondary data were collected on selected health indicators using information from the World Health Organization Global Health Expenditure Database, European Health Information Platform, and World Bank Open Data.

**Results:** In terms of population status, countries achieved relatively good results. Infant mortality and under-5 mortality rate decreased in all countries; also, life expectancy increased, and it was more than 70 years. Regulations of the health systems are still highly centralized, and the Ministry of Health is the main organ responsible for national health policy developing and implementation. Among the three countries, only Kyrgyzstan was successful in introducing a national health system. Distribution of health expenditure between public expenditure and out-of-pocket payments was decreased, and out-of-pocket payments were less the 50% of total health expenditure in all countries, in 2014.

**Conclusion:** After independent, all three countries implemented a certain number of the policy reform, mostly it was directed to move away from the old the Soviet system. Subsequent reform should be focused on evidence-based decision making and strengthening of primary health care in terms of new public health concepts.

**Keywords:** Health policy; Health care system; Kazakhstan; Kyrgyzstan; Uzbekistan

## INTRODUCTION

The collapse of the Soviet Union in the early 1990s led to changes in the geopolitical map of the world and the creation of new fifteen states. Five of these are the Central Asian countries of Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan with approximately 4,000,000 km<sup>2</sup> of area. All the countries inherited the centralized state Soviet Union Health System (Semashko health model) [1,2]. The Semashko health model characterized by a strictly central government-controlled and publicly provided services. The patients had no or limited choice when seeking health services [3]. After independent, each country implemented a specific number of

reforms to change and improve the existing system. However, each country has unique conditions, history, politics, and national character that might have directly and differently influenced the health care system. Understanding of the current stage of the health system development and model will help for further development of health policy.

The health policy is one of the priorities of each state. Modern scholars have provided different descriptions and identify various health system models. There is no single model that can be applied to all countries. Four of the popular health system models are the National Health Services Model (Beveridge model), Social Health Insurance Model (Bismarck Model), National Health Insurance Model, and the Out-of-Pocket Model [4]. Different scholars

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categorize health systems according to the regulation, payment system, ownership, profit orientation, etc. For instance, Tanner [5] suggested three types of health systems: single-payer system characterized by government coverage of the health care for all citizens, employment-based system characterized by employers providing health insurance to workers, and managed competition in which private enterprises offer health care but within an artificial marketplace operated under strict government control and regulation. Wendt et al. [6] described health systems using three dimensions, namely, financing, health services provision, and regulation which have categorized them accordingly type of ownership (state, private, or societal). They identified 27 combinations of health systems, of which three were defined as ideal-types: state healthcare system, societal healthcare system, and private health care system [6]. Furthermore, Toth [7] suggested 10 health organization models categorized by financing system and the type of relationship between providers and purchasers (insurers). All categorization of the health systems based on the type of financing, governance, management system, and who and how paid for services.

Currently, research on health systems and health policy is concentrated in high-income countries and on issues relevant to low-income countries [8]. Although some case studies are available in some middle-income countries; limited studies have compared health system policy and reform in middle-income countries, particularly those in the Soviet Union, the Middle East, North Africa, and the Pacific Islands. The present study, therefore, aimed to compare the effect of the policies implemented in three Central Asian countries.

However, previous studies reported that the adaptation of the millennium development goals (MDGs) and the achievement of several of these goals led to the improvement of health status [9,10]. Kyrgyzstan introduced a health insurance system, which some scholars consider as having led to the successful shift from in-patient oriented healthcare to a strengthened system of primary care and achievement of almost complete universal access [11]. Additionally, similar problems were found among all the countries in the region such as an increase in out-of-pocket expenditure, poor quality of services provision, lack of the skilled health workers, and limited access to pharmaceuticals and technology [12-14]. Those issues have identified several problems in health care service delivery and achieving universal health coverage (UHC), which is the goal to be

achieved by 2030 according to the sustainable development goals [15].

The study aims to compare the level of the health system transformation of the former Soviet Union countries in Central Asia for 25 years after independence and identify its effect on health status, health care delivery systems, and UHC. This study identifies the strengths and weakness of the health systems and makes a recommendation for the development of the health system based on the level of achievements and current situation in three countries.

## METHODS

### 1. Framework

A comparative analysis was conducted to identify differences in policy effect, and results were obtained. We adopted a framework proposed by Wenzl et al. [16] for evaluating the impact of policy on efficiency and equity (Figure 1). The framework presented three main domains to evaluate and categorize implemented policy: service provision, financing, and regulation. We categorized the implemented policies into seven domains proposed by the Wenzl et al. [16] framework: population coverage and access to services; services coverage and access; height of coverage and access to services; payment and prices; provider structure and procurement; services provision and quality; and overall health system structure. The influence of the policy effect direction in the three dimensions of the health system was evaluated: financing, health service provision, and regulation [6].

### 2. Materials

We purposively chose three Central Asia countries, namely, Kazakhstan, Kyrgyzstan, and Uzbekistan, for extraction of policy effect. Countries selection was based on data and publication availability. Tajikistan was excluded due to civil war in the 1990s. The policies were qualitatively analyzed base on reviewing the results of the previous survey, case studies, research reports, and policy papers of research institutions and health institutions for 25 years after the selected countries achieved independence. The main keywords were chosen as 'health policy,' 'health insurance,' 'former Soviet countries,' 'health reform,' 'health system,' 'health care system,' 'former Soviet

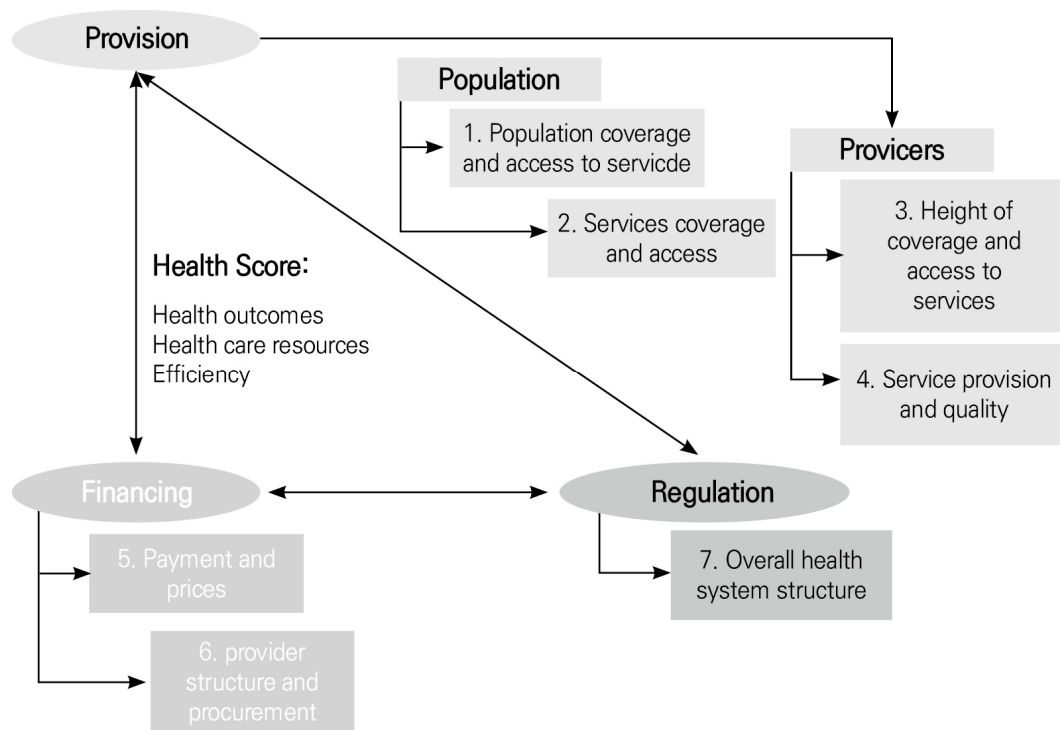


Figure 1. Structure of engagement and evaluation of health system development.

Union,' 'Central Asia,' 'Kazakhstan,' 'Kyrgyzstan,' and 'Uzbekistan.' The search expression used the AND/OR and rejection search appropriately for the main term. We considered publications in English and Russian. We searched the literature using the PubMed database for English publications and identified 3,143 papers. Among them, we selected 74 documents by title screening. Additionally, 63 articles were included from Google Scholar, of which 50 had been published in Russian. A total of 67 papers were excluded after reading the abstract and methodology, and two papers had similar content. A total of 16 papers were considered appropriate to extract the policy type and its effect.

### 3. Measurement

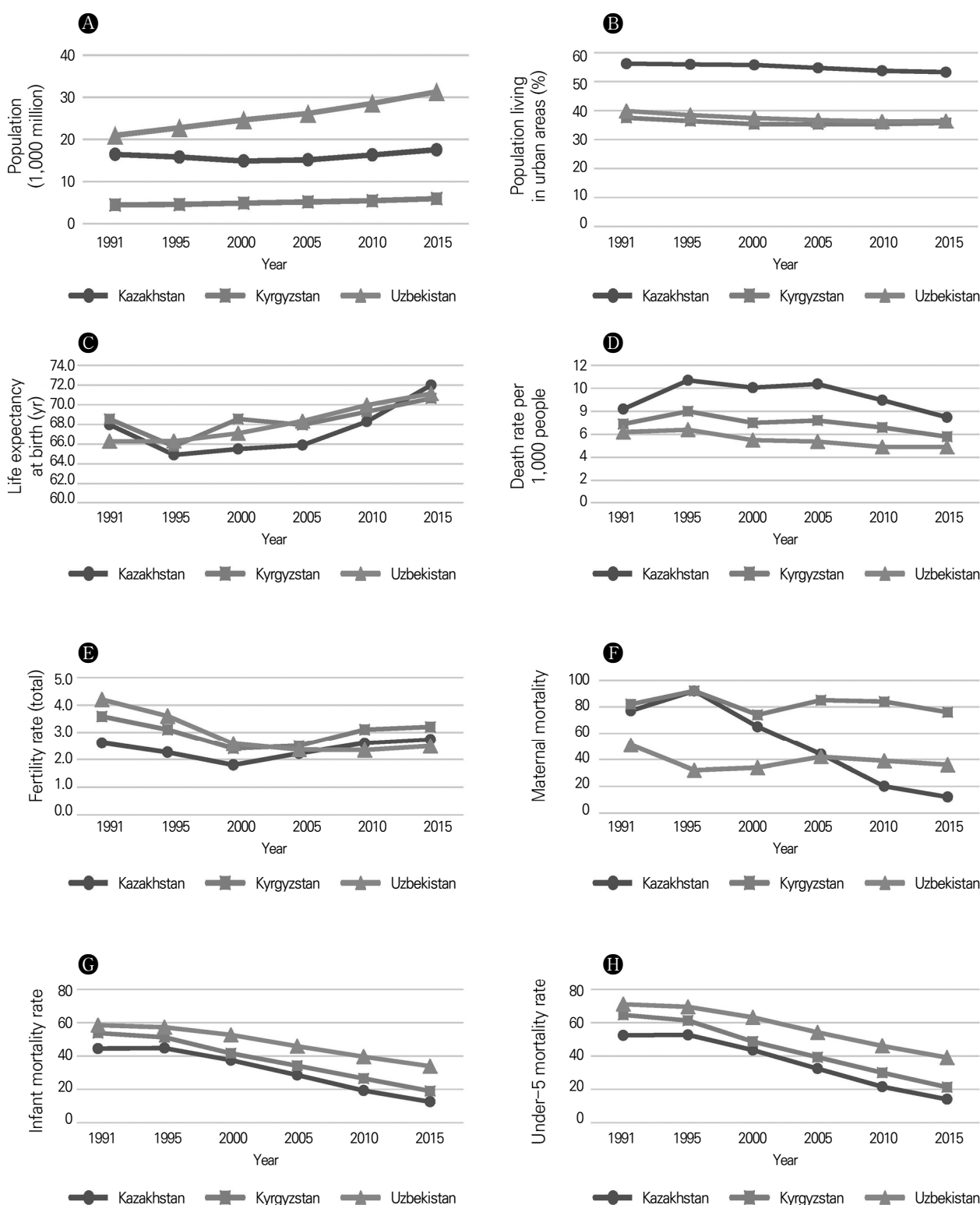
The policy effect was evaluated based on a calculation of health score as the average of three groups of indicators: health outcomes (HO), health care resources (HCS), and efficiency. The evaluation was based on a comparative analysis of eight indicators: life expectancy (LE), infant mortality rate (IMR), healthy adjusted life expectancy (HALE), under-5 mortality rate (under-5), medical staff per 1,000 population (MS) (medical doctor, dentist, and nurse), number of beds per 1,000

population (NB) (inpatients care beds and psychiatric care beds), health-care expenditure as percentage of GDP (HE), and expenditure on health per capita (HEP). Secondary data were collected on selected health indicators using information from the Global Health Expenditure Database developed by the World Health Organization (WHO), the European Health Information Platform, and the World Bank Open Data. HL and HCS were calculated as the average of the weight compared to the best index. Where higher rates would indicate a move in a positive direction, we divided the country average by the best indicator. Where lower rates would indicate a positive direction, we compared the lower rate to the country indicators [17]. For calculating efficiency, we used the Bloomberg rank methodology by ranking country on three criteria with respective weights: LE (60%), relative per capita cost of health care (30%), and absolute per capita cost of health care (10%). The following formulae were used:

$$HO_{it} = \text{AVERAGE} \{ (LE_{it}/LE_{bt}) \times 100 + (IMR_{bt}/IMR_{it}) \times 100 + (HALE_{it}/HALE_{bt}) \times 100 + (\text{under-5}_{bt}/\text{under-5}_{it}) \times 100 \} \quad (1)$$

$$HCR_t = \text{AVERAGE} \{ (MS_{it}/MS_{bt}) \times 100 + (NB_{it}/NB_{bt}) \times 100 \} \quad (2)$$

$$\text{Efficiency}_t = (LE_{it}/LE_{bt}) \times 60 + (HE_{bt}/HE_{it}) \times 30 + HEP_{bt}/HEP_{it} \times 10 \quad (3)$$



**Figure 2.** Comparison of the main health indicators. From World Bank. World Bank Open Data [Internet]. Washington (DC): The World Bank Group; 2017 [cited 2017 Oct 30]. Available from: <https://data.worldbank.org/> [18]. (A) Population. (B) Population living in urban areas. (C) Life expectancy at birth (age), both sex. (D) Death rate per 1,000 people (crude). (E) Fertility rate, total (births per woman). (F) Maternal mortality (per 100,000 live births). (G) Infant mortality rate (per 1,000 live births). (H) Under-5 mortality rate (per 1,000 live births).

## RESULTS

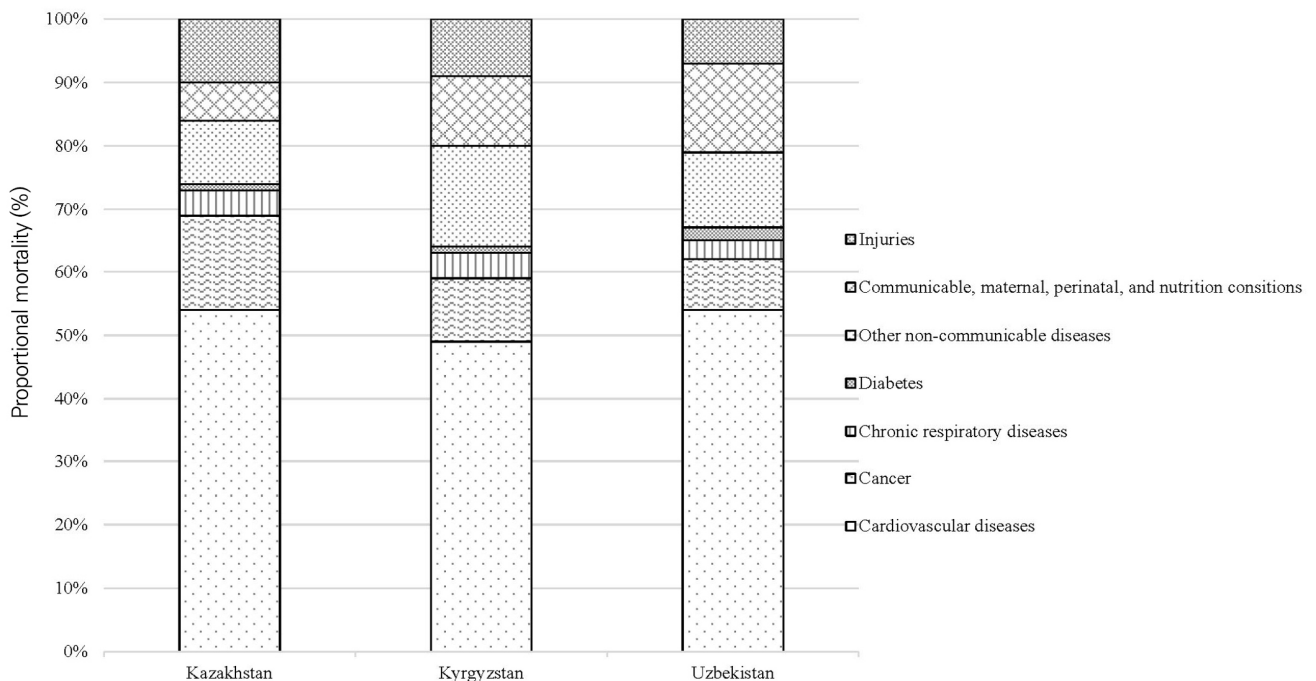
### 1. Health status

The health status of the population in the three countries was almost similar in the early 90s. It was observed a gap in the populations of Uzbekistan and Kyrgyzstan, and the population in Kazakhstan was slightly lesser than in Uzbekistan. The urban population was higher in Kazakhstan than in Kyrgyzstan and Uzbekistan, and it slightly decreased over the past 25 years. Figure 2 presents the comparison graphs of health indicators for the three countries by year [18]. LE at birth increased for the past 25 years; however, for Kazakhstan and Kyrgyzstan, it dramatically decreased after the break-up of the Soviet Union (1991–2000) and reached the lowest point in 1995. LE sharply increased in Kyrgyzstan for the next 5 years and fluctuated for the next 10 years. LE in Kazakhstan steadily increased from 1995 to 2005 and sharply increased for the next 10 years. For Uzbekistan, LE gradually increased during the observation period. The death rate slightly decreased in all countries; it fluctuated in the period under study.

The fertility rate graph shows that fertility reduced and reached its

lowest level in 2000 in Kazakhstan and Kyrgyzstan, after which it increased. According to the maternal mortality graph, maternal mortality significantly reduced in Kazakhstan between 1995 and 2010; meanwhile, it fluctuated and slightly decreased in Uzbekistan and Kyrgyzstan. The maternal mortality in Kyrgyzstan was higher than that of the other two countries. IMR and under-5 evenly declined in all the three countries. The graphs reveal that Uzbekistan had the highest IMR and under-5, whereas Kazakhstan has the lowest rates.

The main cause of death was non-communicable diseases (NCDs) in all the considered countries. According to the WHO NCD progress report, 84% of the deaths were registered in Kazakhstan, 80% in Kyrgyzstan, and 79% in Uzbekistan [19]. Figure 3 shows the percentage of the proportionality of mortality; cardiovascular diseases constituted the main cause of death in all three countries [20]. Among the three countries, only Uzbekistan set national targets and indicators with the time frame in accordance with nine voluntary global targets and 25 indicators from the WHO Global Monitoring Framework. However, national-integrated NCD policy, strategy, or/and action plan were adopted and implemented in Kazakhstan and Kyrgyzstan



**Figure 3.** Proportional mortality (% of total death for all ages and both sexes). From World Health Organization. Noncommunicable diseases country profiles 2014. Geneva: World Health Organization; 2014 [20].

**Table 1.** Classification of health systems in the three countries

Country	Regulation	Financing	Provision	Type
Kazakhstan	State	State	State	State health system
Kyrgyzstan	State	Societal	State	State-based mixed type
Uzbekistan	State	State	State	State health system

[19]. The other indicators used by WHO to measure progress in achieved in the implementation of the time-bound targets were mostly similar.

According to Hogan et al. [21], Uzbekistan has higher UHC index value as 72, followed by Kazakhstan (71), and Kyrgyzstan's value was 66. Figure 4 represented the means for the UHC services in four-component sub-indices and financial risk protection among the three countries. All countries achieved a similar result in the improvement of the reproductive, mother, neonatal and child health care, control on NCD, and services capacity and access. However, infectious disease control still needs to be improved, and mostly in human immunodeficiency virus (HIV) antiretroviral treatment. Financial protection is weak and almost similar in all country due to relatively high out-of-pocket expenditure.

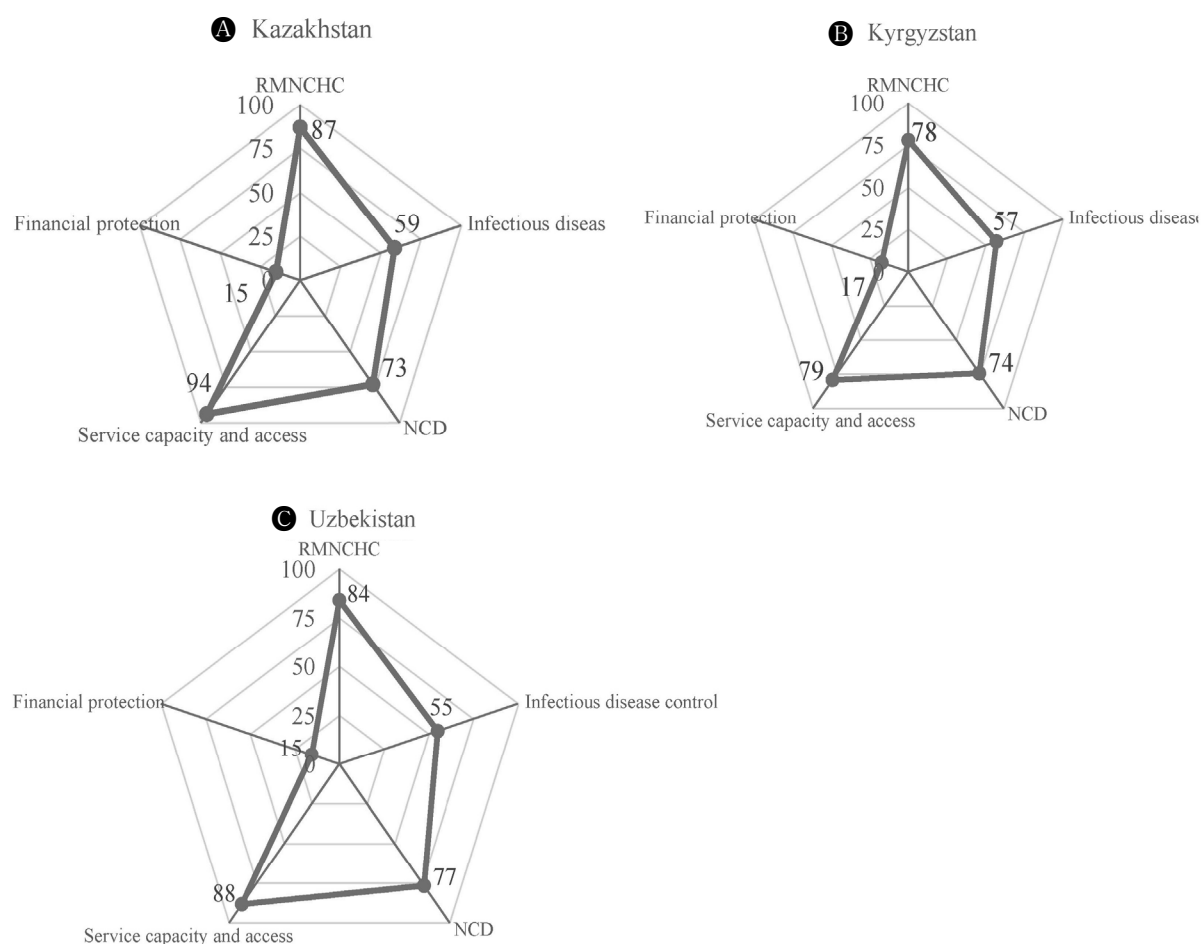
## 2. Health system

The health systems of Kazakhstan and Uzbekistan can be identified as an ideal type of state health system (Table 1). Regulation of health systems in both countries continues to be centralized, and Ministries of Health are responsible for developing and implementing national health policy [22,23]. In contrast, the first regulation changes in Kyrgyzstan were directed to decrease state monopoly and introduce a market economy, which contributed to introducing mandatory social health insurance [24]. However, in the Kyrgyzstan health system, the main health providers are under state regulation, and the government is the main player in the regulation of the system. Therefore, the Kyrgyzstan health system can be identified as a state-based mixed type of system.

**Table 2.** Key health expenditures indicators in 1995, 2005, and 2014

Indicator	Year	Kazakhstan	Kyrgyzstan	Uzbekistan
GDP per capita, PPP	2014	25,096.7	3,454.3	6,081.8
	2005	14,259.0	2,110.4	2,732.7
	1995	6,039.1	1,236.8	1,634.7
Total health expenditure as percentage of GDP	2014	4.4	6.5	5.8
	2005	4.1	5.8	5.1
	1995	4.6	6.0	6.7
Health expenditure per capita, PPP (constant 2011 international \$)	2014	1,068.1	215.1	339.6
	2005	554.8	124.0	139.2
	1995	270.1	73.3	109.3
Public sector expenditure on health as percentage of total government expenditure	2014	10.9	11.9	10.7
	2005	9.3	11.9	7.3
	1995	11.51	10.71	9.45
Public expenditure on health as percentage of total health expenditure	2014	54.4	56.1	53.3
	2005	61.9	40.9	44.6
	1995	63.9	51.2	53.4
Private out-of-pocket payment as percentage of total health expenditure	2014	45.1	39.4	43.9
	2005	37.5	56.0	52.1
	1995	35.5	45.2	46.5

From World Bank. World Bank Open Data [Internet]. Washington (DC): The World Bank Group; 2017 [cited 2017 Oct 30]. Available from: <https://data.worldbank.org/> [18].  
GDP, gross domestic product; PPP, public-private partnerships.



**Figure 4.** (A–C) Universal health coverage index of coverage of essential health services and financial risk in three countries. RMNCHC, reproductive, mother, neonatal, child health care; NCD, non-communicable disease.

### 3. Health expenditure

Table 2 presented the key indicators of health expenditure in 3 years, namely, 1995, 2005, and 2014 [18]. The lowest total health expenditure as a percentage of GDP among the three countries was in Kazakhstan; however, the health expenditure per capita was the highest there. The total health expenditure as a percentage of GDP decreased by 0.9% in Uzbekistan and increased in Kyrgyzstan by 0.5% from 1995, and the value for Kazakhstan almost not changed. The government expenditure on health as the percentage of total government expenditure in the three countries was nearly 10%; furthermore, the Kyrgyzstan government expenditure allocated a higher percentage among the three countries (11.9%). The public health expenditure as a percentage of total health expenditure increased in Kyrgyzstan, decreased in Kazakhstan, and

almost did not change in Uzbekistan. However, the private out-of-pocket expenditure decreased in the case of Kyrgyzstan and Uzbekistan but increased in Kazakhstan by nearly 10%.

Comparing the health expenditure of the countries revealed that general government expenditure in 2015 was 37,104 million dollars in Kazakhstan; 23,768 million dollars in Uzbekistan; and 2,453 million dollars in Kyrgyzstan [25]. In the same period, out-of-pocket expenditure per capita was 329 dollars in Kazakhstan, 153 dollars in Uzbekistan, and 141 dollars in Kyrgyzstan [25], corresponding to 45.1%, 43.9%, and 39.4% of the total health expenditure, respectively.

Table 3. Summary and categorisation of policies implemented since 1992 in the three countries reviewed

Health system domain affected	Type of effect	The direction of effect on			Description of policy type	Countries
		Financing	Service provision	Regulation		
Provision						
Population coverage (breath) and access to services	Increase breath	+	+	+	Strengthening of primary health care and guarantee of access to initial health care services for vulnerable population Introducing the general practitioner and family doctor approaches Introducing the essential drug list	KAZ, KGZ, UZB
	Increase depth	-	+	+	Facilitating access to care and health education through establishment of village health committees staffed by volunteers Expanding the basic State-guaranteed benefit package Strengthening health promotion through the establishment of the new institution	KAZ, KGZ, UZB KGZ
	Height of coverage and access to services	Increase height Increase user charges (decrease height)	+	+	+	Increasing health spending Decreasing government health expenditure Introducing mix budgetary and self-financing adult health services on secondary and tertiary levels
Service provision and quality	Improve quality Increase capital investment	? -	+	+	Introducing evidence-based health service delivery Increasing public financing of the reconstruction and re-equipment of the public health facilities	KAZ, KGZ, UZB KAZ, KGZ, UZB
	Financing					
Payment and prices	Change of the payment system	+	+	+	Changes of the hospital financing system from historical budget to patient-based payment Introducing capitation-based payment system on the primary level Introducing a mandatory single payer health insurance fund The introduction of national diagnosis-related groups system for the reimbursement of hospitals	KAZ, KGZ KAZ, KGZ, UZB KGZ KAZ
	Provider structure and procurement	+	+	+	Replacing doctors trained under the Soviet system with general practitioners	KGZ
	Private providers	?	+	?	Permitting the private sector to provide a limited list of services in health care services Privatization of the secondary and tertiary health providers	UZB KGZ, UZB
	Reduce the health facilities	+	+	?	Reducing and reorganizing non-effective medical facilities	KGZ, UZB
Regulation						
Overall health system structure	Change the governance system Introduce health insurance Reform of education	+	+	+	Establishment of the Ministry of Health Enabling passage of three major laws enacting changes in the health system Generalization of the undergraduate study by introducing general practitioner specialty Introducing postgraduate education that includes master's and PhD degrees programs Introducing higher and postgraduate education for nurses	KAZ, KGZ, UZB KGZ KAZ, UZB

+, positive effects; -, negative effects; ?, uncertain effects; KAZ, Kazakhstan; KGZ, Kyrgyzstan; UZB, Uzbekistan.



#### 4. Health policy

##### 1) Provision

The analysis of the implemented health policy in the studied countries resulted in the extraction of 24 policy types with 13 types of effect (Table 3). The first steps of the health policy reform in the three Central Asian countries after independence were mostly similar. Health care reform was begun in the 1990s and strengthening the primary health care service delivery, decentralization, and introducing evidence-based service delivery were prioritized. General practitioner and family doctor approaches were introduced to ensure access to initial health care services [22-24]. The basic State-guaranteed benefit package (SGBP) was established to protect a vulnerable population. The national drug policy, including the Essential Drug List, was developed to provide safe and effective drugs to the population [10].

In the middle of the 2000s, a policy program for strengthening the achieved reform was implemented. In 2004, Kazakhstan adopted the National Programme for Health Care Reform and Development 2005–2010, and Kyrgyzstan adopted the “Manas Taalimi” reform program for 2006–2010. Uzbekistan President’s decree on the enhancement of the health reform and realization of the National Programme of the Health Development was implemented in 2007. The main priorities of the health reform enhancement in all the three countries were an extending of the achieved result, reinforcement of the health care providers, the reconstruction and re-equipment of the public health facilities, reduction of differences in health care service utilization between rural and urban areas, and strengthening of health promotion and protection. Kazakhstan and Uzbekistan continuously adopted sets of programs for improving health in 2010 and 2011, respectively.

The health reform also included reorganization of the provider structure system. Uzbekistan and Kazakhstan reduced the number of beds and reorganized ineffective small health facilities. In case of

Uzbekistan, the multi-tiered Soviet primary care model was replaced by the two-tiered model, which included rural physician points staffed with general practitioners, nurses, midwives, and central regional hospitals [26]. Simultaneously, Kyrgyzstan retained the feldsher-midwifery post without modifications, separated provision of the primary and inpatient care, and introduced family medicine that positively affected the provision of health services [27]. As the Soviet health system supposed that the government uses only one health provider, another reform in the health system was the privatization of the secondary and tertiary health facilities and introducing of the private sector. However, ownership transferred from state ownership to a joint-stock company owned partly by the government and private shareholders in the case of Kazakhstan [28]. In the case of Uzbekistan, the government continued to maintain ownership of the public health facilities, and the private sector was allowed to provide a limited list of health care services [23]. Implemented reform lead to decreasing in health workforce (Table 4). Also, the shortage of manpower was highly connected with the brain-drain and migration of the specialist to Russia or other wealthier former Soviet republics.

Evidence-based approaches were introduced in all countries for improving service provision and quality. New institutions were established, or existing institutions were reorganized to provide postgraduate and continuous education. The other prioritized policy direction was strengthening maternal and child health care and prevention of infectious diseases, particularly HIV/acquired immune deficiency syndrome, sexually transmitted infection, and tuberculosis. All the three countries adopted the Directly Observed Treatment, Short-Course strategy recommended by WHO [22-24].

##### 2) Financing

The financial system was refocused and more oriented on decentralization of funds. Decentralization in Kyrgyzstan and

**Table 4.** Human resources before breaking down of Soviet Union and after independence, per 100 000 population

Indicators	Kazakhstan			Kyrgyzstan			Uzbekistan		
	1990	2000	2015	1990	2000	2015	1990	2000	2015
Medical doctor	378.39	297.89	327.39	NA	185.41	185.38	338.75	297.72	245.12
Nurse	987.79	619.59	802.1	1031.18	800.76	598.56	1145.42	1095.53	1164.66
Dentist	41.54	12.57	37.01	28.56	19.19	16.51	27.16	21.69	15.34
Pharmacist	87.46	30.65	81.53	NA	2.86	4.14	20.59	2.73	4.22

NA, not available.

Uzbekistan empowered regional (oblast) authorized bodies to regulate and distribute funding among health facilities, and the Kazakhstan system provides those rights to district level (rayon). However, the Kazakhstan government failed to manage such micro-level systems. In 2001, the Ministry of Health and regional health departments respectively began to administer funds. In the last part of the 1990s, Kazakhstan and Kyrgyzstan introduced patient-based payment (PBP), which led to an increase in the health expenditure [29]. Introduction of PBP in Kazakhstan contributed to case-based funding reform in 2009 and the introduction of diagnosis-related groups (DRGs) in 2011. The DRG system provides better management in contract terms and represents the main funding system for the hospital [30]. The capitation-based payment was introduced at the primary level. In the first stage of the health system reforms, Kazakhstan and Kyrgyzstan announced mandatory health insurance systems. Implementation of the health reform was piloted in two regions of Kazakhstan during 1995–1999 [28]. However, they failed to expand mandatory health insurance to all the countries [22].

To decrease government expenditure, Uzbekistan introduced mix budgetary and self-financing adult health services on secondary and tertiary levels. Therefore, health services on secondary and tertiary levels were permitted to provide payment-based services for adults.

This financing system increased the financial burden of the population as the patient has to pay for services themselves, and the government covers expenditure only for the vulnerable population such as veterans, disabled, poor people, and children. Out-of-pocket payments in Kyrgyzstan are implemented as co-payments [12,31]. However, co-payment contributed to decreasing informal ‘under-the-table’ out-of-pocket payments [12].

Among the countries, Kyrgyzstan underwent the most significant number of structural changes. The Kyrgyzstan government introduced the mandatory health insurance system under the “Manas” program that began in 1996. In 2001–2004, the single-payer system was developed for the SGBP and piloted in two regions. A mandatory health insurance fund was established, and pooling mechanisms were tested. The pooling mechanisms consisted of a contribution from district-owned taxes and through the reallocation of revenues remaining at the disposal of oblast budgets from regulated taxes. Implementation of the mandatory health insurance system introduced official co-payments for SGBP, which contributed to preventing informal under-the-table payments [32].

**Table 5.** Strengths and weakness of the policy implementation

Country	Kazakhstan	Kyrgyzstan	Uzbekistan
Strengths	<ul style="list-style-type: none"> <li>– Strengthening of the primary health care service delivery system</li> <li>– Evidence-based service delivery</li> <li>– State-guaranteed benefit package</li> <li>– Capitation-based payment on the primary level</li> <li>– <b>National diagnosis-related groups</b></li> <li>– Single-payer system</li> <li>– Patient-based payment</li> <li>– Introducing general practitioner</li> <li>– Postgraduate education: master’s and PhD degrees programs</li> <li>– Introducing higher and postgraduate education for nurses</li> </ul>	<ul style="list-style-type: none"> <li>– Strengthening of the primary health care service delivery system</li> <li>– <b>Village health committees staffed by volunteers</b></li> <li>– Evidence-based service delivery</li> <li>– State-guaranteed benefit package</li> <li>– Strengthening health promotion through the establishment of the new institution</li> <li>– <b>National Health Insurance System</b></li> <li>– Single-payer system</li> <li>– Capitation-based payment on the primary level</li> <li>– Patient-based payment</li> </ul>	<ul style="list-style-type: none"> <li>– Strengthening of the primary health care service delivery system</li> <li>– <b>Reorganization of the primary health care model to the two-tiered model</b></li> <li>– Capitation-based payment on the primary level</li> <li>– Introducing general practitioner</li> <li>– Postgraduate education: master’s and PhD degrees programs</li> <li>– Introducing higher and postgraduate education for nurses</li> <li>– The private sector in health care service provided with a limited list of services</li> </ul>
Weaknesses	<ul style="list-style-type: none"> <li>– Privatization of the secondary and tertiary health providers</li> <li>– Higher out-of-pocket payment</li> <li>– Informal payment</li> <li>– Limited package of the state-guaranteed benefit</li> </ul>	<ul style="list-style-type: none"> <li>– Privatization of the secondary and tertiary health providers</li> <li>– Limited package of the state-guaranteed benefit</li> </ul>	<ul style="list-style-type: none"> <li>– Self-financing and mix budgetary for adult health services on secondary and tertiary levels</li> <li>– Higher out-of-pocket payment</li> <li>– Informal payment</li> <li>– Limited choice of health care providers</li> <li>– Limited package of the state-guaranteed benefit</li> </ul>

The unique policy marked as bold.

**Table 6.** Health score

Year	Indicators	Kazakhstan	Kyrgyzstan	Uzbekistan
2015	Score	95.93	71.94	71.04
	Health outcomes	99.77	82.66	67.42
	Health care resources	96.51	43.98	57.09
	Efficiency	91.51	89.18	88.62
2000	Score	93.02	83.74	78.82
	Health outcomes	97.93	94.79	84.51
	Health care resources	91.24	59.73	65.30
	Efficiency	89.88	96.68	86.64
1991	Score	96.97	76.46	75.83
	Health outcomes	100.00	87.85	82.24
	Health care resources	96.89	48.31	59.95
	Efficiency	94.02	93.20	85.31

### 3) Regulation

The education and training systems for health workers in the three countries were almost similar. Kazakhstan and Uzbekistan implemented a 7-year undergraduate education system to obtain a physician diploma. In the case of Kyrgyzstan, physician diploma was provided after finishing a 6-year education program. To obtain a dentist and epidemiology diploma, graduates had to finish a 5-year education program. Education reform in Uzbekistan and Kazakhstan included changes to the framework and content of the education program, higher generalization of undergraduate study, and the introduction of postgraduate education that included master's and PhD degrees programs. Nurse, midwife, feldsher (paramedical practitioners), and dental technician education are provided in the form of 3-year diploma courses at college (Uschilishe in case of Kirgizstan). Reform of the nursing education system also includes introducing higher nursing education provided by medical schools. However, changes in Uzbekistan (in 2000) and Kazakhstan (2010) allowed graduates from higher nursing to engage in career development as well as researcher and managerial staff. In the case of Kyrgyzstan, nurses who had completed higher education were permitted to engage in the teaching clinical nursing [33].

### 5. Strengths and weaknesses

Table 5 summarized the strengths and weaknesses of the implemented policy. The main opportunities in the case of Kazakhstan are the implementation of the standardized system of

diagnostics through national DRGs. In the case of Kyrgyzstan, it was implementing the National Health Insurance System with the single-payment system. Another strength is the interaction of the volunteers in village health committees. Reorganization of the primary health care model to the two-tiered model in Uzbekistan led to a reduction in the health expenditure on ineffective health facilities. The main weaknesses include privatization of the secondary and tertiary health providers in Kazakhstan and Kyrgyzstan, and occasional high out-of-pocket and informal payment in the case of Kazakhstan and Uzbekistan. Self-financing and mix budgetary for adult health services on secondary and tertiary levels in Uzbekistan limited access to health services by adults. Also, the introduction of the state-guaranteed benefits package guaranteed access to services to the vulnerable population. However, a limited number of services covered by the state-guaranteed benefits package is a weakness.

### 6. Health score

The scoring of the health system based on eight indicators is presented in Table 6. We calculated the score for 3 years in 1991, 2000, and 2015. The Kazakhstan health system performed the best followed by Kyrgyzstan, and the weakest performances were observed at Uzbekistan. We found a trend of an overall decrease in scores in 2015 in comparison to 1991. In the case of Kyrgyzstan and Uzbekistan, the health system performed the best in 2000 in comparison to 1991, and the overall score decreased in 2015. In contrast, the Kazakhstan health system underwent a recession in 2000, and the system improved during the MDGs period.

However, data analysis revealed that Kazakhstan has higher per capita expenditure on health but lesser health expenditure as a percent of GDP than the other two states. In comparison with Uzbekistan, lower IMR and under-5 were observed in Kazakhstan and Kyrgyzstan. LE slightly varied among the three countries. Regarding HCS, Kazakhstan had the highest rate of a medical doctor; however, Uzbekistan has the highest rate of nurse staff.

## DISCUSSION

Health policy reform implemented in the Central Asia countries during the 25 years after independence led to an achievement of improvement in the health status. There has been an increase in LE and a decrease in maternal, infant, and under-5 mortality. MMR was 10 times less than the WHO global indicators, and Kazakhstan achieved remarkable progress in reducing MMR, which decreased by more than 6 times during the last 25 years. MMR in Kazakhstan is less than the WHO European region average. MMR in two other countries is higher than the WHO European region average and OECD countries average. The highest MMR was found in Kyrgyzstan, and a previous study founded that in rural areas, children were more frequently delivered without the assistance of medical staff [34]. The other countries in the region should learn from Kazakhstan experience of implementation of the specialized surveillance system and conducting of confidential inquiries into maternal death to produce more accurate data systems and revise clinical guidelines [35]. The IMR was less than the WHO global average in Kazakhstan and Kyrgyzstan, and slightly more in Uzbekistan, and IMR was higher compared to the WHO European region average and OECD average. However, the overall decreasing of IMR in the three countries was related to the strengthening of the perinatal care supported by WHO, United Nations Children's Fund, United Nations Population Fund, and the European Union [22-24]. The proportion of mortality due to NCD is prevalent in other cause of death, which is similar to the global trend [19,36]. The double burden of diseases requires reinforcement of political commitment and greater population involvement.

However, all the countries implemented a certain number of policies directed at the decentralization of the health system; two countries were evaluated as having the state health system, and one as

having a state-based mixed type. In the current political and financial situation, these types help restrain the increase of health services cost. Moreover, the reform led to achieving a good result in UHC in case of mother and child health care, NCD, and service capacity and access. Although coverage of costly infection diseases (as HIV antiretroviral treatment) still need to be improved, and the population did not have proper protection from devastating health expenditure. Transition to the National Health Insurance System in Kyrgyzstan led to the achievement of almost complete universal coverage [11]. On the other hand, the quality of the provided services needs to be improved in all the countries. Kazakhstan and Uzbekistan's health systems based on the National Health Services and main financing are a consequence of the collected tax through the allocation of the state budget for the cover of health expenditure [8,22,23]. Furthermore, separation of the health services provider from payer is necessary. Inherited health system was organized with much-duplicated structures. However, the health facilities optimization policy was implemented, and further optimization of the parallel structure is necessary. Also, the introduction and adaptation of international protocols of diagnosis and treatment should be done. The next steps in the improvement of the health system are consideration of the transition to the National Health Insurance System, as implemented in Kyrgyzstan. Nevertheless, all three countries should consider strengthening public-private partnerships (PPP) in the health sector to increase the quality of the provided services through fair competition between the health facilities [37].

Introduction of the national DRGs in Kazakhstan standardized the diagnostic system and contributed to the improvement of financing for the health system [38]. In the case of Kyrgyzstan, implementing the National Health Insurance System with single-payer system helped improve the management of the health system [13]. Reorganization of the primary health care model to the two-tiered model in Uzbekistan led to a reduction of the health expenditure on ineffective health facilities. However, some continuous reforms are needed for the consideration and strengthening of overall political commitment. Privatization of the secondary and tertiary health providers in Kazakhstan and Kyrgyzstan requires reinforcement of PPP in the health sector that need to specify service quality clearly [39]. Comprehensive approaches are needed to solve the problem of the high out-of-pocket and informal payment that occasionally overlaps

in both Kazakhstan and Uzbekistan [40,41]. Introducing the official co-payment or contribution payment for health services might support decreasing of the informal payment and control out-of-pocket payment.

Evaluation of the performance of the health system among the three countries shows that among the three countries, Kazakhstan has the best-performing health system. However, in 2000, improvement of the performance in Kyrgyzstan and Uzbekistan and a decrease in the performance of Kazakhstan were observed. Decreasing score in case of Kazakhstan in 2000 was led by reducing the LE compared to 1991 and shortage of health professionals and bed density. Therefore, it can be concluded that reforms implemented at the middle and end of the 1990s positively influenced the health system performance in Uzbekistan and Kyrgyzstan. Nevertheless, rising the issues in the health sector led to a reduction of the performance in Kyrgyzstan and Uzbekistan and increasing gap compared to Kazakhstan in 2015. Also, continuous policy in decreasing of the medical staff and hospital beds lead to disparity in HCS between three countries as well as a reduced gap of the LE between the states compare to 2000. Kazakhstan had more health resources in compare to Uzbekistan and Kyrgyzstan.

Furthermore, Kazakhstan has better performance in case of the improving of the HO between 2000 and 2015. We assume that another reason for the gap in the health performance between Kazakhstan compared to Kyrgyzstan and Uzbekistan can be the overall socio-economic development in Kazakhstan [22]. It led to substantial differences in health expenditure per capita. Health expenditure per capita was increased more than ten times in Kazakhstan while the health care cost as a percentage of GDP was almost the same. In the opposite, Kyrgyzstan and Uzbekistan increased the health care cost as a percentage to the GDP and HEP comparatively did not increase.

For continuous improvement of health system performance, all countries should continuously improve their financial systems. It is necessary to revise the policy with regard to the percentage distribution of the health cost between the expenditure on health and out-of-pocket payments [40,42]. Health financing policy needs to be changed in the extent of the source of financing, distribution of the funds between and within the different levels of health services provision, as well as providing the funding based on the performance. Moreover, strengthening of health promotion is necessary for the prevention of the NCD, popularization of a healthy lifestyle, and

improvement of the diagnosis of disease on early-stage and screening.

## 1. Conclusion

Summarizing the findings, we would like to highlight that in all the three countries, the main implemented reform was based on political commitment rather than evidence. The implemented reforms in the considered countries were mostly similar, and changes aimed to reform the structure of the system and were related to the provider of services and regulation of the financing system [10,13]. Additionally, primary health care services were prioritized for strengthening and improving the health systems, and 'general practitioner' and 'family doctor' were introduced to secure universal access to health services. The expansion of the basic SGBP facilitated access to vital health services, particularly for vulnerable populations. Transition to evidence-based health service delivery contributed to the improvement of health service quality.

Privatization, mix budgetary, and increasing of the private sector negatively influenced on the access to the specialized health services. However, the experience of the developed countries provides evidence that the establishment of PPP improves the quality of services. All countries need to strengthen policy in the PPP, especially in regulation, financing, and supervision. Additionally, strength capacity building in quality assurance and a certification system of health facilities, as well as health professionals, are needed. Other issues to be addressed include out-of-pocket payment and informal payment in Kazakhstan and Uzbekistan. Introducing national health insurance will be an effective mechanism to improve the services offered by the service provider as well as the financing of the health care system.

## 2. Limitations

The existing study was based on the review and comparison of the academic paper and WHO report and not included grey literature. Health score system did not include the indicators and factors that influenced the population health and HO such as socioeconomic, behavior, and environmental. The more comprehensive analyses are necessary to do in the future to evaluate the factor influence on the health status of the population and to compare its influences between the countries.

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