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Health System Effectiveness in Hypertension Control in Kyrgyzstan

Melitta Jakab (WHO)
Elizabeth Lundeen (Swiss Red Cross)
Baktygul Akkazieva (WHO)

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Health Policy Analysis Unit, Center for Health System Development
• 1 Togolok Moldo Street , 720 040 Bishkek, Kyrgyz Republic
Phone: 996 (312)666-244 • Fax: 996 (312) 663-649 •Email: mjakab@manas.elcat.kg

Introduction

Effective control of hypertension can improve health outcomes by reducing acute cardiovascular events such as stroke and heart attacks and can be cost-saving for the health system by decreasing hospitalizations. The Kyrgyz health system has made great inroads in strengthening primary care and in this process hypertension control received a special emphasis as one of the six monitored diseases. Primary care consultations are free for all Kyrgyz citizens, hypertension treatment guidelines have been developed and distributed, medical professionals have been trained in hypertension control, and hypertension medication has been included among the subsidized medicines in the Additional Drug Benefit.

There has not been a comprehensive evaluation to date on the effectiveness of the health system in hypertension control. This study has two objectives. First, it aims to establish the prevalence of HTN based on a representative sample of the population and thereby improving on the results of studies conducted previously. Second, the study aims to assess the overall effectiveness of the health system with regards to hypertension control. We seek to understand to what extent people with elevated blood pressure know about their condition, take medication, and have their blood pressure under control.

1 Data sources

Hypertension measurement was added to the 2007 Health Module of the Kyrgyz Integrated Household Survey (KIHS-2007). The KIHS is an ongoing survey of living standards conducted by the National Statistical Committee (NSC). The KIHS sample is representative of the Kyrgyz population at the oblast level. The total number of households participating in the survey was 5,005 including 21,257 individuals. In 2007, a detailed Health Module was added to the survey with the main objective of measuring trends in health care utilization and expenditures. The Health Module was a repeat of the 2001 and 2004 surveys but the measurement of hypertension was included for the first time. The survey was conducted by the National Statistical Committee (NSC) with technical and financial support from WHO EURO and DFID.

The blood pressure of each respondent was measured by using automatic upper-arm blood pressure measurement devices (A&D Medical UA-767 Plus). Seventy blood-pressure measurement devices were purchased and used in the process. Instructions for interviewers were developed by the Center for Health System Development and WHO. KIHS interviewers participated in a two-day training program. Training on blood pressure measurement was conducted by family practitioners from the Family Medicine Training Center and WHO.

The study was approved by the Ethical Committee under the Kyrgyz State Medical Academy on February 13, 2007. Consent was obtained from each study

participant prior to measuring blood pressure. After taking blood pressure measurements, the interviewers read out a standardized explanation of the meaning of the blood pressure reading and handed respondents a printed card. Two explanatory cards were designed: one for normal blood pressure reading and one for elevated blood pressure reading.

2 Methods

2.1 Hypertension prevalence

For the purpose of this analysis, hypertension was defined as systolic blood pressure greater than or equal to 140 mmHg, or diastolic blood pressure greater than or equal to 90 mmHg, or having taken medicine for hypertension in the last 24 hours. This is consistent with the definition used in international literature on hypertension prevalence.[1]

For the entire sample across all regions, interviewers were able to take blood pressure measurements for 82% of adults 18 years or older, which left an 18% overall non-response rate. To determine whether the rate of non-response was random, or could have been related to factors associated with hypertension prevalence, the rate of non-response for the blood pressure measurement was stratified across three factors which are known to affect the prevalence of hypertension (region, age, and gender). The missing values (non-response) for blood pressure measurement were not random, but were found to differ by oblast, age and gender. Table 1 below shows the rate of non-response across regions, age categories and gender.

Non respondents were more likely to be male, younger, and be resident of Chui oblast and Bishkek. Therefore, by not accounting for non-response in the analysis of hypertension prevalence, the prevalence results would be biased. The prevalence would likely have been biased upward, as hypertension prevalence increases with age, and it was the older age categories which had the lowest non-response. Additionally, Issyk-kul and Talas oblasts had the lowest non-response rates, but the highest prevalence of hypertension, which would also result in an upward bias of the prevalence in those oblasts.

[1] Kearney, P. "Worldwide Prevalence of Hypertension: A Systematic Review." *Journal of Hypertension*. 2004. 22:11-19.

Table 1. Distribution of missing blood-pressure measurement

% of respondents 18+ without blood pressure measurement (N)	
Region	
Issyk-kul	11.1% (N=182)
Jalal-abat	18.6% (N=334)
Naryn	14.9% (N=214)
Batken	22.2% (N=323)
Osh	21.9% (N=408)
Talas	7.7% (N=106)
Chui	23.8% (N=335)
Bishkek	25.0% (N=366)
Age	
18-29 years	33.6% (N=1,337)
30-39 years	13.6% (N=325)
40-49 years	10.1% (N=270)
50-59 years	9.3% (N=154)
60-69 years	9.2% (N=78)
70+ years	11.9% (N=104)
Gender	
Male	23.2% (N=1,333)
Female	14.0% (N=935)

Therefore, to account for the non-random missing values in the data analysis, an imputation technique was used to estimate the mean systolic and diastolic blood pressure of missing observations based on three factors known to affect hypertension prevalence (region, age, and gender). The mean systolic and diastolic blood pressure of the non-missing observations was stratified by region, age, and gender, and this strata-specific mean was used as the blood pressure measurement for the missing observations in each corresponding strata. This imputation technique resulted in all observations 18 years or older having a value for systolic and diastolic blood pressure, and essentially corrected for the bias caused by non-random missing values.

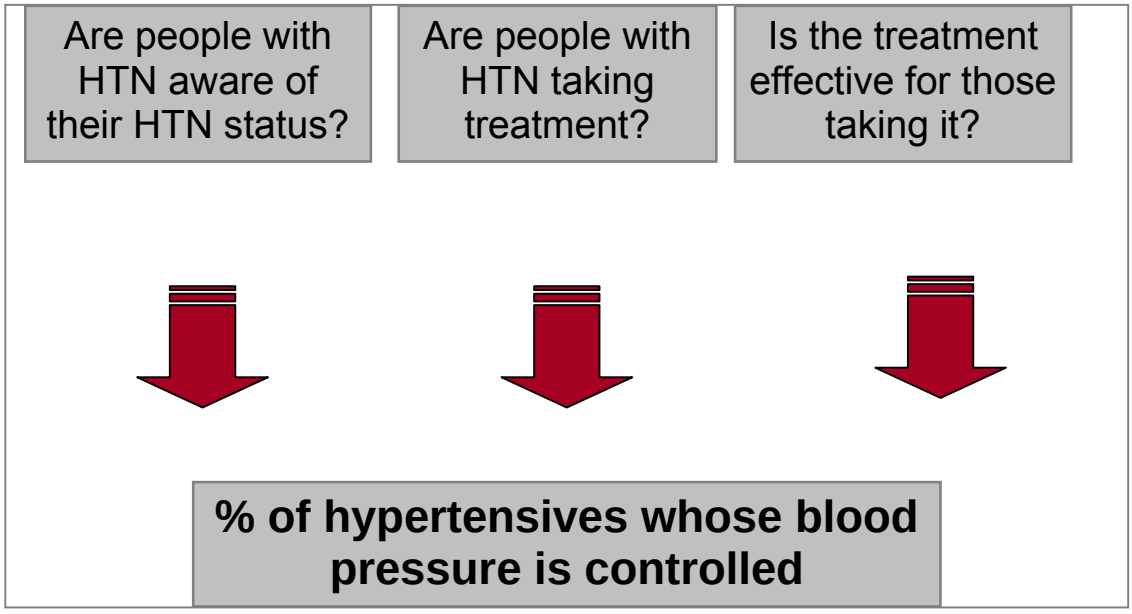
The hypertension prevalence rates were standardized for age and gender in each oblast in order to directly compare results between oblasts to the 2007 Kyrgyz national population[2]. Likewise, the national prevalence rate was age- and sex- standardized to the 1990 world population to facilitate direct comparison to international prevalence rates of hypertension[3].

[2] National Statistical Committee of the Kyrgyz Republic. Demographic Statistics for 2007.
[3] http://esa.un.org/unpp/index.asp?panel=2

2.2 Health system effectiveness

Effectively working health systems, particularly at the primary care level, can contribute to reducing the disease burden and health system costs associated with hypertension. While primary prevention focuses on reducing the prevalence of hypertension, primary care services can be effective in controlling the blood pressure of those identified as hypertensives. Hypertension is a key modifiable risk-factor for cardiovascular disease and how well the health system addresses this risk factor is an important area of investigation.

Figure 1. Health system effectiveness in hypertension control



There are four criteria frequently used in the international literature to assess the effectiveness of the health system in hypertension control. The key outcome indicator of interest is the **percentage of patients with hypertension whose blood pressure is controlled**. This indicator is affected by three intermediate indicators:

- **% aware:** Awareness is a pre-condition for effective treatment and control. This indicator evaluates to what extent respondents with elevated blood pressure are aware of their condition. It reflects the effectiveness of the health system in detection of hypertension. Several health system factors affect the level of this indicator such as awareness of the importance of annual hypertension measurement, frequency of contact with primary care practitioners, routine measurement of hypertension in primary care setting, and availability of hypertension measurement outside the medical system (e.g. pharmacies).

- **% treated**: This indicator reflects whether those with hypertension take treatment for their condition. With effective hypertension medication, blood pressure can be effectively controlled. Several health system factors affect the level of this indicator including physician prescription practices, availability and affordability of hypertension medicines, patient awareness about the importance of regularly taking medication, and patient adherence to medication instructions.

- **% controlled**: This indicator reflects the effectiveness of treatment as the percentage whose blood pressure is under control among those taking treatment. This indicator is affected by a number of health system factors such as appropriateness of prescriptions and instructions to patients, quality, availability and affordability of medicines, regularity of follow-up with a health care provider, and patient adherence to physician instructions.

Table 2. Definition of indicators for health system effectiveness in hypertension control

	Numerator	Denominator
Aware	Those who report they have hypertension	Those with HTN (SP>=140 or DP>=90 or took BP medication in last 24 hours)
Treated & compliant	Those who took medication in last 24 hours	Those with HTN (SP>=140 or DP>=90 or took BP medication in last 24 hours)
Controlled	Those with blood pressure under control (SP<140 and DP<90)	Those who took medication in last 24 hours
Overall effectiveness	Those with blood pressure under control (SP<140 and DP<90)	Those with HTN (SP>=140 or DP>=90 or took BP medication in last 24 hours)

3 Results

3.1 Hypertension prevalence

3.1.1 Previous studies

In the 1980's, the National Cardiology Institute established a hypertension prevalence rate of around 25% in adults. However, two previous studies conducted in recent years raised concern that the prevalence of hypertension has increased in the past decade and placed Kyrgyzstan in a leading place by worldwide prevalence rates. The Kyrgyz Swiss Swedish Health Reform (KYSSHP) project conducted action research in three oblasts including Naryn, Talas and Issyk-kul in 2006. Teams of village health committees and medical personnel measured the blood pressure of 141,485 individuals using wrist-cuff automatic blood pressure measurement devices. The study established prevalence rates of 46.5% in Talas, 43.3% in Issyk-kul, and 40.6% in Naryn. Finally, the National Cardiology Institute measured blood-pressure in studies initiated and financed by KYSSHP in 2004-2006. in villages of Talas, Naryn and Chui oblasts. The study established prevalence rates of 34% in Talas, 38% in Naryn and 44% in Chui (Kemin).

Unfortunately, neither of these studies was based on a representative random sample of the population. In the KYSSHP study, blood pressure was measured at home for those villagers who were at home at the time of the visit. Thus, the study sample is likely to be older than that of the general population and the hypertension prevalence estimates are likely to be overestimated. Since age was not registered for respondents, this hypothesis cannot be verified. In the NCI study, blood pressure was measured in primary care facilities to volunteers who showed up in response to a health promotion campaign. It is possible that those with known hypertension were more likely to show up in expectation of free medical advice, and in this case, the study overestimated the prevalence of hypertension. Conversely, if more health conscious and healthier individuals participated to take part in the project, the study underestimated the prevalence of hypertension.

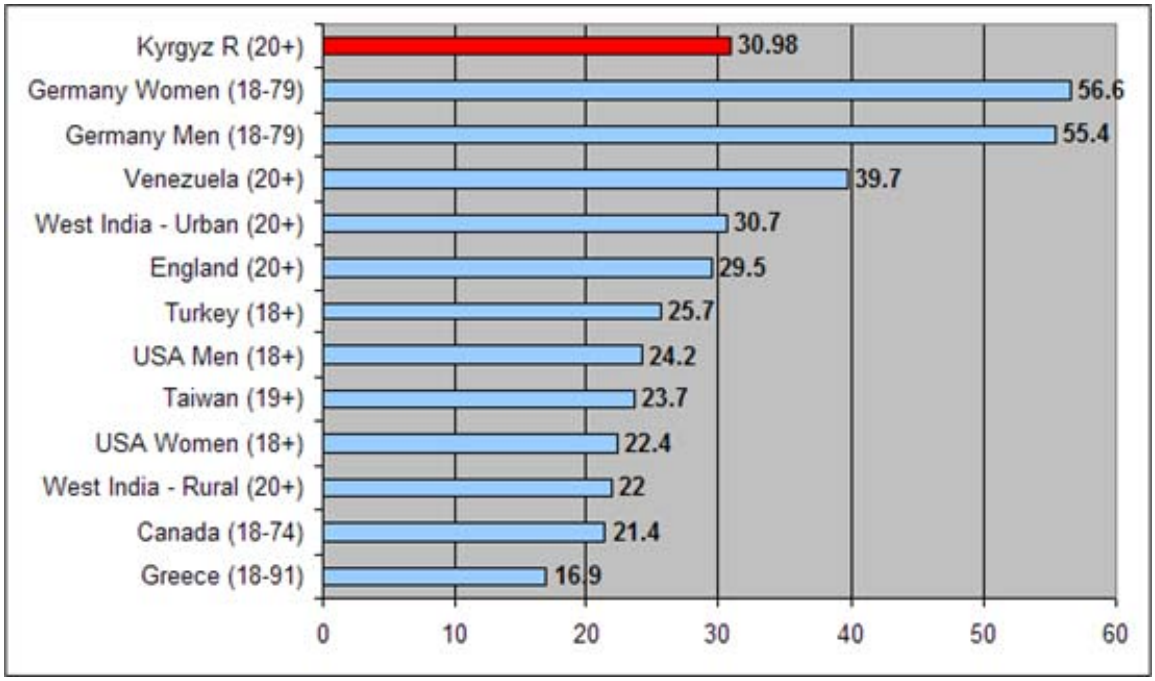
3.1.2 Hypertension prevalence results from the KIHS-2007

The crude prevalence of hypertension for the sample of adults in Kyrgyzstan is 28.4% based on the data collected in the KIHS-2007 and adjusted for missing observations as described in section 3.1. Standardizing the Kyrgyz hypertension prevalence results for the World Population for international comparisons yields a 30.98% prevalence estimate. These national estimates are significantly lower than the results suggested by previous studies discussed in section 4.1.1.

Compared to reference countries, hypertension prevalence in Kyrgyzstan is at the high end of the distribution. (Figure 2) A recent review of the international

literature on hypertension prevalence selected countries where the study methodology was comparable. We further reduced the sample of countries to those where the age group of the study was similar to the age group of the Kyrgyz household survey (18 years or older). Figure 2 shows the prevalence of hypertension in Kyrgyzstan relative to a number of selected countries. While hypertension prevalence is not the highest in Kyrgyzstan, it is at the high end of the distribution matching the prevalence of developed countries such as the U.S., England and Canada, where chronic conditions such as hypertension generally comprise the majority of morbidity experienced by the population.

Figure 2. Hypertension prevalence in selected countries



Note: Kyrgyz prevalence results standardized to the 1990 World Population.

To obtain comparable results across oblasts, we age- and sex-standardized prevalence rates to the 2007 Kyrgyz national population. The results revealed a great deal of variation in the prevalence of hypertension across different regions. (Table 3) The prevalence of hypertension is alarmingly high in Issyk-kul (37.4%) and Talas (36.0%), but is considerably lower in Osh (21.5%). The results confirm the earlier findings of the SRC and the CI that found very high prevalence rates in the Northern oblasts of Talas, Issyk-kul and Naryn.

Table 3. Prevalence of hypertension by oblast

	Crude prevalence	Age and sex standardized prevalence	
		2000 Kyrgyz population	1990 World Population
Kyrgyz Republic (18 years and older)	**30.36%**	**28.37%**	**30.98%**
Issyk kul	41.00%	37.40%	-
Talas	37.90%	36.00%	-
Jalal-Abad	29.40%	29.10%	-
Batken	26.60%	27.60%	-
Naryn	31.70%	26.80%	-
Bishkek	29.10%	25.20%	-
Chui	28.10%	24.20%	-
Osh	20.90%	21.50%	-

Overall, the prevalence of hypertension was slightly higher for women (29.9%) than for men (26.7%). (Table 4) This higher prevalence in women was the case in most regions, except for Bishkek and Talas, where men and women essentially had the same prevalence, and Jalal-abat where the prevalence was 5% higher among men. As would be expected, the prevalence of hypertension increased sharply among the older age categories. In the first four age categories, as you move from one category to another there is a doubling of hypertension prevalence at each interval. The overall prevalence of hypertension is extremely high in the two oldest age categories: 60-69 years (72.1%), and 70+ years (78.1%). One interesting finding is that in Issyk-kul and Talas (the two oblasts with the highest overall hypertension prevalence), there seems to be an earlier onset of hypertension than in other oblasts. In the three youngest age categories (18-29, 30-39, and 40-49 years) Issyk-kul and Talas oblasts have the highest prevalence of hypertension compared to other oblasts. Shockingly, in the 40-49 year category, Issyk-kul has a hypertension prevalence of 62.8%, compared to a 20-30% prevalence in most other oblasts. From the data, one can see that in the older age categories, the prevalence of hypertension levels out across oblasts. This suggests that some factor in Issyk-kul (and possibly Talas) is contributing to the earlier onset of hypertension in the population.

Table 4. Prevalence of hypertension by gender, age and oblasts

	IK	TA	NA	JA	BI	CH	BA	OSH	Total 18+
Crude hypertension prevalence rate									
% with HTN	41.00%	37.90%	31.70%	29.40%	29.10%	28.10%	26.60%	20.90%	**30.36%**
Crude hypertension prevalence rate by gender									
% Men with HTN	39.40%	37.80%	26.90%	31.90%	29.20%	23.10%	24.70%	17.40%	**26.70%**
% Women with HTN	42.50%	37.90%	36.70%	27.00%	29.00%	32.40%	28.30%	24.10%	**29.90%**
Crude hypertension prevalence rate by age group									
% with HTN 18-29 years	11.20%	16.70%	8.20%	6.80%	4.20%	3.20%	8.60%	7.60%	**7.00%**
% with HTN 30-39 years	24.30%	27.20%	15.80%	22.00%	12.70%	7.90%	14.60%	7.40%	**14.10%**
% with HTN 40-49 years	62.80%	40.50%	34.30%	27.20%	22.30%	35.00%	27.80%	26.40%	**32.00%**
% with HTN 50-59 years	77.00%	62.50%	42.40%	68.30%	73.70%	65.00%	72.70%	38.40%	**63.30%**
% with HTN 60-69 years	63.90%	77.80%	75.10%	81.20%	74.80%	61.10%	76.90%	72.30%	**72.10%**
% with HTN 70+ years	71.80%	90.80%	92.80%	78.10%	83.20%	78.00%	67.10%	73.60%	**78.10%**

An analysis of CVD risk factors measured by the household survey also reveals variation across oblasts (Table 5). The prevalence of overweight (BMI ≥ 25) for the entire sample of adults in Kyrgyzstan was 32.3%, with a high of 38.2% in Chui and a low of 28.0% in Issyk-kul. The prevalence of obesity (BMI ≥ 30) for the entire sample was 7.5%, with a high of 16.1% in Chui and a low of 3.7% in Jalal-abat. As one would expect, a much higher proportion of men than women are current or former smokers. The proportion of men who are current or former smokers is quite high in certain regions (approximately two-thirds in Naryn, Chui and Bishkek). Based on this preliminary analysis of BMI and smoking, there is no clear link between these two CVD risk factors and the prevalence of hypertension across oblasts (although, evidence only links smoking to the development of CVD, not hypertension). This suggests that some other factor (e.g. differences in genetic susceptibility to hypertension) may be driving the variation in hypertension across oblasts. However, further analysis of hypertension risk factors is needed.

Table 5. Prevalence of CVD risk-factors across oblasts

Oblast	IK	TA	JA	BA	NA	BI	CH	OSH	Total 18+
Crude HTN prevalence[1]	41.0%	37.9%	29.4%	26.6%	31.7%	29.1%	28.1%	20.9%	**28.4%**
Age and sex adjusted prevalence of HTN[1, 2]	37.4%	36.0%	29.1%	27.6%	26.8%	25.2%	24.2%	21.5%	--
Prevalence of Overweight, BMI ≥ 25[1]	28.0%	33.2%	29.7%	29.1%	33.7%	34.5%	38.2%	31.2%	**32.3%**
Prevalence of Obesity, BMI ≥ 30[1]	7.2%	7.3%	3.7%	5.0%	8.4%	7.0%	16.1%	6.0%	**7.5%**
Current/Former Smokers (Men)	54.8%	45.1%	38.4%	55.1%	63.6%	65.7%	67.0%	57.9%	**56.3%**
Current/Former Smokers (Women)	1.4%	0.14%	0.06%	3.1%	2.9%	11.5%	11.6%	3.3%	**5.3%**

3.2 Effectiveness of health system in hypertension control

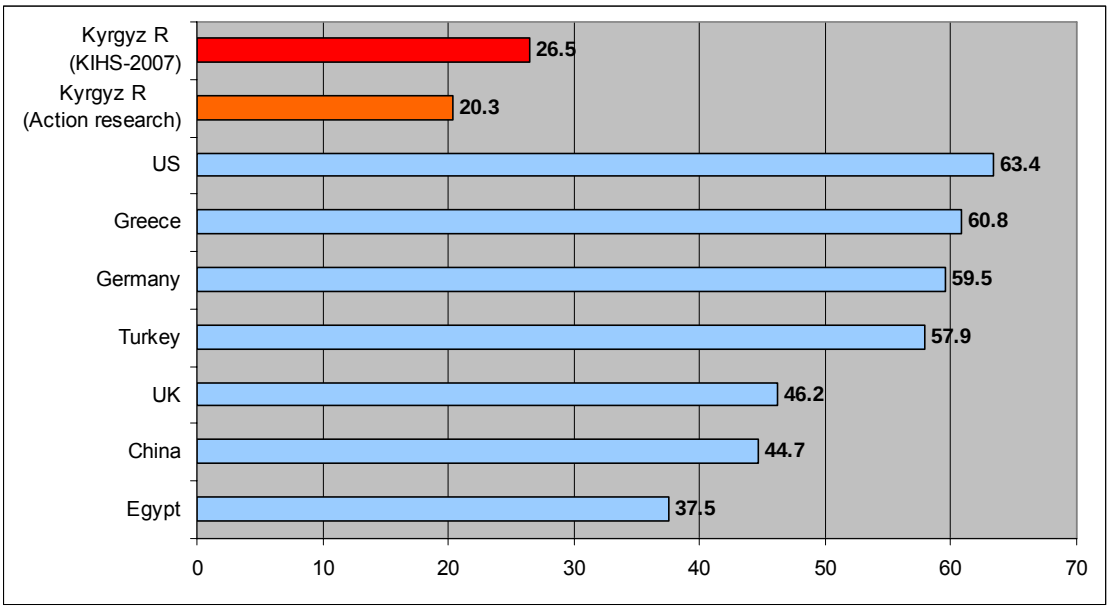
As described in Section 3.2, we use four indicators to measure the effectiveness of the health system in hypertension control: % aware of those with hypertension, % treated of those with hypertension, % controlled of those taking treatment, and as the final outcome indicator, % controlled of those with hypertension. For each of these indicators, we reviewed the international literature to compare the results of the Kyrgyz Republic to that of other countries. There were a number of criteria based on which we selected the comparator countries. First, we restricted comparison to countries where the study population matched closely the age group of the Kyrgyz study (18 or older). Second, we selected a few countries that are showing the best results in hypertension control to illustrate achievable goals (e.g. US, Germany, UK, etc.). These countries spend much greater amounts on health care than the Kyrgyz Republic, and thus, their results are not necessarily replicable but can serve as a helpful illustration. Third, we also included countries that are closer to the level of economic and social development of Kyrgyzstan in order to illustrate how well Kyrgyzstan is doing for its level of health investment (e.g. China, Egypt, etc)

3.2.1 Awareness

Among those with hypertension, 27% knew that they had hypertension nationwide. These results are similar to the findings of the KYHSSP study in Naryn, Issyk-kul and Talas which found that about 20% of those with elevated blood pressure measurement were aware of their condition. Comparing these results with other health systems, we find that awareness is quite low in the Kyrgyz Republic. The best performing country on this indicator is the United States with 63%, Greece with 61%, Germany with 60% and Turkey with 58%. However, even China and Egypt outperform Kyrgyzstan on this indicator at 45% and 38% respectively.

There is quite significant variation across oblasts on this indicator. The highest rates of awareness are in Bishkek (48%), Naryn (39%), and Chui (33%) while the lowest rates of awareness are Talas (12%) and Jalal-Abad (12%). It is important to highlight that the lowest rates of awareness are registered in those oblasts where the prevalence of hypertension is the highest. This suggests that these oblasts ought to receive priority in population education programs.

Figure 3. Awareness of hypertension status



Note: % who know they have hypertension of those with hypertension (SP>=140 or DP>=90 or took blood pressure medication in last 24 hours)

Although population awareness is low, it is a positive finding of this study that blood pressure is routinely measured in the context of outpatients visits for adults. Blood pressure was measured for 72% of those respondents above 18 years old who reported having visited an outpatient care provider in the past 30 days. Thus, the health system is making a good contribution to the detection of hypertension. However, many adults do not visit a primary care provider and thus does not have their blood pressure measured.

In conclusion, awareness of the population of their hypertension status is low. Increasing awareness is a key pre-condition for increasing the share of population with hypertension whose blood pressure is under control.

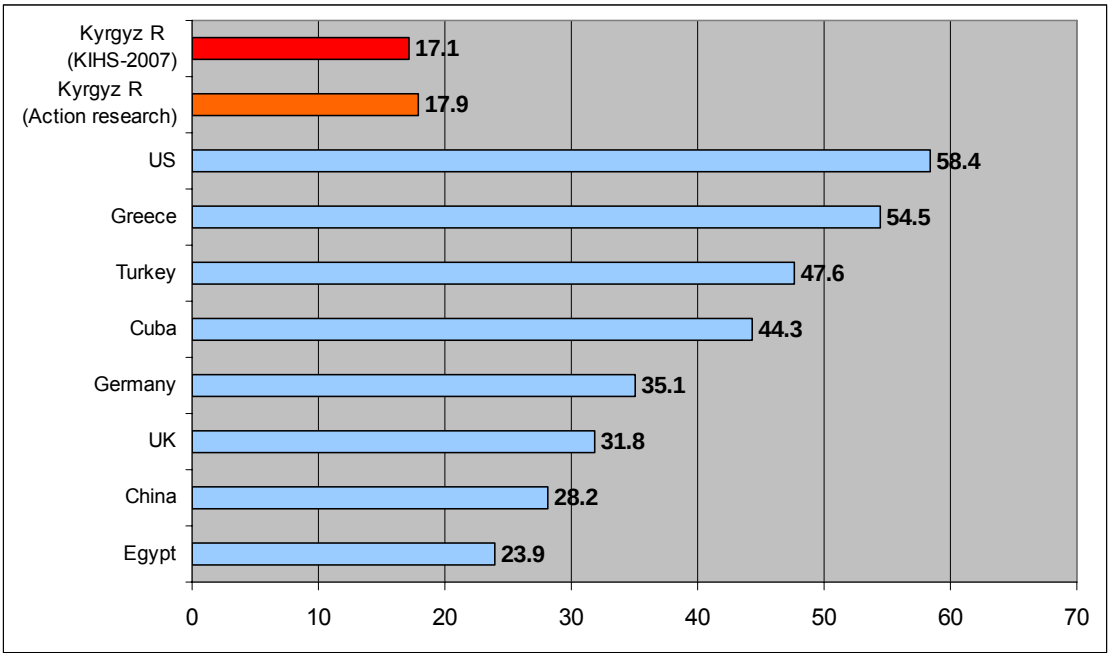
3.2.2 Treatment and compliance

Among those with hypertension, 17.1% took medication for their condition in the last 24 hours. These results are similar to the findings of the Swiss Red Cross study in Naryn, Issyk-kul and Talas which found that about 18% of those with elevated blood pressure measurement took medication for their condition. Comparing these results with other health systems, we find that the treatment rate is quite low in the Kyrgyz Republic. The best performing country on this indicator is the United States with 58%, Greece with 55%, Turkey with 48% and Cuba with 44%. China outperforms Kyrgyzstan with 28% treatment rate while the Egyptian results are similar at 24%.

It is possible that the treatment results are influenced by the definition "treatment" used in our study and thus these international comparisons should be viewed only for illustrative purposes. In the Kyrgyz study, we asked if the respondent took medication in the last 24 hours. In some studies, the question is formulated more broadly as to whether the respondent takes medication for hypertension in general. This latter definition would lead to higher reported rates of treatment as it is less dependent on patient compliance. Nonetheless, given that those with hypertension are required to take medication every day for effective control of their condition, 17% treatment rate is extremely low.

The low level of this indicator is not surprising given low levels of hypertension awareness. If people are not aware of their condition, they would not be taking treatment for it. Thus, we re-calculated this indicator as the % who took medication in the last 24 hours among those who know they have hypertension. The treatment rate increases to 57% among those who knew they have hypertension indicating that a major reason for the low treatment rate is the lack of awareness of hypertension status. This rate varies across oblasts showing the highest rate in Bishkek (72%) and the lowest rate in Batken (41%), Talas (42%) and Jalal-Abad (43%).

Figure 4. Treatment rate



Note: % who took blood pressure medication in the last 24 hours of those with hypertension (SP>=140 or DP>=90 or took blood pressure medication in last 24 hours)

The survey asked a follow-up question about why respondents did not take their medication in the last 24 hours if they had a prescription for blood pressure medication. The main reason highlighted was that the doctor told patients to take it only at the time of a hypertensive crisis. This reason was cited among 63% of

respondents. The second major reason cited was "I did not feel like it" (17%) which can cover a range of reasons such as mistrust of medication, fear of addiction, and not understanding the necessity of daily medication. Only 10% of respondents suggested a financial barrier to obtaining medications but this figure likely would have been higher had the question been phrased to include treatment in general rather than taking medications over the past 24 hours. No respondents cited that "they could not find" or "distance to pharmacy" as the main reason for not taking medication indicating good availability of hypertension medication nationwide.

The finding of this survey was also confirmed in a recently conducted study on the Quality of Care for Cardiovascular Diseases conducted in Kyrgyzstan by Akunov, Ibraimov et al. The authors conducted 25 in-depth interviews with stroke survivors focusing on prevention among other subjects. The following quote illustrates the general feeling that patients are not aware of the importance of taking blood pressure medication on a daily basis and that physicians do not provide appropriate instructions to patients:

> *"If my physician had emphasized the importance of taking drugs for high blood pressure, I would have taken it on a regular basis, and maybe I would have avoided getting a stroke." (Man, 50 years old, Jalal-Abad oblast)*

The qualitative work with both stroke and AMI survivors highlighted that another important factor behind the intermittent consumption of blood pressure medication is physicians' preference for brand name drugs. If physicians prescribe expensive brand name drugs, patients are less likely to afford them on a continuous basis. They purchase them when they have money, and take them when they have a crisis. Lack of appropriate information about generics and mistrust for generics among both physicians and patients is an important factor behind inappropriate adherence to blood pressure medication. The following quote from one of the focus group discussions captures this sentiment:

> *"Cheap drugs don't help and expensive ones are beyond my means." (Man, 54 years old, Naryn oblast)*

An analysis of the ADB database for 2003-06 shows interesting results in the comparison of generics versus brand-name blood pressure medication. (Table 6) When interpreting these results, it has to be kept in mind that the ADB represents only a small part of the pharmaceutical market. With this caveat in mind, we can conclude the following about prescription and dispending practices. In 2006, 95% of ADB prescriptions for hypertension were for generic drugs. However, only 45% of sold drugs were generics. At the time of purchase, most likely at the recommendation of pharmacists, patients switched to brand-name drugs. This is the most obvious for enalapril where instead of the 85,138 prescriptions for generics only 28,176 were purchased. Similarly, only 7,028 prescriptions were given for brand name enalapril but 60,930 purchased. As a result, only 30% of the MHIF subsidy channeled through the ADB for

hypertension medication is going to generics and 70% supports the purchase of brand-name drugs.

Table 6. Hypertension drugs prescribed under the Additional Drug Benefit

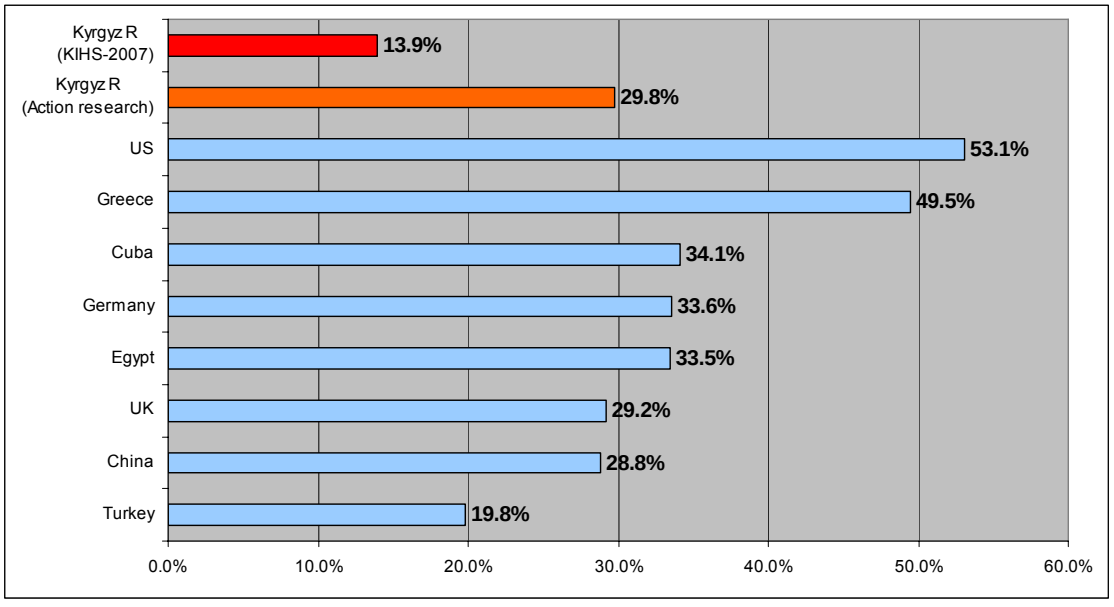
	2003			2004			2005			2006		
	Prescribed	Sold	MHIF subsidy ('000)	Prescribed	Sold	MHIF subsidy ('000)	Prescribed	Sold	MHIF subsidy ('000)	Prescribed	Sold	MHIF subsidy ('000)
GENERICS												
Atenolol	18,554	16,424	741	29,241	27,234	1,263	27,144	24,897	466	25,956	23,617	442
Verapamil	10,712	9,676	386	11,774	10,911	425	11,105	10,302	442	12,423	11,594	582
Hidrochlortiazid	5,850	3,900	71	9,579	7,352	140	9,188	6,721	126	8,022	5,608	125
Nifedipin	9,304	-	-	14,296	-	-	17,978	-	-	18,052	-	-
Indapamid	2,261	80	5	1,812	122	7	2,698	398	24	2,649	261	16
Enalapril	31,296	3,163	493	49,218	6,863	1,052	80,161	18,448	3,711	85,138	28,096	4,863
Total generic	**77,977**	**33,243**	**1,696**	**115,920**	**52,482**	**2,887**	**148,274**	**60,766**	**4,769**	**152,240**	**69,176**	**6,028**
Generic as % of total	**95%**	**45%**	**19%**	**95%**	**46%**	**19%**	**96%**	**41%**	**25%**	**95%**	**45%**	**31%**
BRAND NAME												
Atenolol	32	228	15	77	274	15	33	360	11	34	492	11
Verapamil	24	52	2	21	53	2	51	123	4	16	95	4
Hidrochlortiazid	212	1,146	63	250	1,578	92	183	2,003	159	132	1,949	162
Nifedipin	877	9,152	984	1,176	14,479	1,562	1,295	18,224	1,455	1,489	18,438	1,664
Indapamid	155	2,112	186	107	1,669	154	46	2,201	129	102	2,363	150
Enalapril	2,981	28,520	6,123	4,373	44,362	10,240	5,258	64,156	12,668	7,028	60,930	11,280
Total brand name	**4,281**	**41,210**	**7,373**	**6,004**	**62,415**	**12,065**	**6,866**	**87,067**	**14,426**	**8,801**	**84,267**	**13,271**
Brand name as % of total	**5%**	**55%**	**81%**	**5%**	**54%**	**81%**	**4%**	**59%**	**75%**	**5%**	**55%**	**69%**
TOTAL	**82,258**	**74,453**	**9,069**	**121,924**	**114,897**	**14,952**	**155,140**	**147,833**	**19,195**	**161,041**	**153,443**	**19,298**

In summary, treatment rate of hypertension is low. There are three probable contributors to this result. The first one is the low awareness of the population, the second one is the inappropriate prescription practices of physicians instructing patients to take medication only at the time of crisis, and the third one is the preference of both physicians and patients to brand name rather than generic drugs.

3.2.3 Effectiveness of treatment

Among those who took medication in the last 24 hours, only 14% had their blood pressure under control at the time of the survey. In this case, our results are significantly lower than the results found by the Swiss Red Cross study in Naryn, Issyk-kul and Talas which found that about 30% of those who took medication had their blood pressure controlled. In part, our results can be due to small sample size and the finding needs to be interpreted with caution. If the actual rate is closer to the findings of the KIHS-2007 study, then Kyrgyzstan is again outperformed by all countries included for comparison. If the actual rate is closer to the findings of the Swiss Red Cross, then the rate of effective treatment in Kyrgyzstan is in the mid-range of comparator countries and is close to that of Cuba (34%), Germany (34%), Egypt (34%), and the UK (30%).

Figure 5. Effectiveness of treatment



Note: % whose blood pressure is under control (SP<140 and DP<90) of those who took blood pressure medication in the last 24 hours

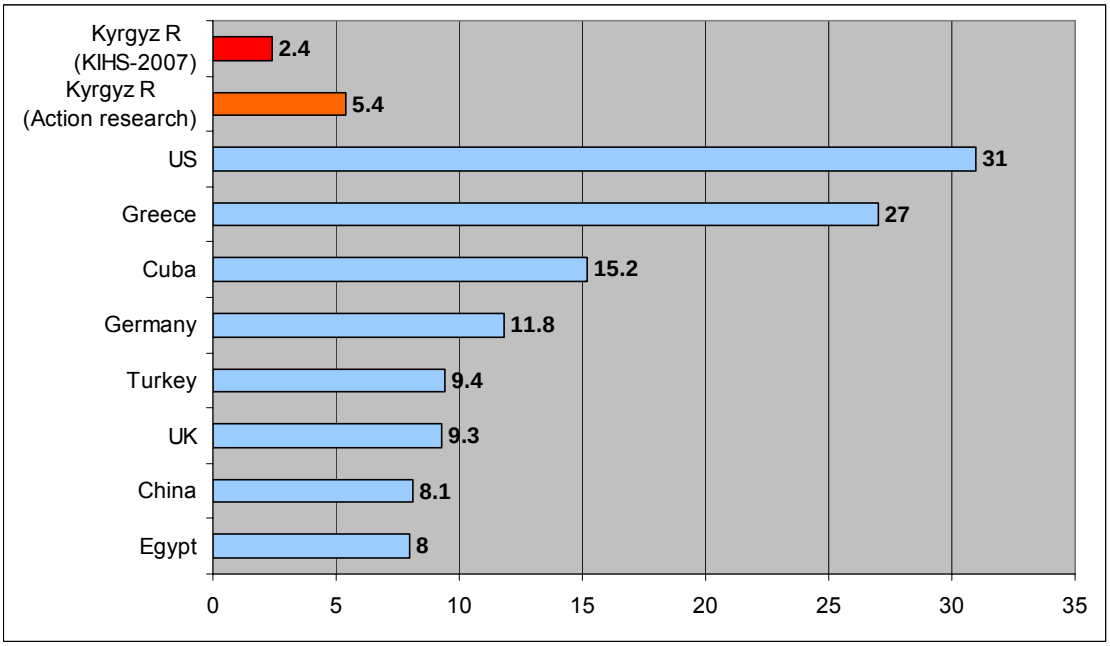
Treatment effectiveness is influenced by the regularity of consuming medication and the quality of medication and by the regularity of follow-up visits to PHC provider as it may take 2-3 visits to adjust medication and control blood pressure. Regarding the former, we discussed above that patients do not regularly take blood pressure medication based on the advice of their physicians. This could

explain the low rates of effectiveness of treatment as taking medication within the previous 24 hours does not necessarily imply that patient is regularly taking his or her medication and benefiting from its full effect.

3.2.4 Overall effectiveness of the health system in hypertension control

As discussed in the methods section, the three indicators of awareness, treatment rate, and effectiveness of treatment contribute to an overall indicator that measures the ratio of those whose blood pressure is under control relative to those who have hypertension. This indicator for Kyrgyzstan is 2.4% as a result of low awareness, low treatment rate and low effectiveness of treatment. Taking into account the differential findings of the Swiss Red Cross study, the indicator increases slightly to 5.4%. Under either scenario, there is room for improvement in the control of hypertension.

Figure 6. Overall health system effectiveness



Note: % whose blood pressure is under control (SP<140 and DP<90) of those with hypertension (SP>=140 or DP>=90 or took blood pressure medication in last 24 hours)

4 Discussion

In summary, our study suggests that while hypertension is a major health concern in the Kyrgyz Republic and that there is room for improvement in its effective control. Our study highlighted the following findings:

- Hypertension is a major health problem in the Kyrgyz Republic affecting 30% of the adult population.

- Population awareness of hypertension status is low with only 27% of those with elevated blood pressure being aware of their condition.

- The rate of treatment is low with less than 20% of those with hypertension having taken blood pressure medication in the last 24 hours. The main reasons behind the low treatment rate include lack of awareness of hypertension status, inappropriate medication advice given by physicians and preference for purchasing brand name drugs which most patients cannot afford on a regular basis.

- Finally, the rate of treatment effectiveness is low which can be due to many factors including poor quality medication, inadequate dosage of medication, intermittent consumption of medication.

A good initiative to change the *clinical behavior of physicians* is the introduction of a continuous quality improvement (CQI) process for patients with hypertension. The approach has been piloted by the USAID-sponsored ZdravPlus project in coordination with STLI and the KSMIRCE. A systematic approach to quality improvement was used in select FGP's and FAP's throughout the country focusing on six standards of care related to the diagnosis and management of patients with elevated blood pressure. The six standards include: existence of equipment, routine blood pressure measurement of all adults seeking care, use of appropriate technique in measuring blood pressure, documentation of all risk-factors to identify the CVD risk category, counseling on life-style changes, and appropriate prescription of medications. After initial training in quality improvement processes, a CQI "curator" from each clinic coordinated monthly collection of data over a one-year period. Results were regularly analyzed and presented by the curator to clinic personnel with the goal of making changes to improve the quality of care. Clear improvement was seen related to each standard of care over the one-year period and health care worker satisfaction with the process and results was high. The FGPA conducted external audits in select facilities to assess the impact of this CQI project on blood pressure levels. The average reductions in systolic and diastolic blood pressure over the one-year project period were 23.3 and 8.3 mmHg, respectively.

A good initiative to change the *behavior of the population* is currently being piloted by the KYSSHP in 5 villages. Their individual based strategy (focusing on those with hypertension) is based on hypertension clubs. Trained volunteers of the village health committees organize teaching sessions about hypertension and cardiovascular diseases. They are equipped with automatic upper-arm blood pressure cuffs. Each patient receives a personalized booklet with information about cardiovascular diseases, place for noting blood pressure measurements

and risk factors and a table for individual calculation of the risk of cardiovascular disease. Teh booklets and the sessions also provide information about generic versus brand name drugs. The population based strategy aims at creating awareness on hypertension and CVD among the general population. It involves development of a brochure on hypertension and CVD and their distribution through village health committees. These activities are in early phase of development but evaluation of their effectiveness and impact may be available in 2008.

Our findings and the positive experience of ongoing pilots suggest the following policy steps in order to improve hypertension control through the health system:

- **Recommendation #1**. Provide understandable and tested information to the population about the importance of regular hypertension measurement in an attempt to increase the share of people with hypertension who are aware of their condition. The rate of awareness is the lowest in Talas and Jalal-abad and the highest in Bishkek. Therefore, information provision through village health committees is a priority in rural areas where such committees exist, while mass media campaigns can accompany and complement this and reach also inhabitants of Bishkek and other large urban centers.

- **Recommendation #2.** Provide information to the population about medication options including the effectiveness and costs of brand name drugs versus generics in an effort to reduce reliance on brand name blood pressure medication which is not affordable to the majority of the population on a regular basis.

- **Recommendation #3**. Continue to explore and refine individual and population based strategies for hypertension control in increasing awareness, improving adherence to treatment, and increasing the use of generics.

- **Recommendation #4**. Emphasize appropriate and inappropriate medication practices in medical training, continuous education programs, guidelines, and quality improvement processes. . Include in these training programs the need to prescribe generic drugs in order to increase compliance. This would contribute to reducing the rate of patients being misinformed to take their antihypertensives only at the time of a hypertensive crisis.

- **Recommendation #5**. Conduct a study on the demand for generics versus brand name hypertension medication and the impact of medication choice on the continuity of treatment. This study could lead to a more in-depth understanding of prescription, dispensing and consumption patterns.