



# Irrational Use of Drugs, Healthcare Level and Healthcare Expenditure in Bangladesh

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**Abstract:** The health sector of Bangladesh registered a significant improvement since the independence of Bangladesh in 1971. Life expectancy at birth which is one of the indicators of economic development increases to 70.65 years in 2014 from 46.88 years in 1972. Nevertheless, misuse of drugs is a common phenomenon in Bangladesh. This study is an attempt to investigate irrational use of drugs, health care level and healthcare expenditure in Bangladesh. The study uses simulated patients and they behaved like ordinary patients when they visited the doctors and collected prescriptions from them. The study finds that there exists a high rate of incorrect diagnosis and inappropriate prescription of drug(s) considering that 82.2% of patients were given more than 2 drugs and 71.2% patients were prescribed antibiotics drug. The rate indeed is very high especially when we consider the fact that the patients were simulated ones with good health. They just pretended being sick. In case of taking physical examination of patients, the situation is worse though the situation at sub-district levels and Dhaka urban area is much better than that in public hospitals. Study finds that cost of drugs per prescription is highest at sub-district level being TK. 301.81 and lowest at Dhaka urban area being TK. 265.20. In public hospital the cost is TK. 232.97 which appears higher than one would expect. All of these impose unnecessary costs on the patients' healthcare expenditure, increase indebtedness due to income loss, and even employment. Thus, the illness and its related caring expenditures and consequent impacts can severely disrupt living standards. The national policies should emphasize the poverty reduction strategies through improved healthcare status of the country which will ultimately contribute to sustainable development.

**Keywords:** Drugs, Misuse, Healthcare, Healthcare Expenditure, Life Expectancy

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## 1. Introduction

Bangladesh is now a lower-middle income country with the Gross National Income per capita (WB) [1] and the per capita income in the country is US\$ \$1,314 which is around 15 times higher than what it was in 1972 (BBS) [2]. Due to increased income and living standard of common people, awareness about the importance of a healthy life increases significantly and thus the demand for medical services among cross section of population has increased. Further, people in general appear to be more health-conscious. Good health, however, makes a labor effective and productive; and a labor is an important factor of production thus economic development. A large number of them are engaged in wage employment in formal and informal sectors and also a good number of them are self-employed in various income generating activities both in urban and rural areas. They

generally do not like to remain absent from work due to illness and so loose income. Further, aspiration for living a long and healthy life is very common among cross section of population. So they visit doctors for treatment when they fall sick. As majority of them have small families and they want to replace quantity for quality of their children, they also take care of their children's health and visit doctors as the children fall ill.

On the supply side too, there has been a very significant improvement in the access of the general people to medical services both in urban and rural areas. There are now more public and private hospitals and clinics. Besides, general-practitioner physicians are now available in urban cities and other rural townships. Further, the supply of medicines has considerably increased due to the expansion of pharmaceutical industry in the country. The sales promotion officers of the different pharmaceutical industries are reaching medicines to drug stores at different locations of the country. As a result,

medicines are easily accessible to patients.

People's knowledge about health problems has increased and changed their attitude and behavior towards seeking and using the available health services to address their health problems. This indeed is a commendable development. In Bangladesh, on the other hand, expenditures for healthcare constitute a large share of people's living financial plan [3, 4]. The healthcare expenditures are largely unpredictable and usually have a negative impact on the poor households, while large expenditures have catastrophic impacts on household welfare. The magnitude of this welfare loss will depend upon the living standards of that particular household. A well-off household can finance medical expenses from savings, or by reducing on luxury stuffs of consumption. However, a less well-off household is bound to cut back on daily necessities and could be placed into further shortage for living budgets [3]. However, there is a lot of room for improving the provision of medical services in the country. One area which needs special attention is the irrational use of drugs. It imposes unnecessary costs on the patients because treatment expenditures increase and raise the expenditures for overall healthcare service. Inappropriate use of drugs leads to the development of drug-resistant organisms which may result in the use of more toxic drugs. The patients infected with drug-resistant organisms may require hospitalization with longer hospital stay and may ultimately die [5]. Although consultations with doctors most commonly result in drugs being prescribed, very little is known about the proper use of drugs. The productivity and effectiveness of labor in an economy depend on the quality of health care whereas the quality of health care, particularly the rational use of drugs, depends on a wide range of activities, such as making the correct diagnosis, prescribing the appropriate drug(s), and dispensing them properly. When used rationally, drugs cure ailments; on the other hand, they may be dangerous and can threaten life when used irrationally.

However, in Bangladesh, appropriate attention has hardly been given to recognize the linkage between irrational use of drugs, healthcare provision and healthcare expenditure which could be the basis for the public investment policies on the condition of healthcare and living standard.

The objectives of this study are to (a) investigate irrational use of drugs in Bangladesh, (b) examine health care level in Bangladesh and (c) find out unnecessary healthcare expenditure in Bangladesh.

## 2. Literature Review

The irrational use of medicines is very severely in rural China in terms of high antibiotic use and injection use. Economic incentives and lack of continuous training to health care providers are main reasons [6]. [7] carried out a research in which patients in all age groups who have come to physicians with general diseases including respiratory tract disorders like cough, chest infections; urinary tract infections; fever; diarrhea; skin diseases were included. It was found that a total of 37.47% prescriptions contained

antibiotics. Especially the broad spectrum as well as new generation antibiotics was more frequently prescribed than older ones which definitely increases unnecessary cost of healthcare. [3, 4] found through normalized gap measure that additional healthcare expenditures incurred by poor households not only raise the poverty prevalence, but also increase the poverty intensity over time. This strongly provides the evidence that low health facilities and status of the population is a major factor for the persistence of poverty and it can be relieved by proper targeting and provisioning of public healthcare. It is evident that the poor are worse protected from healthcare burdens in Bangladesh. [8] If cough and cold medicines are consumed when such symptoms aren't present, they may affect the brain in ways very similar to illegal drugs. If it continues, feeling can lead to addiction—a chronic relapsing brain disease characterized by inability to stop using a drug despite damaging consequences to a person's life and health. It is clinically proved that almost all drugs have side effect at therapeutic level besides toxic effect. The unwanted side effect is referred to as adverse drug reaction (ADR). Hence inappropriate use of drugs does not refer to a good level of health care [9]. [10] found that lack of public knowledge about drug usage (45%), lack of appropriate cooperation and communication between physicians and pharmacists (39%), pharmacists' low tariff and economic issues (34%), and lack of supervisory regulations on pharmacy practice (15.8%) were important elements from pharmacists' viewpoint in occurrence of irrational drug use. [11] showed that inappropriate consumption of drugs is related to low socio-economic status, which is associated to low education levels. Researchers also found that poor socio-economic status is associated with irrational use of drugs in Hungary. One in five high school students in U.S. had taken a prescription drug without a doctor's prescription. The majority of these teenagers are obtaining the drugs from friends or relatives for free [12]. It is also found that new generation antibiotics were more frequently prescribed than older ones. [13] found that 20% patients were considered to receive inappropriate antibiotic therapy in Egypt. In India, antibiotics constitute 15.7% of the drug market (the largest therapy group) [14]. [15] found that China had a rapid growth rate of drug resistance. The annual growth rate was on average of 22% between 1994 and 2000 in China, while the rate was only 6% between 1999 and 2002 in the U.S. [16] showed that almost all physicians (93.5%) in Canada believed that educating parents about drugs and their implications would minimize the irrational use of drugs.

## 3. Methodology

### 3.1. Study Method

The present study is to investigate irrational use of medicine and health care level in Bangladesh. The study has been conducted using simulated student-patients. For doctors' visit and prescription collection, the undergraduate

students of Department of Economics, Southeast University were used as simulated patients. The students were in the age group of 18-22 years. They were healthy and did not suffer from any disease, they pretended being sick. Information was collected by simulated patients about the doctors using a pre-designed questionnaire. The simulated patients did not interview the doctors using the questionnaire; they filled in the questionnaire immediately after visiting the doctors based on their interaction with the doctors and their observation on the behavior of doctors. For example the doctors were not asked to report about their age; the simulated patients applied their judgments/guess and recorded doctors' age in the questionnaire. As a simulated patient visited a doctor, he informed the doctor about his health complaints in the way: "For the last two days, I've been feeling fatigued. I have a light fever, slight dizziness, a sore throat, and a poor appetite. This morning, the symptoms worsened, so I took my body temperature. It was 99°F." The simulated patients were also given the instruction that if the doctor asks about the following symptoms: dizziness, fever, throat-ache and poor appetite, patients should answer "yes"; if the doctor asks about a cough, simulated patients should answer "a little bit".

Very minor symptoms as mentioned above were purposely chosen so that it would be difficult for physicians to determine if the patient was infected or not and infections were viral or bacterial without further tests.

### 3.2. Sampling Method and Sample Size

In this study, public hospitals, private sector health care centers in sub districts and private sector health care centers in urban area (capital city-Dhaka) were randomly selected. Prescriptions were collected from doctors. 320 prescriptions were collected from doctors who were selected using simple random sampling method.

## 4. Definition of Terms

### 4.1. Simulated Patient

A simulated patient is a person who is not actually sick but acts as a patient for an audit study.

### 4.2. Irrational Use of Drugs

The World Health Organization defined that irrational use of drugs refers that patients do not receive medicines appropriate to their clinical needs, in doses that meet their own individual requirements, for an adequate period of time, and at the lowest cost to them and their community.

### 4.3. Sub-district

Sub-district is third tier government administrative units. They are also a kind of growth centers facilitating trade and commerce in the area of their jurisdiction. Average size of population in a sub-district is around 0.32 million.

### 4.4. Public Hospitals

These are funded and managed by the government. All public hospitals are attached to government medical colleges.

## 5. Findings and Discussion

### 5.1. Age, Gender and Educational Qualification of Doctors

As can be seen in Table-1, close to 55.90% of the 320 doctors visited by our simulated patients are relatively young belonging to age group 20 to 40 years. Only 10.6% are over age of 50 years.

Table 1. Age, gender and educational qualification of Doctors.

		Gender of the physician			Education of Physicians		
		Female	Male	Total	MBBS	MBBS plus postgraduate degree/fellowship	Total
Age of physician, Years	20-30	1 (0.30)	19 (5.90)	20 (6.20)	20 (6.25)	0 (0.00)	20 (6.25)
	31-40	16 (5.00)	143 (44.70)	159 (49.70)	140 (43.75)	19 (5.94)	159 (49.69)
	41-50	4 (1.20)	105 (32.80)	109 (34.10)	79 (24.69)	30 (9.38)	109 (34.06)
	>50	0 (0.00)	32 (10.00)	32 (10.00)	0 (0.00)	32 (10.00)	32 (10.00)
Total		21 (6.60)	299 (93.40)	320 (100)	239 (74.69)	81 (25.31)	320 (100)

Note: Figures in parenthesis show percentages.

Overwhelming majority of doctors are male being 93.4% which reveals that the practicing doctors are predominantly male. Among the doctors visited, 74.69% are with MBBS degree while 25.31% have MBBS plus postgraduate degree/fellowship. This indicates that the majority of doctors do not have specialized degrees.

### 5.2. Physical Examinations of Patients by Doctors

It is expected that patients will receive physical examination by doctors before they are prescribed medicine. Our study finds that in all locations, a good number of doctors did not do so (Table-2). It is likely that doctors will not be able to diagnose diseases correctly if they do not

physically examine patients which may result in inappropriate prescription of medicine. As is shown in the table, in public hospitals in majority of cases doctors did not

take temperature of patients, did not examine tonsil and did not use stethoscope. The situation is much better at sub-district levels and Dhaka urban area.

**Table 2.** Physical examination of patients by doctors.

Locations	Physical Examination (%)		
	Did not take temperature	Did not examine tonsil	Did not use stethoscope
Public hospitals	67.3 (52)	82.7 (52)	75.0 (52)
Sub-district	7.4 (68)	50.0 (68)	10.3 (68)
Dhaka urban area	17.5 (200)	31.5 (200)	14.0 (200)

Note: Figures in parenthesis show total number of patients.

Our observation suggests that the doctors in public hospitals had to attend a large number of patients and so they really did not find much time to examine each and every patient thoroughly. This may be explained by two factors - administrative and resource constraints. The process followed from the initial stage of registration to prescribing medicine at public hospitals appears outdated. The other constraint is a lack of resources (e.g., low doctor to patient ratio, underutilization of equipments). The doctors at sub-district and Dhaka urban area levels may not face such time

constraint; they can give physical examination to each and every patient if they want to.

### 5.3. Doctors' Enquiry and Examinations for Patients

Among the 320 visits by simulated patients, doctors did not take temperature in 23.4% cases (Table-3). This, as been mentioned earlier, is not expected. One wonders how a doctor can prescribe medicine to patients without taking temperature of patients!

**Table 3.** Doctors' enquiry and examinations.

Temperature examination		Use of stethoscope		Tonsil examination		Cough Symptoms	
Did not examine	Examined	Did not use	Used	Did not examine	Examined	Did not ask	Asked
23.4%	76.6%	23.1%	76.9%	43.8%	56.2%	22.5%	77.5%

A stethoscope is an instrument used by doctors for checking the breathing of heart, sounds of breathing etc of patients. A doctor is expected to use stethoscope before he prescribes medicine. As can be seen from Table-3, in 23.1% cases doctors did not use stethoscope. The study also finds that 43.8% patients were given drugs without examining patients' tonsil - a vital examination that is required for treating patients suffering from cold. Patients suffering from cold expect that doctors would enquire the patients about cough symptom before prescribing medicine. The present study finds that only 77.5% patients were asked about cough

symptom.

### 5.4. Providing Relevant Information to Patients

It is very important that patients are informed by doctors about diseases of patients and side effects of drugs prescribed. This study finds that about 49.4% of the patients were not informed about the side effects even after they asked for information, 22.8% were informed without being asked (self-initiative) and 27.8% were informed when asked by the patients (Table-4).

**Table 4.** Providing relevant information to patients.

Information about side effects			Explanation about disease		Advice after prescription	
Did not inform even after asked	Informed when asked	Informed without being asked	Did not explain	Explained	Did not advise	Advised
49.4%	27.8%	22.8%	37.5%	62.5%	36.6%	63.4%

Patients generally expect that doctors would tell them about the type of diseases they are suffering from. In fact it is a right of patients to know about his disease. Our study finds that 62.5% of doctors explained the nature of disease to patients while 37.5% doctors did not explain. Patients expect that doctors would take some time to give them some advice of general nature so that they recover quickly. This is very important because this increases effectiveness of medicine. Result shows that, majority of the patients (63.4%) received such advice.

### 5.5. Number of Drugs Prescribed by Doctors

As is shown in Table-5, only 0.3% of prescriptions did not contain any drug, while 41.3% of patients were given more than 3 drugs and 82.2% of patients were given more than 2 drugs (Table-5). Across locations, more than 3 drugs were prescribed to 47.5% patients at Dhaka urban area levels, the corresponding figures for sub-district level is 45.6% and for public hospitals 11.5% respectively (Table-6). We may recall that our patients are simulated ones-they are not real patients. And so they did not require any medicine.

**Table 5.** Total number of drugs prescribed by doctors.

Number of drugs	Number of doctors	Percent
None	1	.3
1	11	3.4
2	45	14.1
3	131	40.9
>3	132	41.3
Total	320	100.0

**Table 6.** Total number of drugs prescribed in different locations.

Locations	Number of drugs prescribed				None	Total
	1	2	3	>3		
Public hospitals	8 (15.4)	18 (34.6)	19 (36.5)	6 (11.5)	1 (1.9)	52 (100)
Sub-district	0 (0.0)	3 (4.4)	34 (50)	31 (45.6)	0 (0.0)	68 (100)
Dhaka urban area	3 (1.5)	24 (12)	78 (39)	95 (47.5)	0 (0.0)	200 (100)
Total	11 (3.4)	45 (14.1)	131 (40.9)	132 (41.3)	1 (0.3)	320 (100)

Note: Figures in parenthesis show percentages.

**5.6. Rate of Antibiotic Prescription**

As Table-7 reveals that of the 320 prescriptions collected by our simulated patients, 71.2% contained antibiotics drug. The rate indeed is very high especially when we consider the fact that the patients were simulated ones with good health. They just pretended being sick.

Among the three locations, the incidence of antibiotics prescriptions appears highest, being 91.2% at sub-district level followed by Dhaka urban area being 74.5%. The rate of antibiotics prescription appears lowest at public hospitals being 32.7%. None of our simulated patients asked for antibiotics nor they had any symptoms of bacterial infections. Doctors themselves prescribed antibiotics. The doctors at public hospitals levels appear less influenced by supply side factors to prescribe antibiotics than those at Dhaka urban area and sub-district levels. In fact, public hospital doctors generally do not have the usual incentives for prescribing antibiotics- they use public hospital offices as their chambers, drugs including antibiotics are supplied free of costs to patients, and pharmaceutical companies may not find it much rewarding- to give them gifts to influence their decisions to prescribe antibiotics to patients. The hospital authorities buy drugs including low cost antibiotics of generally older generations.

**Table 7.** Rate of antibiotics prescriptions.

Locations	Did not prescribe	Prescribed	Total
Public hospitals	35 (67.3)	17 (32.7)	52 (100)
Sub-district	6 (8.8)	62 (91.2)	68 (100)
Dhaka urban area	51 (25.5)	149 (74.5)	200 (100)
Total	92 (28.8)	228 (71.2)	320 (100)

Note: Figures in parenthesis show percentages.

To see whether there is a significant effect of location of doctors on prescription of antibiotics or not, ANOVA has been carried out.

**Table 8.** ANOVA.

Prescribed antibiotic rate	Sum of Squares	df	Mean Square	F	Sig.
Within Groups	54.908	317	173		
Total	65.550	319			

The result is statistically significant and there is a significant effect of location of doctors on prescription of antibiotics (F = 30.72, p=.000). In other words, the prescription of antibiotics is statistically significantly different from one place to another.

The supply side factors seem to work very strongly at sub-district level where doctors work in more relaxed environment and treat generally the less informed and less aware patients. At the Dhaka urban area level too, supply side factor appears to influence the doctors’ decision to prescribe antibiotics to patients.

**5.7. Costs per Prescription**

Antibiotics generally are more expensive than other medicines. The present study made an attempt to find the cost of total drugs including antibiotics per prescription. As table-9 shows that cost of drugs per prescription is highest at sub-district level being TK. 464.72 and lowest at public hospitals being TK. 146.04. In Dhaka urban area the cost is TK. 316.68 which appears higher than one would expect. It imposes unnecessary costs on the patients because treatment expenditures increase and raise the costs of overall health care service.

Table 9. Cost per prescription.

Locations	Range (tk.)	Average cost (tk.)
Public hospitals	07 - 846	146.04
Sub-district	27 - 1285	464.72
Dhaka urban area	07 - 1863	316.68

To see whether there is a significant effect of location of doctors on cost of drugs in prescriptions or not, ANOVA has been carried out.

Table 10. ANOVA.

Prescribed antibiotic rate	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2999997.017	2	1499998.509	23.008	.000
Within Groups	2.067E7	317	65194.958		
Total	2.367E7	319			

The result is statistically significant and it refers that there is a significant difference among any of the means of drug costs at different locations (Table-10). There is a significant effect of location of doctors on cost of drugs in prescriptions ( $F = 23$ ,  $p=.000$ ). In other words, the costs of drugs in prescriptions are statistically significantly different from one place to another.

To find out which means are significantly different from which other means, Tukey's post-hoc tests, which are like a series of t-tests and are more stringent than the regular t-tests, have been considered.

The following table-11 shows mean differences among locations. These mean differences are statistically significant.

Table 11. Tukey's post-hoc test.

Total cost of prescription Tukey HSD		Post Hoc				
(I) Location of doctor	(J) Location of doctor	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Public hospitals	Sub-district	-318.682*	47.037	.000	-429.44	-207.92
	Dhaka urban area	-170.645*	39.746	.000	-264.24	-77.05
Sub-district	Public hospitals	318.682*	47.037	.000	207.92	429.44
	Dhaka urban area	148.037*	35.843	.000	63.63	232.44
Dhaka urban area	Public hospitals	170.645*	39.746	.000	77.05	264.24
	Sub-district	-148.037*	35.843	.000	-232.44	-63.63

\*The mean difference is significant at the 0.05 level.

In other words, this study indicates that doctors in public hospitals prescribe significantly less costly drugs. Doctors in Dhaka urban area prescribe significantly more costly drugs than those in public hospitals and doctors in sub-district area prescribe the most costly drugs than those in other locations.

## 6. Conclusion

Based on the above findings and the discussions made earlier, the study concludes that there exists a high rate of incorrect diagnosis and inappropriate prescription of drug(s) considering that 82.2% of patients were given more than 2 drugs and 71.2% patients were prescribed antibiotics drug. The rate indeed is very high especially when we consider the fact that the patients were simulated ones with good health. They just pretended being sick. The currently prevailing very high rate of inappropriate prescription of drugs including antibiotics in Bangladesh is undesirable and is not acceptable. Inappropriate use of drugs leads to the development of drug-resistant organisms which may result in the use of more toxic drugs. The patients infected with drug-resistant organisms may require hospitalization with longer hospital stay and may ultimately die. Rate of inappropriate drugs prescription is

higher outside urban areas than that in urban areas. Doctors outside urban areas prescribe more costly drugs. In public hospitals, this rate of drugs prescription is the lowest. In fact, public hospital doctors generally do not have the usual incentives for prescribing antibiotics- they use public hospital offices as their chambers, drugs including antibiotics are supplied free of costs to patients, and pharmaceutical companies may not find it much rewarding to give them gifts to influence their decisions to prescribe antibiotics to patients. In case of taking physical examination of patients, the situation at sub-district levels and Dhaka urban area is much better than that in public hospitals. Study finds that cost of drugs per prescription is highest at sub-district level being TK. 301.81 and lowest at Dhaka urban area being TK. 265.20. In public hospital the cost is TK. 232.97 which appears higher than one would expect. All of these impose unnecessary costs on the patients' healthcare expenditure, increase indebtedness due to income loss, and even employment. Thus, the illness and its related caring expenditures and consequent impacts can severely disrupt living standards. On the other hand, most of the doctors explained the nature of disease to patients and gave them some advice of general nature so that they recover quickly.

## Recommendations

The national policies should emphasize the poverty reduction strategies through improved healthcare status of the country. This also calls for investment in the health sector as a continuing process and then the outcomes will contribute to sustainable development.

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