

Assessing the Availability, Service Quality, and Price of Essential Medicines in  
Private Pharmacies in Afghanistan

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University of Washington

**Abstract**

**Assessing the Availability, Service Quality, and Price of Essential Medicines in  
Private Pharmacies in Afghanistan**

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Chair of Supervisory Committee:

Professor Louis P. Garrison, Jr.

School of Pharmacy

**Background:**

Globally, medicines remain inaccessible and unaffordable in low and middle-income countries, where national medicines regulatory authorities are often weak. In Afghanistan, the Ministry of Public Health strives to develop pharmaceutical systems to ensure people's access to health care. However, the private pharmacy sector is largely uncontrolled, and its role is unknown in terms of guaranteeing accessibility, availability, and affordability of essential medicines.

**Objectives:**

The dissertation aimed to estimate the prevalence and types of private pharmacies—licensed and unlicensed—and to assess the relationships among pharmacy licensure status, the availability of essential medicines, pharmacy service quality, and essential medicine prices.

**Methods:**

A national-level, interview survey of 879 pharmacies was conducted to examine characteristics of private pharmacies in 10 representative provinces in Afghanistan and to obtain information of staff characteristics, licensure status, service quality, availability of essential medicines, and price. Regression models were estimated to assess relationships between the availability of

essential medicines as a proportion of a basket of 30 essential medicines, licensure status, service quality, and price of essential medicines.

#### Results:

Of 30 sampled essential medicines, national-level availability at private pharmacies was estimated to be 63.7%. In terms of licensure, 54.5% were licensed, 10.5% were unlicensed, and the rest unverifiable. There was a consistent trend to slightly lower availability in unlicensed pharmacies. In addition, associations between licensure status, service quality, and price were weak, despite considerable price variation.

#### Conclusion:

Private pharmacies have an important role to play in improving access to care by making essential medicines available for the population in need in Afghanistan. Licensure status does not explain the variations in the availability of essential medicines. Essential medicine prices showed considerable variability, indicating that that regulation is unsuccessful at controlling the price of essential medicines in the private market. The private licensure system as a regulatory intervention does not effectively guarantee the availability of essential medicines in Afghanistan. Further research is needed to identify the appropriate changes in regulatory policy to improve access to pharmacy services in terms of the availability and affordability of essential medicines.

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## Summary

### Background:

Despite the global efforts to improve access to essential medicines, the medicines remain inaccessible and unaffordable to the poor in low and middle-income countries (LMICs), where national medicines regulatory (MRA) authorities are often weak. In Afghanistan, the Ministry of Public Health (MoPH) strives to develop pharmaceutical systems to ensure people's access to health care. However, the private pharmacy sector is largely uncontrolled, and their role is unknown in terms of accessibility, availability and affordability of essential medicines.

### Objectives:

The dissertation aimed to estimate the prevalence and types of private pharmacies—licensed and unlicensed—and to assess the relationships among pharmacy licensure status, the availability of essential medicines, pharmacy service quality, and essential medicine prices in Afghanistan.

### Methods:

A national-level survey was conducted to examine characteristics of private pharmacies in 10 representative provinces in Afghanistan. The survey collected data from 879 pharmacy respondents using a structured interview questionnaire. The obtained information included staffing level, staff knowledge, licensure status, pharmacy service quality, availability of essential medicines, and price information. Regression models were developed to assess relationships between the availability of essential medicines as a proportion of a basket of essential medicines, the licensure status, pharmacy service-related variables and price of essential medicines.

## Results:

As a proportion of a basket of 30 essential medicines, national-level availability of essential medicines at private pharmacies was estimated to be 63.7%. Point prevalence of private pharmacies with licensure as a percentage of all private pharmacies was estimated to be 54.5%, private pharmacies with no licensure was 10.5% and those with unverifiable licensure was 35.0% in Afghanistan. However, the availability of essential medicines as a proportion of a basket of 30 pharmaceutical products was not significantly different between the licensed and unlicensed pharmacies though there was a consistent trend to slightly lower availability in unlicensed pharmacies. In addition, associations between licensure status and other factors that constitute pharmacy service quality were also less pronounced in this study. Considerable price variation of medicines sold at the licensed pharmacies indicates that the regulatory requirement to control the price does not function as intended in providing the population with financial access. Greater availability of essential medicines was significantly associated with number of medicines per prescription, number of years in business, and fewer supply chain constraints. The price of essential medicines was not significantly associated with the pharmacy service quality in Afghanistan.

## Conclusion:

Private pharmacies have an important role to play in improving access to care by making essential medicines available for the population in need in Afghanistan. However, the licensure status does not necessarily explain the difference in the availability of essential medicines, and the patients have access to only two-thirds of the essential medicines at the private pharmacies. Like many other LMICs, the medicine prices in Afghanistan showed considerable variability; the licensure status did not clearly indicate that regulation successfully controls the price of essential medicines on market. While the licensure system as a regulatory intervention does not effectively guarantee the availability of essential medicines in Afghanistan, further research is required to understand what other regulatory interventions are needed to improve access to pharmacy services in terms of the availability and affordability of essential medicines.

## **Introduction**

### **Background**

Although multiple initiatives including the United Nations' Millennium Development Goals strive to improve access to essential medicines in developing countries, little progress has been made during the past decade as essential medicines remain unavailable and unaffordable for many of the poor. For low-income nations, the World Health Organization (WHO) estimates that medicines are, on average, more available in the private sector than in the public sector, but that the prices are higher in the private sector. The growing numbers of private medicines dispensers in countries where national medicines authorities are weak may not only leave the population without adequate access to essential medications, but may also impede the development of effective public pharmaceutical systems to meet their needs. On the other hand, private pharmacies may help to fill the gap in access to essential medicines in health systems with weak public delivery systems.

### **Rationale**

Afghanistan is one of the poorest conflict-affected countries, and is defined by the World Bank as a "fragile state." Afghanistan has a weakly-regulated pharmaceutical sector. The Afghan Ministry of Public Health (MoPH) anecdotally reports that there are over 12,000 private pharmacies with an unknown number of them licensed by the MoPH. However, ministry officials are concerned that the vast majority of retail pharmacies used by patients are not sufficiently controlled by the Afghan Medicines Regulatory Authority (MRA). Steinhart et al. estimate that about one-third of the poor who sought care when ill chose a private clinic or private pharmacy [1]. Household out-of-pocket expenditures used for the private healthcare providers are considerable: 75% of the national health expenditures in Afghanistan are attributable to care obtained from the private sector [2]. Little is known about the extent to which the licensed private pharmacies and unlicensed private pharmacies are regulated by the MRA and how they operate in terms of availability of essential medicines or the quality of medicines and services provided. Therefore, a better understanding of the factors associated with availability and affordability of essential medicines at private pharmacies could help the MRA make better decisions as to what regulation and policy interventions are needed to improve access to essential medicines and services.

## **Overall Research Objective**

The overall objective of this research was to estimate the relative prevalence and types of private pharmacies—licensed and unlicensed—and to assess the relationships among pharmacy licensure status, the availability of essential medicines, pharmacy service quality, and essential medicine prices in Afghanistan.

## **Aims**

**Aim 1:** To estimate the availability of essential medicines sold at licensed and unlicensed private pharmacies in Afghanistan and examine its relationship with service quality, characteristics of the regulatory framework, market structure, and other factors.

*Primary hypothesis for Aim 1: The availability of essential medicines is higher in the licensed pharmacies as compared to unlicensed pharmacies, after controlling for the potential confounding factors.*

**Aim 2:** To assess the relationship between the price of essential medicines sold at licensed and unlicensed pharmacies and their service quality. This aim examines whether or not the lower price is associated with lower quality of service.

*Primary hypothesis for Aim 2 is that the price of medicines is higher at pharmacies that provide higher quality services as compared with those providing lower quality services.*

## **Study Implications**

This dissertation reports on new survey data and analysis to better understand the extent of the problems with access to essential medicines in a fragile state. This information should be valuable to the Afghan government and its public health department, whose medicines regulatory resources and efforts are limited in face of a significant number of unregulated private providers. The results should help to inform policy makers as to what specific regulations and policy interventions could help to make essential medicines more accessible and affordable in Afghanistan.

## **Introduction References**

[1] Steinhardt LC<sup>1</sup>, Waters H, Rao KD, Naeem AJ, Hansen P, Peters DH. The effect of wealth status on care seeking and health expenditures in Afghanistan. *Health Policy Plan.* 2009 Jan;24(1):1-17. doi: 10.1093/heapol/czn043. Epub 2008 Dec 5.

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## Chapter 1

# A Baseline Survey on the State of Access to Essential Medicines in Afghanistan: Background, Approach, and Key Findings

### Introduction

Although the United Nations' (UN) Millennium Development Goals (MDGs) strive to encourage countries to improve access to essential medicines in developing countries, little progress has been made during the past decade as essential medicines remain unavailable and unaffordable for many of the poor [1, 2]. The World Health Organization (WHO) estimates that generic medicines are available in only 38.1% of facilities in public sector in the surveyed developing countries, and, on average, cost 2.5 times more than the international reference price. In the private sector, those same medicines are available in 63.3% of facilities, but the cost, on average, is about 6 times higher than the international reference price [3, 4].

In recent decades, private retail outlets have become one of the major sources of medicines and pharmacy services for patients in developing countries [5, 6]. The retail market is still growing in those countries where medicines regulatory authorities are weak, continuing to leave the population with limited access to potentially life-saving medications, and to pose challenges to the development of effective pharmaceutical systems. On the other hand, in the short term, private pharmacies can help to fill the gap in weak public delivery systems.

### Background

#### 2013 Afghanistan Retail Pharmacy Survey (ARPS)

To ensure patient access to the essential medicines, the Afghan government developed the Medicines Law in 2003 [7]. The provisions under the Medicines Law articulate that: (1) only the licensed pharmacies can sell licensed medicines; (2) the manufacture, import, and supply medicines outside of the Licensed Drug List (LDL) is not allowed; and (3) physicians should not prescribe medicines to patients unless they are included in LDL. The LDL includes the medicines listed in the Essential Drug List (EDL), which specifies the medicines used at public health facilities [8, 9]. Approximately 30% of medicines listed in LDL are essential medicines. Although licensed pharmacy practices are obliged to sell only the licensed medicines, they may

not necessarily keep all medicines on the EDL in stock. However, the essential medicines selected for this survey were the highest priority essential medicines that the MRA anticipated should be made accessible to patients at any service points. Therefore, assessing the availability of these essential medicines will tell the MRA how well the regulations and guidelines were interpreted and practiced by the private sector particularly by licensed pharmacy practices.

If government regulations are enforced, when patients demand the essential medicines, the licensed pharmacy practices should at least breakeven financially on the sales of these medicines. Thus, licensed pharmacy practices are likely to make the important essential medicines available for patients. In contrast, unlicensed pharmacy practices are, by definition, free from these regulations and thus are likely to make choices of medicines for sale depending on the profit margin of medicines, other things being equal. When licensed pharmacy practices and unlicensed pharmacy practice coexist in market and could compete for the same essential medicine sales, unlicensed pharmacy practice may shy away from the sale of essential medicines, which licensed pharmacy practices are obliged to sell under the set profit cap. Or, since pharmaceutical manufacturers tend to consider the essential medicines not profitable [10], the medicines may become less available in market, the cost of obtaining them by unlicensed pharmacy practices may outweigh their potential profit, and thus unlicensed pharmacy practices may try not to sell the essential medicines. Either way, it is expected that the availability of essential medicines in unlicensed pharmacy practices should be lower than in licensed pharmacy practices.

#### Afghan Economic and Health Care Situation

Afghanistan is one of the poorest conflict-affected countries and has an estimated total population of 25 million, of whom 76.5% live in rural area [11]. Its economy is highly dependent on international aid, which mainly supports the services sector while the vast majority of population is engaged in agriculture [12]. Total expenditures on health are about 8% of the real Gross Domestic Product (GDP); however, the government's financial contribution to total health expenditure accounts for 5.6% while 73.6% is borne by private sources and the rest comprises of direct funding of donors [13].

In 2002 after the fall of Taliban regime, to respond to the imminent and pressing needs of population for basic health services, the Afghan Ministry of Public Health (MoPH) and its global partners initiated the contracting-out of health services to non-governmental organizations (NGOs). As a result of this explicit policy priority and of coordinated and increased investment

by donors in these priorities, coverage of public healthcare has increased to 85% of the population over the last decade [14-16]. In 2002, the WHO performed an assessment of the Afghan pharmaceutical sector that called for global attention to the deteriorating pharmaceutical situation in the country [17]. In 2005, the UK Department for International Development (DfID) assessed the opportunities and risks that existed in the Afghan pharmaceutical market [18]. They found that (a) the private sector accounted for between 70-80% of the national pharmaceutical consumption, (b) total market size may have been worth up to USD 200 million per year, and (c) unlicensed imports of medicines appeared to be pervasive and the magnitude of problem was large despite the regulatory efforts of the MoPH.

In 2007-2008, the European Union conducted a comprehensive investigation of the Afghan pharmaceutical sector and concluded that the sector “operates in a chaotic fashion and suffers from many weaknesses that cover the entire spectrum of sector activities.” [19]. A study conducted by the United States Aid for International Development (USAID) in 2009 examined the extent to which the private health sector plays its role in Afghanistan’s health service systems through in-depth case studies in five representative provinces [20]. Despite some methodological limitations, the study contributed to our understanding by describing some basic characteristics of the private healthcare providers and the households’ utilization of their services including the findings that a large proportion of the interviewed households visited private providers for care, and a large proportion of interviewed pharmacy operators claimed to have had formal training.

#### The Afghan Medicines Regulatory System

In 2011, Yusuf et al. provided a holistic view of the pharmacy regulatory situation in Afghanistan [21], including that: (a) there are 13 manufacturers who produce finished dosage forms; (b) the medicines are brought in by about 900 traders, importers, and wholesalers to the country from India, Iran, China, Europe and various other countries; (c) the distribution of medicines is dealt with by intermediaries including wholesalers with or without a license from the MoPH; (d) medicines are sold to patients by either private outlets or wholesalers; and (e) the number of MoPH registered pharmacies amounts to 11,720. Yusuf et al. also pointed out that the government provides little regulatory services of internationally acceptable standards in registering medicines and licensing the pharmaceutical business entities. The report concluded that “(t)here is weak capacity for existing medicines regulation and control for both public and private sectors, and no functional medicine regulatory authority in the country”.

The Afghan Medicines Law and Regulations of Private Pharmacy specify the conditions and standards for licensure of retail outlets. The specifications include requirements for the presence of a pharmacist or pharmacy assistant, the amount of the license fee, the obligation to keep licensed medicines in stock, physical structure requirements, recording requirements, storage and waste management of medicines, and a limited price mark-up of 15% of wholesale price [7][22]. In addition, the National Medicine Policy provides the broad policy directions to improve the performance of the pharmaceutical sector although it lacks strategies to develop the national regulatory framework [23].

The medicines regulatory authorities and functions are dispersed among several entities within the MoPH. For example, by regulation, licensure of the outlets is solely held by the General Directorate of Pharmaceutical Affairs (GDPA); however, the actual inspection of retail pharmacy outlets is carried out by several other MoPH departments on the ground. As is the case in other sectors in Afghanistan [24], it is reasonable to assume that some “malversation”, i.e., informal side payments to public officials, is potentially present in the inspection. In addition, MoPH information about retail outlets is patchy and unreliable. Along with paucity of professional human resources and lack of physical infrastructure needed for the MoPH to function, the sector generally fails to enforce the existing laws and regulations.

The three major outlets from which patients obtain medicines in the pharmaceutical market are the public healthcare facilities (PHFs), licensed private pharmacies and unlicensed private pharmacies. Interactions among them can exist at all layers of the supply chain where a large number of intermediaries operate [18][25]. Under this uncontrolled and nontransparent market structure, private facilities have a large share of the provision of health services [23][26, 27]. In addition, a recent study reveals that the household out-of-pocket expenditure constitutes 76% of total health expenditures [13]. Understanding the growing numbers of private outlets and their characteristics should help the government to design effective policy interventions to improve patient access to essential medicines.

### **Conceptual Framework**

Based on previous studies that have explored factors associated with medicines, pharmacy services, supply chain, and regulatory systems, we developed the conceptual framework

depicted in Figure 1. This conceptual framework informed the selection of potential variables for inclusion in the statistical methods.

Goel and his colleagues (1996) developed a conceptual framework to explore effective policy interventions to improve retail pharmacies' behavior in developing countries [6]. Their framework proposed regulatory factors that may affect the pharmacy's behavior including number and types of products available in the private sector, staff education requirements, freedom to substitute, requirements for providing information, and control of profit margins. However, evidence to support effectiveness of regulatory interventions in developing countries appears to be inconclusive as far as private pharmacy practice is concerned [28-30]. Smith (2009) reviewed the interventions to improve private pharmacies' role in varying low- and middle-income countries (LMICs) with an emphasis on educational interventions and regulatory interventions [31]. She emphasized that for further research efforts are needed to explore the underlying factors for successful interventions that enhance the value of private pharmacies in developing countries.

Our conceptual framework focuses on understanding the relationships among factors potentially involved in private pharmacy service-related quality. Borrowing the concepts of quality of medicines and good governance for medicines suggested by the WHO [32] [33], the conceptual framework attempts to relate the three major areas that may affect pharmacy service-related quality: the consumer/patient domain, the regulatory system, and the supply chain. In each area, key items and characteristics derived from the WHO documents are proposed for inclusion in the exploratory models.

## **Survey and Study Design**

### Overview

A national-level cross-sectional survey was conducted in 10 provinces selected from among the 34 provinces in Afghanistan. See Figure 1 for a map of Afghanistan, with the provinces selected highlighted. In the absence of a complete list of retail outlets, a sample of 800 pharmacy managers was randomly selected from existing MoPH lists of licensed pharmacy practices and unlicensed pharmacy practices augmented with local information on the estimated number of outlets that we obtained in each study site. The primary sampling unit (PSU) was the administrative division of the district under province and five outlet elements were interviewed per unit of PSU. In each province, the number of districts to be selected were determined in

accordance with the probability proportional to size (PPS) approach. A structured questionnaire was administered to the pharmacy managers, owners, or pharmacy operators who met the inclusion criteria and agreed to the oral informed consent. Approval was obtained from the institutional review boards of the MoPH and the Population Service International (Washington, DC). The survey began in March 2013 and was completed in April 2013. The study was contracted by the Strengthening Pharmaceutical System (SPS) program of Management Sciences for Health (MSH) in Afghanistan with financial support from USAID [34].

### Sampling Methods

To determine the proportions for sample allocation, two datasets were analyzed: the pharmacy human resource database of licensed pharmacy practices and unlicensed pharmacy practice developed by SPS/MSH and the list of retail outlets registered by the MoPH. While these datasets provide the global and some urban-rural distributions of public and private pharmacies across provinces and districts, neither alone meets the level of validity and detail required to constitute a sampling frame for the universe of licensed pharmacy practices and unlicensed pharmacy practices. Hence, the two datasets were merged to be used for a cluster-level sampling frame and to generate the proportions for allocating the retail outlets across provinces and between urban and rural districts in each province. Based on the allocated number of outlets, the number of PSUs in provinces was determined for both urban and rural districts. One hundred and sixty (160) districts were then randomly selected from the official list of districts of the Afghan Central Statistics Office [35].

To develop the sampling frame for each cluster in a province, the full listings of landmark locations in the districts were developed using the best available local knowledge and information. We believed this was the best alternative sampling frame in the absence of full listing and addresses of outlets. In order for the listing to be exhaustive enough to sufficiently capture the characteristics of a district, the prominent locations were defined to include mosques, bazars, schools, hospitals, hotels, public parks, shop streets, and clusters of clinics and pharmacies. The listing of landmark locations and prominent buildings in district developed by the survey team and local experts allowed the survey to strike a reasonable balance between the data quality and survey efficiency. Two independent sub-national authorities responsible for inspection of retail outlets were interviewed to obtain the estimated number of retails in each location: the Provincial Public Health Directorate and Provincial Rules and Regulations Directorate. When the estimates from two sources differed for one location, the average of two

numbers was used. These estimates were used both for calculation of the selection probabilities and sampling interval of outlets in each location. Once the listing was complete and the starting point in each location was specified, the prominent locations were selected at random and the survey interviewers implemented a random walk by spinning a pen at the starting point of the landmark location and visit outlets in the direction pointed by the pen until the end of the district. When the selected district had fewer than five retail outlets particularly in rural area, an additional district was randomly chosen for inclusion of the study.

### Study Population

The survey respondents were private pharmacy managers, owners, or operators selected from the districts. Any outlet that had a sign outside with any of the following names, i.e., pharmacies in the local languages—*Dawaakhaana*, *Darmaltun*, or *Darukhaana*, was considered as private pharmacy. Once they verbally agreed to the survey informed consent statement, pharmacy managers, owners, or operators who were older than or equal to 18 years of age and who had completed at least 9<sup>th</sup> grade of education, which is indicative of being literate in Afghanistan, were interviewed using the structured questionnaire. The outlets and respondents that did not meet these criteria were excluded from the study.

### Study Sites

Ten provinces of the 34 Afghan provinces were selected in order to obtain the national representative data of retail outlets in Afghanistan. These were: Kabul, Nangarhar, Bamyan, Khost, Badakhshan, Kunduz, Balkh, Kandahar, Faryab and Herat (see Appendix A for a map). These provinces represent the diversity of the geographic, demographic and socio-economic characteristics of the country. They included 52.2% of the estimated total population of about 25 million [35]. To capture inter- and intra-provincial variability of retail outlets, we included the provinces with major commercial cities where a greater number of the registered outlets are known to operate and also the provinces that have a less number of registered outlets: the estimated number of private outlets in these provinces share more than 60% of total number of licensed pharmacy practices and unlicensed pharmacy practice that are anecdotally known to the MoPH.

### Sample Size

The minimum number of respondents needed for the survey data analysis was 630 pharmacies. Factors considered for the sample size calculations were:

- Anticipated percentage of unlicensed private pharmacies: 40%
- Required confidence level (cl): 95%
- Required confidence interval (ci): <6% [to detect a difference of >12% in key outcome variables when compared against the comparator group]
- Design effect: 2
- Non-respondent: 20%

The formula used to calculate the sample size is given below.

$$n = \frac{Deff \times \left( Z_{1-\alpha} \sqrt{2P(1-P)} + Z_{1-\beta} \sqrt{P_1(1-P_1) + P_2(1-P_2)} \right)^2}{(P_1 - P_2)^2}$$

where: n is the desired sample size for the survey,  $P_1$  is the estimated value of the key outcome variable in reference group,  $P_2$  is the expected value of the key outcome variable in comparator group,  $P=(P_1+P_2)/2$ ,  $Z_{1-\alpha}$  is the standard normal ( $1-\alpha$ ) quintile corresponding to a type I error with one-sided test,  $Z_{1-\beta}$  is the standard normal ( $1-\beta$ ) quintile corresponding to the power of the test, and “*Deff*” is the design effect for cluster sampling. As described in subsequent section, proposed non-respondent rate may be an underestimate. To be conservative, 879 pharmacies were included in the study analyses, allowing for greater than 65% non-response rate.

### Measurement of Variables

#### *Service Quality of Private Pharmacies*

The pharmacy outlets’ service quality was measured against the government standards used for private pharmacies. The variables were obtained by respondent self-report and direct observations made by the interviewers using the structured questionnaire. The MoPH standards are derived from the relevant law and regulations [7][22]. These variables included: the location of outlets, information about human resources (i.e., staff qualification, staffing level), business hours, physical structure, power supply, cleanliness, storage of medicines, functional refrigerator, quality of medicines, record keeping, dispensing practice, and knowledge of the first-line pharmacological treatment for diseases of national priority. The variables to be selected independently for analysis are listed in Table 1.

To avoid potential bias induced by the questions related to the licensing and inspection, these questions were administered towards the end of the survey questionnaire. Medicines’ quality was also examined by physical inspection of labeling and packaging using the International Pharmaceutical Federation (FIP)/WHO method modified for this study [36]. The outcome and

explanatory variables are listed and sample size calculation presented for each outcome variable is described in Appendices B and C, respectively.

### *Availability and Price*

Information about availability of essential medicines was collected using the same questionnaire. Availability was defined using the WHO and Health Action International (HAI) method as the proportion of medicine outlets in which a specific medicine was found on the date of data collection [37]. In order for our findings to be comparable to the results of global comparators, only the exact same form and strength of the essential medicines as listed in Table 2 was considered available when found at the visited outlet. In addition to the WHO/HAI definition, the medicines selected for inclusion under the study were grouped into major therapeutic classification and programmatic areas, and considered as a composite indicator to measure the availability. Considering the disease patterns in Afghanistan, these groupings included anti-bacterials, medicines for diarrheal diseases, and reproductive health.

Thirty essential medicines to be examined were selected in collaboration with the General Directorate of Pharmaceutical Affairs (GDPA) of MoPH and SPS/MSH based on the EDL and LDL and Afghanistan's priority disease conditions. Of the selected 30 medicines, 43% (13) were products for infectious diseases, 20% (6) were reproductive health-related products, and the rest included products for respiratory system, analgesics, and dermatological preparations (Table 2). Appendix D lists the medicines by the Anatomical Therapeutic Chemical (ATC) classification and clinical indications.

To understand the variability in medicines' price and their financial implications, the lowest price of the selected essential medicines was elicited from the respondents. To address the potential bias in eliciting price information from respondents, the survey interviewers who were trained on how to administer the questionnaire reiterated the use of the information and other intangible benefits the respondent may get from the study before the questionnaire was administered.

### Study Instrument

A structured questionnaire was developed for the study and was administered via interview to assess the outlet's registration status and service quality with respect to the staffing, knowledge, storage condition, dispensing, supply chain, waste management, and infrastructure.

Additionally, questions related to availability and price of medicines were included in the questionnaire. The questionnaire was translated from English into local languages (i.e., Dari and Pashto) and back-translated to English as a validity check. The questionnaire was pre-tested in the selected outlets in Kabul City and was modified as necessary. The full questionnaire is included in Appendix E

## **Key Findings**

Key findings from the baseline analyses of the ARPS have been documented in two project reports [38, 39] available from MSH, the organization with overall responsibility for the ARPS. For purposes here, some key findings in relation to the aims of this dissertation should be noted. The values presented below are descriptive counts and differ than the estimates described in the following chapters of this dissertation, which adjust for complex sampling features:

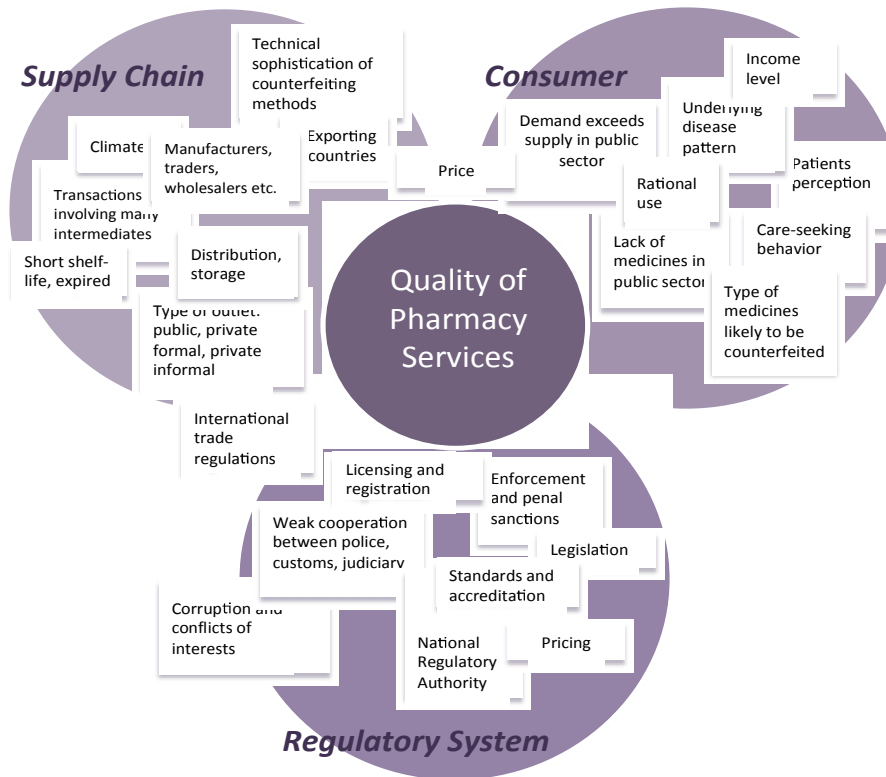
- The vast majority (95%, n=837) of Afghan pharmacies claimed to be licensed, though only 60% (n=499) could produce a license during the interviews.
- In terms of 15 structural facility features, about one-third had at least one negative characteristic, but two thirds (68%) did not exhibit any negative characteristics.
- Approximately 85% (n=748) did not have a working refrigerator although 65% (n=488) sold medicines needed refrigeration.
- All pharmacies carry at least one medicine for a pre-specified list of 30 EDL medicines used in our availability measure.
- On average, about 19 of the 30 pre-specified essential drugs were available.
- There was wide variation in retail prices for the same medicine across different pharmacies: the highest to lowest price ratios varied from 4.0 for chloramphenicol tablets to 45 for condoms.

The focus of this dissertation was on the role of private pharmacies in addressing the problem of access to essential medicines in Afghanistan. A key finding was that the prevalence of unlicensed private pharmacies was much lower than was anticipated in the study design. The study was designed assuming a proportion of unlicensed private pharmacies of about 40% based on previous studies implemented in other LMICs [40, 41]. The survey found that only about 10% of pharmacies were unlicensed. Furthermore, although 35% of respondents could not produce a licensure document, along all dimensions, they do appear to be quite similar to the

licensed pharmacies that could produce a document. Overall, the survey found that, on average, unlicensed pharmacies stocked 59.6% of the 30 essential medicines, but the remaining licensed pharmacies average only about 64%. The private sector in Afghanistan appears to fall far short of meeting government regulations on access to medicines and most likely is not meeting the shortfalls in public sector provision.

## Chapter 1 Figures and Tables

**Figure 1: Conceptual framework of quality of pharmacy services**



**Table 1: Summary of study measurement**

| Variable   | Format      | Data source   |
|--|-------------|---------------|
| Aim 1: To estimate the availability of essential medicines sold at licensed private pharmacies and unlicensed private pharmacies and examine the relationship between availability and licensing status. |             |               |
| Exposure   |             |               |
| Licensing status (yes/no)  | Categorical | Questionnaire |
| Covariate  |             |               |
| Inspection in the last year (yes/no)   | Categorical | Questionnaire |
| Location, urban/ rural   | Continuous  | Questionnaire |
| Number of pharmacies in proximity (number)   | Continuous  | Questionnaire |
| Quality of medicine (standard/substandard)   | Categorical | Questionnaire |
| Presence of pharmacist at time of visit (yes/no)   | Categorical | Questionnaire |
| Frequency of prescriptions (number in the last 10 dispensing episodes)   | Continuous  | Questionnaire |
| Number of suppliers (number)   | Continuous  | Questionnaire |
| Number of years in business (number)   | Continuous  | Questionnaire |
| Outcome  |             |               |
| Availability (yes/no)  | Categorical | Questionnaire |
| Aim 2: To assess the relationship between the price of essential medicines sold at pharmacy outlets and the quality of pharmacy services.  |             |               |
| Exposure   |             |               |
| Presence of pharmacist at time of visit (yes/no)   | Categorical | Questionnaire |
| Storage condition of medicines (standard/substandard)  | Categorical | Questionnaire |
| Systematic stock arrangement (yes/no)  | Categorical | Questionnaire |
| Use of refrigerator (yes/no)   | Continuous  | Questionnaire |
| Record Keeping (yes/no)  | Categorical | Questionnaire |
| Dispensing practice (standard/substandard)   | Categorical | Questionnaire |
| Knowledge (yes/no)   | Continuous  | Questionnaire |
| Cleanliness (standard/substandard)   | Categorical | Questionnaire |
| Sales of licensed medicine (yes/no)  | Categorical | Questionnaire |
| Quality of medicine (standard/substandard)   | Categorical | Questionnaire |
| Covariate  |             |               |
| Inspection in the last year (yes/no)   | Categorical | Questionnaire |
| Licensing status (yes/no)  | Categorical | Questionnaire |
| Location, urban/ rural   | Continuous  | Questionnaire |
| Number of pharmacies in proximity (number)   | Continuous  | Questionnaire |
| Frequency of prescriptions (number in the last 10 dispensing episodes)   | Continuous  | Questionnaire |
| Number of suppliers (number)   | Continuous  | Questionnaire |
| Number of years in business (number)   | Continuous  | Questionnaire |
| Outcome  |             |               |
| Price of selected essential medicine (number)  | Continuous  | Questionnaire |

**Table 2: Medicines selected for survey**

| #  | Name of product                  | Unit    | #  | Name of product                             | Unit   |
|----|----------------------------------|---------|----|---|--------|
| 1  | Tetracycline eye ointment        | Tube    | 16 | Mebendazole 100mg                           | Tablet |
| 2  | Chloramphenicol 250mg            | Capsule | 17 | Salbutamol injection                        | Ampule |
| 3  | Amoxicillin 250mg/5ml suspension | Bottle  | 18 | Aminophylline 100mg                         | Tablet |
| 4  | Amoxicillin 500mg                | Capsule | 19 | Magnesium trisilicate +aluminium hydroxide  | Tablet |
| 5  | Ampicillin 500mg injection       | Vial    | 20 | ORS packets                                 | Pack   |
| 6  | Cotrimoxazole 480mg              | Tablet  | 21 | Zinc sulfate, dispersible tablets           | Tablet |
| 7  | Gentamycin 80mg injection        | Ampule  | 22 | Iron & folic acid (any strength)            | Tablet |
| 8  | Ciprofloxacin 250mg              | Tablet  | 23 | Ringer lactate                              | Bag    |
| 9  | Ibuprofen 200mg                  | Tablet  | 24 | Gentian violet crystals                     | Bottle |
| 10 | Paracetamol 120mg/5ml suspension | Bottle  | 25 | Chlorhexidine w/wo cetrimide, solution      | Bottle |
| 11 | Paracetamol 500mg                | Tablet  | 26 | Condom                                      | Piece  |
| 12 | Diazepam 5mg/ml injection        | Ampule  | 27 | Ethinylestradiol +Norgestrel (Combination)  | Cycle  |
| 13 | Metronidazole 200(or 250) mg     | Tablet  | 28 | Medroxyprogesterone acetate 150mg injection | Vial   |
| 14 | Chloroquine 150mg                | Tablet  | 29 | Norgestrel (Progesterone Only Pill: POP)    | Cycle  |
| 15 | Chloroquine syrup (any strength) | Bottle  | 30 | Oxytocin injection                          | Ampule |

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## **Chapter 2**

### **Assessing the Availability and Affordability of Essential Medicines in Afghanistan**

#### **Introduction**

Although the United Nations' (UN) Millennium Development Goals (MDGs) strive to encourage low and middle-income countries (LMICs) to improve access to essential medicines, little progress has been made during the past decade as essential medicines remain unavailable and unaffordable for many of the poor [1, 2]. In 2012, the World Health Organization (WHO) reported on the availability and price of medicines using data from 53 surveys conducted between 2001 and 2008 in LMICs [3]. The analysis estimated that generic medicines were available in only 38.1% of surveyed public sector facilities and, on average, cost 2.5 times more than the international reference price [3]. In the same report, generic medicines were available in 63.3% of private sector facilities, but the cost, on average, was about 6 times higher than the international reference price [3, 4]. In recent decades, private retail pharmacies have become one of the major sources for medicines and pharmacy services for patients in LMICs [5, 6]. The retail market is still growing in countries where medicines regulatory authorities (MRAs) are weak, continuing not only to leave the population with limited access to essential medications, but also posing challenges for the development of effective pharmaceutical systems.

Afghanistan faces these same challenges and more. The availability of essential medicines through the private sector in Afghanistan is affected by the complex interaction between government regulation and market activity. Pharmacies can apply for and obtain licenses from the central government, but not all do so. Since 2007, the General Directorate of Pharmaceutical Affairs (GDPA) of Ministry of Public Health (MoPH) has been the sole authority for the licensure of private pharmacies. The GDPA licenses pharmacy business entities in accordance with the regulatory requirements pertaining to staffing level, location of business, and physical infrastructure. The GDPA also has the mandate to inspect private pharmacies under the provisions of law. Being licensed by the government entails an obligation to follow government regulations, including those pertaining to facility staffing, limits on price mark-ups, and availability of medicines. Unlicensed pharmacies, on the other hand, that are believed to be

pervasive, are not obliged to so. A Presidential Decree was issued in 2013 to alert civil society about the illegal operations of unlicensed healthcare providers, including pharmacies [7]. In response to the growing concern over the quality of medicines sold in the market and concern over illegal pharmacy operations, the GDPA has started paying more attention to unauthorized pharmacies.

The MoPH also has statutory authority to ensure the availability of essential medicines in the public health services. In Afghanistan, the vast majority of public health services are provided by the non-governmental organizations (NGOs) through a contracting-out mechanism, in which essential medicines to be used are clearly defined for a specific level of services, namely, the Basic Package of Health Services (BPHS) and Essential Package of Hospital Services (EPHS) [8-10]. Depending on the type of contract that the MoPH and NGO agree upon, these medicines can be sought in the local and/or international pharmaceutical market, though supply can be limited. Globally, essential medicines tend to be more available in private sector than in the public sector in low- and middle-income countries (LMICs) [3, 11]. This similar trend was also anecdotally reported in Afghanistan [12]. Therefore, Afghan private retail pharmacies may play an important role by increasing the availability of essential medicines to the public.

While there are several pharmacy chains operating in Afghanistan, their market composition in terms of percentage of the market is not known to the MoPH. In principle, a licensed pharmacy is subject to government regulations. These regulations include: 1) a requirement to keep in-stock the list of licensed medicines as specified in the Licensed Medicines List (LML); 2) a requirement that licensed pharmacies only sell the medicines listed on the LML, and 3) a requirement that prices be limited to a fixed mark-up of up to 15 percent over their acquisition cost [13]. The LML developed by the MoPH includes all of the approximately 470 different essential medicines [14].

Unlicensed private pharmacies, by definition, do not necessarily follow government regulations, including those that pertain to maintaining a supply of essential medicines. Nonetheless, unlicensed pharmacies may be somewhat responsive to market forces and may attempt to stock essential medicines that are most profitable and that meet the pharmaceutical needs of the communities they serve. Given licensing requirements, it is likely that essential medicines will be more available in licensed pharmacies as compared to unlicensed pharmacies.

In 2013, the MoPH and Strengthening Pharmaceutical Systems (SPS) program of Management Sciences for Health (MSH), with the support of United States Agency for International Development (USAID), conducted the Afghanistan Retail Pharmacy Survey 2013 (ARPS 2013) of licensed and unlicensed private pharmacies in order to establish a baseline for the specific areas that the SPS program would target for change, such as regulatory systems strengthening, supply chain improvement, human resource development, and use of evidence in pharmaceutical decisions; the survey also increases the knowledge base of the MoPH with respect to private pharmacy operations in the country [15,16]. The ARPS 2013 was contracted out by SPS to ACSOR-Surveys (ACSOR), which is a Kabul-based research company and subsidiary of D3 Systems, Inc., headquartered in the State of Virginia, USA. ARPS 2013 was financed by the Associate Award Program under the USAID.

This analysis of the ARPS data had two primary objectives: 1) to characterize differences in the availability of essential medicines in licensed versus unlicensed pharmacies, and 2) to identify factors that influence medicines availability in Afghanistan including licensure status and price.

## **Methods**

### Survey Aims

APRS 2013 was designed to deepen stakeholder understanding of the relationships between medicines regulatory measures and the availability of essential medicines in the retail medicines market in Afghanistan. APRS 2013 aimed to address three specific areas of policy interest for pharmacies in the private sector: 1) the availability, quality, and price of pharmaceutical products; 2) the level of pharmacy service quality; and 3) the prevalence of pharmacy licensure. Using a structured questionnaire developed by SPS, ACSOR conducted field interviews with most senior pharmacy workers across ten provinces of Afghanistan. Fieldwork for data collection took place between April 15, 2013 and May 4, 2013.

The principal author (NK) of this chapter served as a technical consultant to the SPS program and the ARPS 2013, providing a wide range of technical input throughout the course of survey that started in planning in November 2012. This technical input included extensive participation in the study design, survey tools development, development of training materials, sampling methodology and planning, monitoring of survey implementation, quality control, data analyses and report writing.

### Sample Size

The minimum number of respondents needed for the planned survey data analysis was 644 pharmacies. Factors considered for the sample size calculations included:

- Anticipated proportion of unlicensed private of all private pharmacies was estimated to be 40% based on previous studies with similar scope of work [17, 18].
- Confidence level was 95%.
- Margin of error was set to be less than 6% at the 95% confidence to detect a difference of >12% in key outcome variables when compared against the comparator group.
- Design effect was fixed at 2 after reviewing the studies with the similar objectives.
- Non-respondents were estimated to be 20% of a total of the visited pharmacies.

The following formula was used to calculate the sample size.

$$n = \frac{Def f \times \left( Z_{1-\alpha} \sqrt{2P(1-P)} + Z_{1-\beta} \sqrt{P_1(1-P_1) + P_2(1-P_2)} \right)^2}{(P_1 - P_2)^2}$$

where: n is the desired sample size for the survey,  $P_1$  is the estimated value of the key outcome variable in reference group,  $P_2$  is the expected value of the key outcome variable in comparator group,  $P=(P_1+P_2)/2$ ,  $Z_{1-\alpha}$  is the standard normal (1- $\alpha$ ) quintile corresponding to a type I error with one-sided test,  $Z_{1-\beta}$  is the standard normal (1- $\beta$ ) quintile corresponding to the power of the test, and “*Def f*” is the design effect for cluster sampling.

### Survey Design

Interviews were conducted in ten provinces in the country of Afghanistan: Kabul, Nangarhar, Khost, Kandahar, Herat, Badakhshan, Kunduz, Balkh, Faryab, and Bamyan (Figure 1). These ten provinces were systematically selected in consultation with the MoPH and GDPA. The rationale for their selection was that they are commercial hubs of domestic and imported commerce including pharmaceutical products, and they represent the geographical and ethnic diversity of the country.

A total of 203 geographical sampling points were chosen from within these ten provinces, based on the total number of licensed private pharmacies estimated by GDPA, and estimated

population by province and by district. A geographical sampling point is defined as a tract of a locally prominent location in district such as a bazaar, mosque, hospital or school, around which private pharmacy outlets are likely to operate. Geographical sampling points in a district were determined by using local informants. Population estimates from the Central Statistics Office's Yearbook 2012 were used as reference [19]. Table 1 shows total number of pharmacies by province included in the study.

### Sampling and Data Collection

Geographical sampling points were distributed at random in districts within provinces. Locations were defined as rural if the sampling point was neither in metropolitan Kabul nor in a provincial capital. The neighborhoods (known as "*nahia*" in Dari, which is one of Afghanistan's official languages) within cities were selected randomly: districts were selected by listing them in alphabetical order and implementing systematic sampling using a list of districts in each province based on the intervals calculated by the number of sampling points divided by the number of *nahia*. Supervisors selected a random entry on the list of *nahia* for a starting point and then rotated the interval over the list. This procedure was repeated for neighborhoods within *nahia* [20].

Upon arriving at the location of a geographical sampling point, the surveyors started walking to their right to identify and interview the first pharmacy, and then skipped the next immediate pharmacy after finishing the interview, and selected the third one for the second interview. Using the best available local knowledge, surveyors were allowed to change the starting point if pharmacies in the designated *nahia* or district center were known to be concentrated in another part of the coverage area. After selecting a pharmacy, interviewers were instructed to identify the most senior employee working at the pharmacy at the time of the visit, who was over the age of 18 years. All survey respondents were provided with information about the study and the interview was conducted only when verbal consent for the study participation was obtained.

The study was approved by the Institutional Review Board (IRB) of the Afghan Ministry of Public Health and by the Research Ethics Board (REB) of Population Services International (PSI), a global health organization located in Virginia, USA. The University of Washington (UW) IRB deemed this as a secondary data analysis, not requiring UW IRB approval.

The only data available *a priori* to estimate the number of pharmacies in each district was the estimated number of registered pharmacy outlets in each province provided by MoPH. For sampling purposes, the estimated total number of pharmacy outlets in each district was based on the district population relative to the province population: this assumes that the population distribution is similar to the pharmacy distribution as reflected in the aggregate pharmacy data we obtained from MoPH. These variables including the estimated total number of pharmacy outlets in each province and population estimates for each of the provinces and districts were used for the probability weights calculation at province and district level (Appendix F).

### Survey

The survey questionnaire was designed to assess the aforementioned research objectives. Thirty-eight management-related and quality control questions were added to the survey for a total of 199 questions (Appendix E). The structured interview included direct observation and measurement at the time of data collection by the surveyor (e.g., of facility conditions, validating the medicines available in stock, measuring the temperature in refrigerator, and counting the number of pharmacies in proximity), and document review (i.e., license holders' names and dates, sign board of 24-hour service). The questionnaire covered a number of thematic areas including: staffing and business hours; physical structure; storage condition of medicines; items sold in the pharmacy; dispensing practices and staff knowledge; waste management; licensure status and inspection history; and physical examination of essential medicines.

Sixty-five surveyors participated in fieldwork in ten provincial teams [20]. Training sessions were held in the provincial capital of five provinces (i.e., Kabul, Jalalabad, Mazar-i-Sharif, Kandahar, and Herat) and consisted of review session of the questionnaire contents and sampling procedures for pharmacy samples and medicine samples, simulated interviews, group practice interview at nearby pharmacies, and a final assessment quiz at the end of the training course. Those surveyors who did not attain a satisfactory score in the final quiz were not invited to participate in the fieldwork.

### Quality Control

The ten provincial supervisors closely monitored interviewers' work in the field. When there was no opportunity for direct supervision of the surveyors' work, a provincial supervisor and/or assistant supervisor revisited selected locations after the completion of interviews or called the respondents if there was a working telephone at the pharmacy. Thirty percent (or 268/879) of

completed interviews were examined by supervisor or assistant supervisor who checked for possible errors in recording. No interviews were rejected as a result of spot-checks by supervisors [20].

After the field data collection was complete, each of the completed questionnaires was reviewed for completeness and correct administration of the survey instrument by a provincial supervisor or the project manager responsible for the province. After coding, and data entry and processing, the dataset was reviewed using logic checks to identify possible errors in questionnaire administration or data entry. If the review of the questionnaire indicated a possible error in questionnaire administration or recording by an interviewer, field management staff including the provincial supervisors contacted the respondent to confirm responses. During this process, no major issues that suggested systematic errors including serious interviewer errors were detected. The staff of a survey subcontractor, ACSOR, continued to maintain control of the paper questionnaires and electronic dataset throughout fieldwork and data processing, and after the completion of the survey [20]. Once the raw dataset was submitted by ACSOR to the SPS program, the analyst (NK) thoroughly examined the dataset and re-coded variables where appropriate and necessary for the subsequent analyses. Neither this analyst (NK) nor SPS staff were allowed access to identifiable material and data.

#### Information on Medicines

For the assessment of availability of medicines, 30 pharmaceutical and medical products were selected *a priori* by an expert panel comprised of Afghan authorities in the pharmaceutical sector including the technical officers from the MoPH. The two key selection criteria that the panel adopted were that the products were listed in the Afghan Essential Medicines List, and the products addressed priority disease conditions in Afghanistan [21]. The set of essential medicines selected for the ARPS 2013 differs from those assessed by the government administration via the Health Management Information System (HMIS): the latter list examines six essential items on an ongoing basis including chloroquine, cotrimoxazole, oral contraceptives, ORS, zinc tablets, and vitamin A. Because of the difference in the medicines basket, the percent value of availability derived from the ARPS cannot be directly compared with that of HMIS. Of six medicines used by HMIS, four medicines overlap with the ARPS 2013 medicines. And the HMIS definition of availability is different: i.e., for HMIS, medicines are considered not available if any of the aforementioned indicator drugs were not present for one

day or more during the month [22]. The 30 essential medicines included in the APRS 2013 survey are listed in Table 2.

## **Analysis**

### *Dependent Variable: Availability of Essential Medicines*

The primary APRS 2013 availability measure is the percentage of the 30 medicines in stock at the time of the survey visit. At an aggregate level, the APRS 2013 provides a national estimate of access to essential medicines in terms of availability of essential medicines at private pharmacies.

The primary outcome variable of interest was the proportion of essential medicines that a pharmacy had in stock at the time of data collection. This outcome aims to measure how well private pharmacies support the concept of essential medicines and comply with the government regulation that licensed pharmacies are obliged to keep in stock the licensed medicines that includes the entire essential medicines list of Afghanistan.

A secondary, system-level and medicine-specific availability measure was calculated, as defined by WHO and Health Action International (HAI), i.e., the proportion of medicine outlets in which a specific medicine of interest was found on the date of data collection [23].

### *Independent Variables*

Table 3 summarizes the principal pharmacy-specific independent variables used in the analysis of availability of essential medicines. Selection of covariates included in the regression model was based on a conceptual model the author adapted using the previous studies (see Chapter 1). Licensure status, which is the key independent variable and the focus of the analysis, is subject to measurement error. Surveyors requested the pharmacy respondent to present their pharmacy license if the response was “licensed.” The “unverifiable” group was those pharmacies that did not produce the license to the interviewer at the time of data collection even if they claimed that they were licensed. The licensure status of this group could not be verified by the interviewer or by the field manager.

### *Prevalence of Unlicensed Facilities*

By design, the ARPS 2013 provides an estimate of the prevalence of unlicensed and licensed pharmacies, defined by pharmacies that can produce a pharmacy license for visual inspection at the time of the survey. Also, pharmacies that claim to be licensed but cannot produce a license are designated as “unverifiable” in the analysis.

### *Pharmacy Characteristics Associated with Licensure Status*

Bivariate associations between key characteristics of private pharmacies and licensure status were examined. Either the Chi-square test or other non-parametric tests were used with a significance level of 0.001 to reflect adjustment for multiple comparisons.

### *Relationship Among Availability of Essential Medicines, Licensure Status, and Price*

The availability of individual essential medicines as well as pharmacy-level availability measure were predicted as a function of licensure status and other covariates with adjustments for the sample PSUs using the assumptions above. A similar model was estimated with price as a dependent variable to examine how the price of available medicines differed by licensure status. In Afghanistan, the acquisition price of medicines sold by the licensed pharmacies is regulated, or more precisely price-capped, by the MRA whereas that of unlicensed pharmacies by definition is not. In addition, in order to examine correlations between the availability of each of 30 essential medicines, defined as a mean proportion of pharmacies that carried the medicines at the time of data collection, and the profitability of essential medicines, bivariate analyses were implemented. Profitability of essential medicines was measured as a ratio of local acquisition price to the international reference price (i.e. median price ratio) [24]. If the median price ratio is greater than one, the medicine was considered as a product with higher profitability. If the median price ratio is equal to or smaller than one, the medicine was considered as a product with lower profitability.

For multivariate pharmacy-level analyses, linear regression models were employed to examine relationships between the availability of essential medicines and licensure status with adjustments for the sample weight and sampling features. These regression models also accounted for the effects of key covariates and province fixed effects on the main association between the licensure status and the availability. For the availability of individual medicines, logistic regression models were used to determine if the association between licensure status and availability differed by type of essential medicine after adjusting for other covariates.

Significance levels were corrected for multiple comparisons. The statistical analysis was implemented using *svy* commands for the national aggregate data (STATA SE version 13).

## Results

### Pharmacy Characteristics

The ARPS 2013 visited a total of 881 pharmacies, allowing for a 35% or greater non-response rate and recording errors. None of the visited pharmacies refused to participate in the survey; however two (2) of 881 respondents were excluded from the analysis due to missing data. The total number of respondents included in the analysis were 879 pharmacies and the non-response rate was 0.2% (or 2/881). Table 2 shows characteristics of private pharmacies examined under ARPS 2013. Among the private pharmacies, the estimated overall availability of essential medicines in terms of a mean proportion of available essential medicines in the basket of thirty medicines was 63.7% (95% CI 60.5, 66.9). The private pharmacies had on average 19 medicines in the basket of 30 ARPS essential medicines in stock at the time of visit (95% CI 18.1, 20.1). Only a small fraction, 0.4% of private pharmacies had the complete basket of the 30 essential medicines available and none of these were unlicensed pharmacies. Availability of essential medicines, defined as mean proportion of available essential medicines in the basket of 30 medicines differed significantly between urban and rural, 66.4% and 61.4% respectively ( $p < 0.0005$ ). Difference in the availability of essential medicines between pharmacies with and without pharmacist appeared to be statistically significant at the significance level of 0.05 ( $p = 0.0149$ ): those pharmacies having a pharmacist also had better availability of essential medicines. Less than one percent of the pharmacies carried essential medicines with physical damage on the package (0.1%) and, separately, expired medicines (0.6%).

As shown in Table 4, three out of four private pharmacies were located in urban area (75.5%; 95% CI 66.8, 84.1). A self-identified pharmacist was present in 83.7% of the private pharmacies at the time of survey visit (95% CI 79.3, 88.1). In terms of variables pertaining to pharmacy service and management, only 2.6% of the pharmacies met the government's standards on the pharmacy rooms. Approximately 18% had a functional refrigerator, of which less than 10% kept oxytocin Injectable in the refrigerator following the storage instructions. About 15% of the pharmacies kept the record of dispensed prescription medicines, had systematic stock management, and provided necessary information to patients when dispensing. Over 70% of

pharmacies kept the pharmacy in the standard hygienic condition. Only 3.4% pharmacy staff could correctly answer a question on first-line pharmacological treatments.

#### Prevalence of Facilities by Pharmacy Licensure Status

Table 5 describes the characteristics of private pharmacies by licensure status. Of 879 pharmacies interviewed, 499 pharmacies were able to produce their pharmacy license for verification by the surveyor. A total of 42 pharmacies were verified to be unlicensed, and 338 pharmacies claimed to have a license but could not produce the license for verification. After taking into account of sample weights and sampling characteristics, the estimated proportion of licensed pharmacies was 54.5% (95% CI 46.1, 63.0), unlicensed pharmacies was 10.5% (95% CI 3.2, 17.8) and 35.0% were pharmacies with unverifiable status (95% CI 26.8, 43.1).

#### Pharmacy Characteristics Associated with Licensure Status

Table 5 also shows bivariate associations to assess if key characteristics of private pharmacies differed by licensure status. The urban versus rural location of pharmacy was significantly related to licensure status ( $p < 0.0005$ ). The presence of pharmacist was not significantly associated with licensure status. The availability of the basket of essential medicines showed a moderate but not significant difference between licensed and unlicensed pharmacies ( $p = 0.064$ ). The existence of expired essential medicines at the time of data collection was not significantly related to licensure status. Among the pharmacy service quality and management features, significant differences were observed between licensed and unlicensed pharmacies in dispensing practice and hygienic standards.

None of the pharmacy outlets regardless of the licensure status met all the service quality standards set by the MoPH. There was a statistically significant difference in the number of years in business by licensure status, with those licensed pharmacies being in business twice as long on average ( $p < 0.0005$ ). According to the Afghanistan's private pharmacy regulations, a pharmacy cannot operate within a 200-meter radius of the another pharmacy [11]. The survey found that the number of pharmacies in proximity of the interviewed pharmacy did not differ by licensure status though trend was toward more outlets near licensed pharmacies. Whether the pharmacy had been inspected by any of the regulatory authorities did not differ by licensure status. Respondents were also asked whether or not they experienced problems in the supply chain for medicines. There was a significant difference by licensure status in terms of having experienced problems with the medicines brought in by their top three suppliers ( $p < 0.0005$ ).

### Relationship between the Availability of Essential Medicines and Licensure Status

The relationship between licensure status and availability of individual medicines is shown in Table 6. Availability is defined as a proportion of pharmacies that carried the specific medicine. It varied considerably across medicines. The most available medicine was tetracycline eye ointment tube (91%, 95% CI 87, 95), whereas norgestrel (progesterone only pill, POP) was found to be the least available in the provinces surveyed (26%; 95% CI 20, 33).

Of the 30 essential medicines, availability differed for eight medicines by licensure status at the significance level of 0.001. The essential medicines that were more available in licensed pharmacies than in unlicensed ones included: amoxicillin capsule 500mg; condoms; ampicillin 500mg injection; zinc sulfate dispersible tablets; chlorhexidine with or without cetrimide, solution; and norgestrel (progesterone only pill (i.e., POP). The medicines more available in unlicensed pharmacies than in licensed pharmacies were: medroxy progesterone acetate 150mg inj. and ethinyl estradiol + norgestrel (combination).

Table 7 compares the price variability of the same essential medicines by licensure status. More detailed price information can be found in Appendix C. There was considerable variability in price between and within different licensure status. The mean unweighted coefficient of variation (0.54) was greater for the medicines sold at licensed pharmacies than at unlicensed pharmacies (0.46). However, the unweighted ratios of mean and median prices for essential medicines for unlicensed versus licensed products were greater than one. The major result is considerable variability in both the coefficients of variation across essential medicines and by licensed versus unlicensed status.

### Determinants of Access to Essential Medicines

There was a positive but not statistically significant correlation between the availability of essential medicines, as a proportion of pharmacies that carried the essential medicine, and profitability as a median price ratio (Spearman's  $\rho = 0.163$ ,  $p=0.390$ ) (Figure 2). When correlation between the medicines with higher profitability and their availability was assessed, negative but statistically not significant correlation was suggested (Spearman's  $\rho = -0.178$ ,  $p=0.430$ ). However, for the medicines with lower profitability, there was statistically significant positive correlation between the availability and profitability (Spearman's  $\rho = 0.874$ ,  $p=0.0045$ ).

After controlling for other covariates using linear regression modeling, licensure status was not associated with the availability of essential medicines at the significance level of 0.05 (Table 8). Regression models with and without key variables were estimated to check the impact on the coefficient of primary interest on the unlicensed indicator. None of the results were statistically significant. However, the direction of the effect was consistently negative, suggesting that unlicensed pharmacies do not tend to fill the gaps that licensed private pharmacies leave.

Several covariates were strongly and independently associated with the availability essential medicines when controlling for potential confounders. The point estimates and confidence intervals were derived from the Model (e) in Table 8 that included all the covariates. The pharmacies that had any inspection visits within the last year had significantly lower availability of essential medicines by 9.9% as compared to the pharmacies that did not have any inspection visit ( $p=0.01$ , 95%CI 5.3, 31.8). A difference of one prescription medicine in the last 10 dispensing episodes was statistically significantly different in availability of essential medicines by 0.8% ( $p=0.018$ ). A difference by 10 years in business was associated with 2.7% increase in the availability of essential medicines ( $p=0.006$ ). Pharmacies that had problems with the supply chain had lower availability of the basket of essential medicines by 7.6% as compared to pharmacies that never had problems with supply chain ( $p=0.013$ ). Being in urban area, the number of pharmacies within a 200-meter radius of interviewed pharmacy, the existence of expired medicines and presence of pharmacist at the time of data collection were not associated with the availability of essential medicines.

## **Discussion**

While 20 of the 30 essential medicines (67%) had greater mean availability values in licensed pharmacies compared to unlicensed pharmacies, this analysis found that over one-third (36.3%) of important essential medicines were not available private pharmacies. Neither licensed private pharmacies nor unlicensed pharmacies nor pharmacies with unverifiable license status are fully meeting the needs of those seeking access to essential medicines outside of the public sector. This suggests that new policy decisions or enforcement will be needed by the Afghan MoPH to try to ensure access to essential medicines through strengthening the pharmaceutical regulatory system [25].

Even when essential medicines are available, medicines must meet important criteria including quality. While government licensure is a regulatory tool to help ensure minimum of quality standards, findings from our bivariate analysis showed that licensure status is associated with variables related to the quality of pharmacy services and medicines. Specifically, dispensing practice and cleanliness of pharmacy ( $p=0.008$  and  $p=0.003$ , respectively) were associated with being a licensed pharmacy. In addition to strengthening of the licensure system to have access to essential medicines realized, other policy options may need to be extended or at least considered. These could include accreditation and/or specialty certifications of “quality pharmacy” through a joint effort of public and private players in pharmaceutical affairs [26].

The comparison of price variability in terms of coefficient of variation between the licensed and unlicensed pharmacies shows that the regulatory requirement of the price-cap on the essential medicines did not appear to effectively limit the variability in licensed pharmacy prices. In other words, the licensure control does not guarantee for the public the important aspects of access to essential medicines, including service quality and financial accessibility or affordability. If rational, profit-maximizing private pharmacies operate in a competitive market, then medicines with a greater profit margin should be more available, other things being equal. However, our analysis suggested there was a positive but weak correlation between medicine’s availability and profitability. In addition to the acquisition price information, wholesale price information would have added to the analysis by examining the real profitability of essential medicines.

To provide some international context, Table 9 compares the availability of licensed pharmacies and pharmacy-related professionals in Afghanistan and other countries based on the WHO data [26]. The availability of licensed pharmacies per 10,000 population in Afghanistan appears to be better than in Pakistan, Iraq, Nepal, or Sudan. However, the availability of pharmacists, pharmacy technicians, and pharmacy assistants combined in Afghanistan is lower than the other countries except Sudan. The higher availability of licensed pharmacies suggests that the licensure system is not a significant barrier to market entry. In addition, according to these WHO data, the number of licensed pharmacies exceeds the total number of pharmacists and pharmacy technicians/assistants who are eligible to operate pharmacy in Afghanistan. If the pharmacies with the unverifiable licensure status, which share 35% of the total pharmacies in the ARPS 2013, were in fact licensed, the availability of private pharmacy outlets would outperform countries that have similarly inadequate or even more organized medicines regulatory system [27]. However, relative to the fairly high prevalence of licensed pharmacies, the availability of

the basket of essential medicines in Afghanistan at 63.7% is not compelling and does not immediately support promotion of control over the unlicensed through a more stringent licensure requirement.

According to the WHO/HAI's global medicines price and availability studies, essential medicines are generally more available in private sector as compared to the public by the factor of 1.7 [12]. Due to the differences in the selection of medicines and sampling methods, our findings do not allow for comparisons with the public counterpart in Afghanistan. However, if the same essential medicines are more available in the unlicensed private pharmacies than in the public health facilities, existence of unlicensed outlets could be justified in light of a broad concept of access to care and essential medicines [28, 29]. Given the unlicensed pharmacies provide effective, equitable and affordable essential medicines for population at need, the MRA will be required to allow greater flexibility for the enforcement of licensure system. Thus, a private-public comparison of factors influencing availability of essential medicines will help identify the access gap that may exist and call for policy attention.

The estimated proportion of unlicensed private pharmacies turned out to be much lower, 10.5%, than an *a priori* estimate of 40%, which was derived from reviews of similar research articles and used in planning the ARPS. Possible explanations for the fairly high proportion of pharmacies of unverifiable licensure status include: uncoordinated issuance of licenses by multiple authorities before 2007 increased the number of licenses in Afghanistan, and/or the use of counterfeit licenses that the surveyor's verification failed to detect. In addition, the large share of pharmacies with unverifiable licensure status was not anticipated during the study design phase. At this stage, the author has no access to the identifiable data, making it impossible to determine the true licensure status of those that were categorized as unverifiable. Pre-survey training provided the field surveyors with a session on the license verification method, i.e., how to assess authenticity of the license produced by the respondent. However it was still possible to have an outlet in the dataset that was misclassified as licensed if, for example, the license document was too old, illegible, or damaged to verify the written information including license issuing authority, and/or year of licensure or name of licentiate. If the outlets were misclassified as licensed when they were in fact unlicensed, it can lead to an underestimate of the availability of essential medicines in the licensed group, assuming that the average difference between licensed and unlicensed applies.

In terms of the location of pharmacies, as compared to those in rural, urban outlets are physically closer to the Afghan MRAs, which are typically located in provincial capitals. Our findings support the view that the licensed pharmacies were more likely to operate in urban than in rural and are more likely to have been inspected by the MRAs. One of the questions of regulatory significance is whether or not rural pharmacies provide service of quality that is different than urban counterparts and if so how different. In this analysis, the availability of a basket of essential medicines was higher by 4.6%, when adjusted for other covariates, in urban pharmacies than in rural ones but the difference was not statistically significant ( $p=0.194$ ). Three quarters of Afghans are rural inhabitants, and they tend to be poorer [30, 31]. For rural Afghan women at child-bearing age, lack of medicines was one of the higher ranked problems with regard to barriers to access to care in addition to financial and distance accessibility constraints [32]. Therefore, increasing availability of essential medicines at private pharmacy outlets in rural area could contribute to improved access to care when other barriers are simultaneously addressed.

According to these results, the requirement that licensed pharmacies must stock essential medicines does not guarantee universal availability. The unlicensed private pharmacy sector appears to play an important, limited role in providing access to essential medicines since they tend to stock the similar medicines as the licensed facilities. Also, none of the licensed pharmacies met all the service quality standards set by the MoPH. This could mean that the current licensure system does not help improve the quality of services. While the effect of licensure on the medicines availability turns out to be generally positive in Afghanistan, the regulatory authority needs to consider the use of licensure to improve access to essential medicines but not by necessarily undermining pharmacy goods and services that unlicensed pharmacies provide for patients.

## **Limitations**

In the absence of district-level data of pharmacy outlets, the neighborhoods were identified by local knowledge and defined PSUs. However, due to the logistical difficulties and time constraints, a full listing of neighborhoods from which pharmacy samples were drawn was not developed. Therefore, we had to omit in the analysis the effect of the selection of neighborhoods. Instead, to seek more accurate estimates, we took districts as PSUs in the analysis, and the pharmacy outlets constituted the secondary sampling units. This approach

was likely to result in less efficient estimates than would have been should the neighborhoods have been used as PSU.

The cross-sectional nature of the project does not allow for interpreting the impact of licensure status and other variables as causal effects. Although the countermeasures and adjustments were introduced, the survey was at risk of inducing biases: selection bias might have been induced in the use of “prominent location” approach described in the previous section, and information bias in eliciting the respondents would also have been possible as the respondents may potentially become suspicious of the motivations of the survey and resist answering questions.

The study did not intend to capture other types of private medicines sellers such as private clinics or doctor’s offices, diagnostic centers, traditional healthcare providers, traders, wholesalers, and local manufacturers. These private medicine sellers are believed to provide the public with pharmaceutical products [33], but little is known about their role in the people’s access to essential medicines. An assessment of pharmacopoeial quality of medicines sold at private pharmacy was not included in the study: examination of quality of medicines was limited to the packaging and labeling aspects. It should be noted, however, that a previous study suggests that there is correlation between packaging quality and chemical quality of medicines [34]. The pharmacies with unverifiable licensure status limited the ability to strictly compare licensed versus unlicensed pharmacies. This survey emphasized to respondents that the obtained data would be non-identifiable and not be disclosed to the government authorities, and paid a special attention to the sequence of questions in the questionnaire: sensitive questions (e.g., licensure verification) were administered at the end of the questionnaire. However, there remains the possibility that some respondents made erroneous responses to appear to be responsive or to provide what they thought would be socially desirable responses.

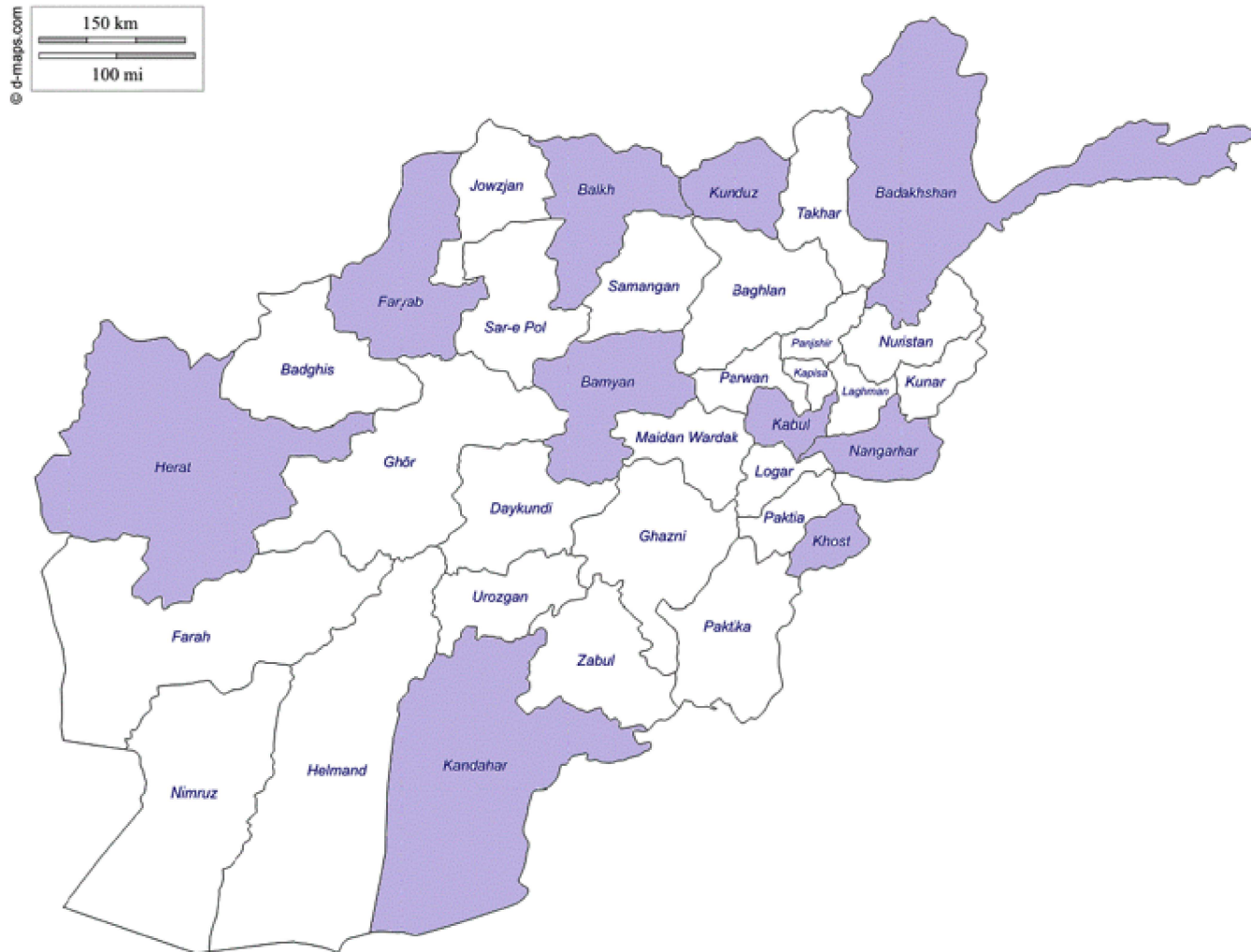
## **Conclusion**

Private pharmacies have an important role to play in improving access to care by making essential medicines available for the population at need in Afghanistan. As a proportion of a basket of 30 essential medicines, national-level availability of essential medicines at private pharmacies was estimated to be 63.7%.

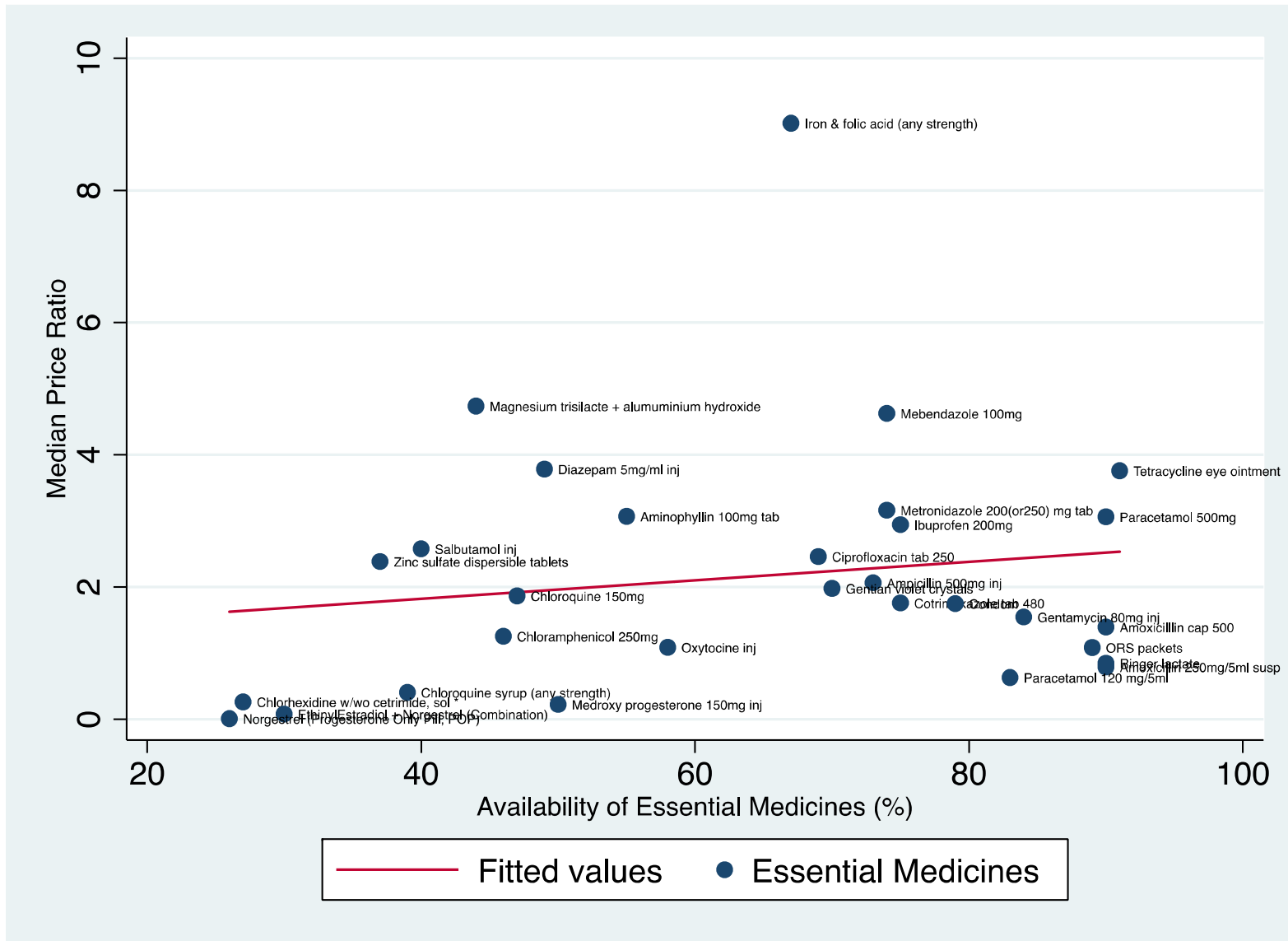
The prevalence of private pharmacies with licensure as a percentage of all private pharmacies was estimated to be 54.5%, private pharmacies with no licensure was 10.5% and those with unverifiable licensure was 35.0% in Afghanistan. However, the availability of essential medicines as a proportion of a basket of 30 pharmaceutical products was not significantly different between the licensed and unlicensed pharmacies though there was a consistent trend to slightly lower availability in unlicensed pharmacies. Associations between licensure status and other factors that constitute pharmacy service quality were less pronounced in our study. Considerable price variation of medicines sold at the licensed pharmacies indicates that the regulatory requirement to control the price does not function well to provide financial access. Greater availability of essential medicines was significantly associated with number of medicines per prescription, number of years in business, and fewer supply chain constraints. In sum, while the licensure system as a regulatory intervention affects the availability of essential medicines in Afghanistan, further research is required to understand what other regulatory interventions are needed to improve access to pharmacy services in terms of the availability and affordability of essential medicines.

## Chapter 2 Figures and Tables

**Figure 1: Provinces where the interviews were conducted.**



**Figure 2: Correlation between availability and profitability of essential medicines**



**Table 1: Distribution of Pharmacy Samples by Province, by Licensure Status**

| <b>Provinces</b>  | <b>Licensed</b> | <b>Unlicensed</b> | <b>Unverifiable</b> | <b>Total</b> | <b>% of total</b> |
|-------------------|-----------------|-------------------|---------------------|--------------|-------------------|
| <b>Badakhshan</b> | 13              | 0                 | 4                   | <b>17</b>    | 1.9%              |
| <b>Balkh</b>      | 59              | 0                 | 27                  | <b>86</b>    | 9.8%              |
| <b>Bamyan</b>     | 6               | 4                 | 1                   | <b>11</b>    | 1.3%              |
| <b>Faryab</b>     | 24              | 0                 | 10                  | <b>34</b>    | 3.9%              |
| <b>Herat</b>      | 63              | 1                 | 47                  | <b>111</b>   | 12.6%             |
| <b>Kabul</b>      | 189             | 0                 | 204                 | <b>393</b>   | 44.7%             |
| <b>Kandahar</b>   | 21              | 6                 | 30                  | <b>57</b>    | 6.5%              |
| <b>Khost</b>      | 1               | 29                | 0                   | <b>30</b>    | 3.4%              |
| <b>Kunduz</b>     | 31              | 0                 | 1                   | <b>32</b>    | 3.6%              |
| <b>Nangarhar</b>  | 92              | 2                 | 14                  | <b>108</b>   | 12.3%             |
| <b>Total</b>      | 499             | 42                | 338                 | <b>879</b>   | 100%              |

**Table 2: List of 30 Essential Medicines in ARPS 2013**

| #  | Name of product                  | Unit    | #  | Name of product                             | Unit   |
|----|----------------------------------|---------|----|---|--------|
| 1  | Tetracycline eye ointment        | Tube    | 16 | Mebendazole 100mg                           | Tablet |
| 2  | Chloramphenicol 250mg            | Capsule | 17 | Salbutamol injection                        | Ampule |
| 3  | Amoxicillin 250mg/5ml suspension | Bottle  | 18 | Aminophylline 100mg                         | Tablet |
| 4  | Amoxicillin 500mg                | Capsule | 19 | Magnesium trisilicate +aluminium hydroxide  | Tablet |
| 5  | Ampicillin 500mg injection       | Vial    | 20 | ORS packets                                 | Pack   |
| 6  | Cotrimoxazole 480mg              | Tablet  | 21 | Zinc sulfate, dispersible tablets           | Tablet |
| 7  | Gentamycin 80mg injection        | Ampule  | 22 | Iron & folic acid (any strength)            | Tablet |
| 8  | Ciprofloxacin 250mg              | Tablet  | 23 | Ringer lactate                              | Bag    |
| 9  | Ibuprofen 200mg                  | Tablet  | 24 | Gentian violet crystals                     | Bottle |
| 10 | Paracetamol 120mg/5ml suspension | Bottle  | 25 | Chlorhexidine w/wo cetrimide, solution      | Bottle |
| 11 | Paracetamol 500mg                | Tablet  | 26 | Condom                                      | Piece  |
| 12 | Diazepam 5mg/ml injection        | Ampule  | 27 | Ethinylestradiol +Norgestrel (Combination)  | Cycle  |
| 13 | Metronidazole 200(or 250) mg     | Tablet  | 28 | Medroxyprogesterone acetate 150mg injection | Vial   |
| 14 | Chloroquine 150mg                | Tablet  | 29 | Norgestrel (Progesterone Only Pill: POP)    | Cycle  |
| 15 | Chloroquine syrup (any strength) | Bottle  | 30 | Oxytocin injection                          | Ampule |

**Table 3: Independent Variables included in the Analyses**

| Independent variable                            | Definition  |
|---|---|
| Licensure status                                | Licensure status: 1=Licensed (reference), 2=Unlicensed, 3=Unverifiable  |
| Location: urban or rural                        | Urban is defined if a pharmacy is located in either metropolitan Kabul or provincial capital, and rural if otherwise: Urban= 1, Rural=0 |
| Inspection in the last year                     | The pharmacy had been inspected by any of the regulatory authorities in the last year, if No=0, Yes=1.                                  |
| Number of other pharmacies within a 200m radius | Number of retail pharmacies within 200m radius of the visited pharmacy  |
| Expired medicines                               | A proportion of medicines that were expired at the time of data collection  |
| Presence of Pharmacist                          | The pharmacy had a pharmacist present at the time of data collection, if No=0, if Yes=1.  |
| Number of prescriptions                         | Number of prescriptions dispensed in the last 10 dispensing episodes  |
| Number of years in business                     | Number of years in business   |

**Table 4: Characteristics of Private Pharmacies under ARPS 2013**

| Characteristics  | Estimate | Standard Error |
|--|----------|----------------|
| Availability: proportion of available medicines of a basket of 30 essential medicines, mean %  | 63.7     | 1.63           |
| Proportion of pharmacies found in urban area, %  | 75.5     | 4.39           |
| <i>Availability of essential medicines in urban area, %</i>  | 64.4     | 2.11           |
| <i>Availability of essential medicines in rural area, %</i>  | 61.4     | 1.58           |
| Licensure status, %  |          |                |
| <i>Licensed pharmacies</i>   | 54.5     | 4.28           |
| <i>Unlicensed pharmacies</i>   | 10.5     | 3.69           |
| <i>Pharmacies with unverifiable licensure status</i>   | 35.0     | 4.12           |
| Pharmacies with pharmacist present, %  | 83.7     | 2.23           |
| <i>Availability of essential medicines as a proportion of available medicines of a basket of 30 medicines at pharmacy with a pharmacist, %</i> | 64.6     | 2.54           |
| <i>Availability of essential medicines at pharmacy without a pharmacist, %</i>   | 59.0     | 1.64           |
| Proportion of pharmacies that carried medicine(s) with physical damage, %  | 0.06     | 0.08           |
| Proportion of pharmacies that carried expired medicine(s)  | 0.58     | 0.29           |
| Proportion of pharmacies that met the service standards §  |          |                |
| Standard rooms, %  | 2.6      | 0.89           |
| Use of functional refrigerator, %  | 18.3     | 3.04           |
| Existence of prescription record, %  | 15.1     | 2.09           |
| Necessary information is provided for patient when dispensing, %   | 15.1     | 2.77           |
| Staff knowledge at satisfactory level, %   | 3.4      | 0.85           |
| Stock management, %  | 15.5     | 2.44           |
| Cleanliness, %   | 71.7     | 3.28           |
| Oxytocin injection kept in refrigerator, %   | 9.8      | 2.13           |
| Median number of years in business, years  | 10.0     | -              |
| Inspection visit(s) within the last year, %  | 95.9     | 1.29           |
| Average number of prescriptions per outlet in the last 10 dispensing episodes  | 5.1      | 0.22           |
| Average number of pharmacy outlets in proximity  | 3.3      | 0.37           |
| Proportion of pharmacies that have ever had a supply chain problems, %   | 30.2     | 4.0            |

Note: the values are estimated means after accounting for sample weights and sampling features unless otherwise stated.

§ Proportion of pharmacy outlets that met the service quality standards defined by MoPH.

**Table 5: Private Pharmacy Characteristics by Licensure Status**

| Characteristics  | Private Pharmacy |             |              | p-value §  |
|--|------------------|-------------|--------------|------------|
|  | Licensed         | Unlicensed  | Unverifiable |            |
| Licensure status, number pharmacies in the sample (n=879)                                  | 499              | 42          | 338          |            |
| <b>Urban/Rural</b>   |                  |             |              |            |
| Urban, % (SE)  | 79.0 (4.1)       | 0.9 (1.0)   | 92.5 (2.2)   | < 0.0005 § |
| <b>Pharmacist present</b>  |                  |             |              |            |
| Outlets with presence of pharmacist, % (SE)  | 89.4 (1.9)       | 81.5 (8.7)  | 75.6 (4.6)   | 0.360 §    |
| <b>Quality of medicines, % (SE)</b>  |                  |             |              |            |
| Availability   | 64.8<br>(15 .8)  | 59.6 (2.3)  | 63.2 (3.5)   | 0.064      |
| Physical damage  | 0.2 (0.3)        | -           | 0            | n.a.       |
| Expired  | 0.4 (0.3)        | 0           | 1.0 (0.7)    | 0.003 §    |
| <b>Quality of services, % (SE)</b>   |                  |             |              |            |
| Standard rooms   | 4.1 (1.4)        | 0           | 0.9 (0.7)    | n.a.       |
| Use of functional refrigerator   | 17.6 (3.0)       | 3.6 (3.3)   | 23.7 (6.1)   | 0.018 §    |
| Existence of prescription record   | 17.2 (2.5)       | 16.4 (7.6)  | 11.5 (3.2)   | 0.922 §    |
| Necessary information is provided for patient when dispensing                              | 19.0 (3.3)       | 1.7 (1.2)   | 13.0 (4.2)   | 0.008 §    |
| Staff knowledge at satisfactory level  | 2.6 (1.0)        | 10.5 (4.7)  | 2.4 (1.2)    | 0.066 §    |
| Stock management   | 18.9 (3.3)       | 17.9 (9.2)  | 9.5 (3.0)    | 0.197 §    |
| Cleanliness  | 79.2 (3.7)       | 40.9 (6.9)  | 69.2 (4.9)   | 0.003 §    |
| Oxytocin inj. kept in refrigerator: n=131  | 9.4 (2.5)        | 0           | 13.4 (4.3)   | n.a.       |
| Average number of years in business, years (SE)  | 12.1 (0.7)       | 5.8 (1.2)   | 13.0 (1.3)   | 0.021 §    |
| Inspection visit(s) occurred within the past year, % (SE)                                  | 96.5 (1.4)       | 82.5 (16.1) | 95.6 (1.8)   | 0.377 §    |
| Average number of prescriptions per outlet in the last 10 dispensing episodes, counts (SE) | 5.6 (0.3)        | 3.8 (0.4)   | 4.8 (0.4)    | 0.015 §    |
| Average number of pharmacy outlets in proximity, number (SE)                               | 3.7 (0.5)        | 2.8 (1.3)   | 2.8 (0.4)    | 0.761      |
| Experience with supply chain problems, % (SE)  | 18.4 (3.0)       | 64.1 (11.5) | 36.8 (7.2)   | < 0.0005 § |

§ P-values with § are the results of nonparametric test comparing licensed and unlicensed with sample weights if the data violate distribution assumption (Newson.2006.2013).

**Table 6: Relationships between Licensure Status and Availability of Essential Medicines**

| Name of product                                      | Unit  | Mean availability (% [95%CI]) |            |             |              | Test for H <sub>0</sub> : |
|--|-------|-------------------------------|------------|-------------|--------------|---------------------------|
|  |       | Overall                       | Licensed   | Unlicensed  | Unverifiable | Licensed=<br>Unlicensed   |
| Tetracycline eye ointment tube                       | Tube  | 91 [87,95]                    | 91 [87,95] | 93 [86,100] | 90 [80,99]   | 0.667                     |
| Ringer lactate                                       | Bag   | 90 [87,94]                    | 89 [85,94] | 94 [88,101] | 90 [85,95]   | 0.186                     |
| Paracetamol 500mg                                    | Tab   | 90 [86,95]                    | 92 [88,97] | 83 [72,94]  | 89 [81,97]   | 0.129                     |
| Amoxicillin 250mg/5ml suspension                     | btl   | 90 [86,94]                    | 92 [88,96] | 80 [63,97]  | 90 [82,98]   | 0.139                     |
| Amoxicillin capsule 500mg                            | Cap   | 90 [86,94]                    | 95 [92,98] | 73 [62,84]  | 88 [79,97]   | <.0005                    |
| ORS packets  | Pck   | 89 [84,93]                    | 89 [83,94] | 71 [53,90]  | 94 [90,99]   | 0.077                     |
| Gentamycin 80mg injection                            | Amp   | 84 [79,88]                    | 87 [82,91] | 78 [60,97]  | 81 [73,90]   | 0.405                     |
| Paracetamol 120 mg/5ml                               | Btl   | 83 [77,88]                    | 86 [81,91] | 77 [57,98]  | 79 [71,87]   | 0.424                     |
| Condom   | piece | 79 [74,84]                    | 81 [74,88] | 55 [42,68]  | 83 [76,91]   | <.0005                    |
| Ibuprofen 200mg                                      | Tab   | 75 [70,81]                    | 76 [69,83] | 74 [54,95]  | 75 [65,85]   | 0.896                     |
| Cotrimoxazole tab 480mg                              | tab   | 75 [69,81]                    | 80 [74,86] | 62 [47,76]  | 71 [61,82]   | 0.017                     |
| Metronidazole 200(or250) mg tablet                   | Tab   | 74 [68,81]                    | 79 [73,85] | 62 [53,72]  | 70 [58,82]   | 0.002                     |
| Mebendazole 100mg                                    | Tab   | 74 [68,80]                    | 78 [72,85] | 51 [27,75]  | 73 [63,84]   | 0.031                     |
| Ampicillin 500mg injection                           | vial  | 73 [68,78]                    | 81 [75,86] | 48 [36,59]  | 69 [60,78]   | <.0005                    |
| Gentian violet crystals                              | Btl   | 70 [62,77]                    | 74 [67,81] | 72 [54,90]  | 62 [48,77]   | 0.823                     |
| Ciprofloxacin tablet 250mg                           | tab   | 69 [62,75]                    | 72 [65,79] | 58 [29,88]  | 67 [57,77]   | 0.368                     |
| Iron & folic acid (any strength)                     | Tab   | 67 [61,73]                    | 71 [63,78] | 66 [54,79]  | 61 [49,72]   | 0.58                      |
| Oxytocine injection                                  | Amp   | 58 [50,66]                    | 55 [46,64] | 67 [40,94]  | 60 [46,74]   | 0.419                     |
| Aminophyllin 100mg tablet                            | tab   | 55 [48,62]                    | 55 [47,63] | 58 [37,80]  | 55 [44,66]   | 0.774                     |
| Medroxyprogesterone acetate Depot<br>150mg injection | Vial  | 50 [43,57]                    | 49 [41,57] | 75 [63,87]  | 43 [31,56]   | 0.001                     |
| Diazepam 5mg/ml injection                            | Amp   | 49 [41,56]                    | 54 [46,62] | 37 [14,60]  | 43 [31,55]   | 0.155                     |
| Chloroquine 150mg                                    | tab   | 47 [40,53]                    | 43 [36,50] | 52 [33,70]  | 51 [42,61]   | 0.364                     |
| Chloramphenicol 250mg                                | cap   | 46 [39,53]                    | 42 [34,50] | 61 [43,80]  | 48 [36,60]   | 0.054                     |
| Magnesium trisilacte + alumuminium<br>hydroxide      | Tab   | 44 [38,50]                    | 42 [34,50] | 40 [27,53]  | 48 [37,60]   | 0.776                     |
| Salbutamol injection                                 | Amp   | 40 [32,47]                    | 36 [27,45] | 69 [49,89]  | 37 [25,48]   | 0.004                     |
| Chloroquine syrup (any strength)                     | btl   | 39 [32,46]                    | 35 [27,43] | 63 [45,81]  | 38 [26,50]   | 0.006                     |
| Zinc sulfate dispersible tablets                     | Tab   | 37 [30,45]                    | 40 [31,49] | 4 [-2,11]   | 43 [32,53]   | <.0005                    |
| EthinylEstradiol + Norgestrel<br>(Combination)       | Cycle | 30 [24,37]                    | 24 [18,31] | 59 [47,71]  | 31 [19,43]   | <.0005                    |
| Chlorhexidine w/wo cetrimide, solution               | btl   | 27 [20,33]                    | 28 [21,36] | 2 [-2,6]    | 31 [19,43]   | <.0005                    |
| Norgestrel (Progesterone Only Pill, POP)             | Cycle | 26 [20,33]                    | 25 [19,32] | 1 [-1,3]    | 36 [22,49]   | <.0005                    |

**Table 7: Price variation of essential medicines by licensure status**

| SN | Name of medicine                               | Coefficient of Variation |      |      | Ratio of means |           |       | Ratio of medians |           |       |
|----|--|--------------------------|------|------|----------------|-----------|-------|------------------|-----------|-------|
|    |  | L                        | UL   | UV   | UL/L           | UL/U<br>V | UV/L  | UL/L             | UL/U<br>V | UV/L  |
| 1  | Tetracycline eye ointment                      | 39.0                     | 42.9 | 36.0 | 0.665          | 0.649     | 1.026 | 0.700            | 0.700     | 1.000 |
| 2  | Chloramphenicol 250mg                          | 40.0                     | 14.1 | 45.3 | 0.651          | 0.664     | 0.981 | 0.667            | 0.667     | 1.000 |
| 3  | Amoxicillin 250mg/5ml susp                     | 32.5                     | 46.3 | 29.6 | 0.938          | 0.943     | 0.995 | 0.833            | 0.833     | 1.000 |
| 4  | Amoxicillin cap 500mg                          | 35.2                     | 33.9 | 36.4 | 1.124          | 1.127     | 0.998 | 1.150            | 1.150     | 1.000 |
| 5  | Ampicillin 500mg inj                           | 41.7                     | 38.5 | 43.1 | 0.861          | 0.898     | 0.959 | 0.800            | 1.000     | 0.800 |
| 6  | Cotrimoxazole tab 480                          | 48.2                     | 29.2 | 42.9 | 0.804          | 0.887     | 0.906 | 0.800            | 0.800     | 1.000 |
| 7  | Gentamycin 80mg inj                            | 70.8                     | 45.4 | 79.1 | 0.634          | 0.685     | 0.927 | 0.800            | 0.800     | 1.000 |
| 8  | Ciprofloxacin tab 250                          | 58.5                     | 65.0 | 57.4 | 0.918          | 1.000     | 0.917 | 0.927            | 0.950     | 0.976 |
| 9  | Ibuprofen 200mg                                | 50.0                     | 52.8 | 47.6 | 0.808          | 0.868     | 0.931 | 0.800            | 0.800     | 1.000 |
| 10 | Paracetamol 120 mg/5ml                         | 38.7                     | 26.5 | 32.9 | 0.727          | 0.753     | 0.966 | 0.750            | 0.750     | 1.000 |
| 11 | Paracetamol 500mg                              | 59.3                     | 29.8 | 68.9 | 0.777          | 0.793     | 0.980 | 0.833            | 1.000     | 0.833 |
| 12 | Diazepam 5mg/ml inj                            | 58.0                     | 50.4 | 61.5 | 1.639          | 1.723     | 0.951 | 1.750            | 1.750     | 1.000 |
| 13 | Metronidazole 200(or250) mg tab                | 51.7                     | 55.1 | 32.2 | 0.973          | 1.076     | 0.904 | 0.800            | 0.800     | 1.000 |
| 14 | Chloroquine 150mg                              | 52.3                     | 55.5 | 49.9 | 0.620          | 0.587     | 1.055 | 0.600            | 0.600     | 1.000 |
| 15 | Chloroquine syrup (any strength)               | 36.5                     | 15.1 | 33.5 | 0.536          | 0.568     | 0.943 | 0.480            | 0.600     | 0.800 |
| 16 | Mebendazole 100mg                              | 57.3                     | 34.1 | 60.7 | 0.796          | 0.839     | 0.949 | 1.056            | 1.056     | 1.000 |
| 17 | Salbutamol inj                                 | 53.9                     | 53.0 | 52.3 | 0.877          | 0.847     | 1.036 | 0.667            | 0.667     | 1.000 |
| 18 | Aminophyllin 100mg tab                         | 70.4                     | 28.7 | 70.4 | 3.130          | 3.113     | 1.006 | 3.000            | 3.000     | 1.000 |
| 19 | Magnesium trisilactate +<br>aluminum hydroxide | 67.9                     | 41.3 | 68.5 | 1.572          | 1.608     | 0.978 | 2.000            | 2.000     | 1.000 |
| 20 | ORS packets                                    | 52.0                     | 33.9 | 51.4 | 0.751          | 0.798     | 0.941 | 1.000            | 1.000     | 1.000 |
| 21 | Zinc sulfate dispersible tablets               | 59.5                     | 69.9 | 61.8 | 1.623          | 1.607     | 1.010 | 1.556            | 1.556     | 1.000 |
| 22 | Iron & folic acid (any strength)               | 76.5                     | 60.4 | 75.8 | 2.149          | 2.521     | 0.853 | 3.500            | 3.500     | 1.000 |
| 23 | Ringer lactate                                 | 31.7                     | 31.8 | 25.1 | 0.844          | 0.863     | 0.978 | 0.760            | 0.760     | 1.000 |
| 24 | Gentian violet crystals                        | 73.5                     | 22.6 | 89.1 | 0.639          | 0.600     | 1.066 | 0.600            | 0.600     | 1.000 |
| 25 | Chlorhexidine w/wo cetrimide, sol *            | 45.4                     | 12.9 | 37.7 | 0.447          | 0.402     | 1.111 | 0.468            | 0.367     | 1.277 |
| 26 | Condom   | 72.2                     | 49.7 | 64.6 | 0.947          | 1.013     | 0.936 | 1.000            | 1.111     | 0.900 |

| SN | Name of medicine                               | Coefficient of Variation |             |             | Ratio of means |              |              | Ratio of medians |              |              |
|----|--|--------------------------|-------------|-------------|----------------|--------------|--------------|------------------|--------------|--------------|
|    |  | L                        | UL          | UV          | UL/L           | UL/U<br>V    | UV/L         | UL/L             | UL/U<br>V    | UV/L         |
| 27 | EthinylEstradiol + Norgestrel<br>(Combination) | 48.0                     | 20.0        | 49.7        | 2.412          | 2.586        | 0.933        | 2.867            | 4.300        | 0.667        |
| 28 | Medroxy progesterone 150mg inj                 | 63.2                     | 91.1        | 60.3        | 0.582          | 0.606        | 0.960        | 0.400            | 0.400        | 1.000        |
| 29 | Norgestrel (Progesterone Only Pill,<br>POP)    | 54.2                     | .           | 65.0        | 0.903          | 0.999        | 0.903        | 1.000            | 1.500        | 0.667        |
| 30 | Oxytocine inj                                  | 80.3                     | 33.6        | 79.7        | 0.794          | 0.764        | 1.039        | 0.800            | 0.800        | 1.000        |
|    | <b>Average</b>                                 | <b>54.0</b>              | <b>40.8</b> | <b>53.6</b> | <b>1.038</b>   | <b>1.079</b> | <b>0.971</b> | <b>1.112</b>     | <b>1.194</b> | <b>0.964</b> |

**L: Licensed pharmacies, UL: Unlicensed pharmacies, UV: pharmacies with Unverifiable status.**

**Table 8: Multivariate linear regression analyses of availability of the basket of essential medicines**

|   | (a)    |       |        | (b)    |       |        | (c)    |       |        | (d)    |       |        | (e)    |       |        | (f)    |       |        |
|---|--------|-------|--------|--------|-------|--------|--------|-------|--------|--------|-------|--------|--------|-------|--------|--------|-------|--------|
|   | Coef.  | t     | p-val. | Coef.  | t     | p-val. | Coef.  | t     | p-val. | Coef.  | t     | p-val. | Coef.  | t     | p-val. | Coef.  | t     | p-val. |
| Licensure (Licensed as reference)                     |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |
| Unlicensed  | -0.052 | -1.86 |        | -0.074 | -0.93 |        | -0.035 | -1.15 |        | -0.057 | -0.73 |        | -0.139 | -1.67 |        | -0.038 | -0.25 |        |
| Uncertain   | -0.015 | -0.41 |        | 0.009  | 0.41  |        | -0.018 | -0.50 |        | 0.007  | 0.30  |        | -0.023 | -0.70 |        | 0.002  | 0.07  |        |
| Urabn (urban as reference)                            | -      | -     |        | -      | -     |        | 0.021  | 0.77  |        | 0.049  | 1.87  |        | 0.028  | 0.89  |        | 0.015  | 0.56  |        |
| Inspection visit(s) occurred within the last year     | -      | -     |        | -      | -     |        | -      | -     |        | -      | -     |        | -0.079 | -2.98 | **     | -0.099 | -2.95 | **     |
| Number of pharmacies in proximity                     | -      | -     |        | -      | -     |        | -      | -     |        | -      | -     |        | -0.003 | -1.25 |        | -0.001 | -0.35 |        |
| Existence of expired medicines                        | -      | -     |        | -      | -     |        | -      | -     |        | -      | -     |        | -0.097 | -2.70 | **     | -0.054 | -1.02 |        |
| Presence of pharmacist at the time of data collection | -      | -     |        | -      | -     |        | -      | -     |        | -      | -     |        | 0.012  | 0.43  |        | -0.010 | -0.49 |        |
| Number of prescriptions                               | -      | -     |        | -      | -     |        | -      | -     |        | -      | -     |        | 0.013  | 3.37  | **     | 0.008  | 2.38  | **     |
| Number of years in business                           | -      | -     |        | -      | -     |        | -      | -     |        | -      | -     |        | 0.005  | 3.96  | **     | 0.003  | 2.78  | **     |
| Problems with medicines supplier                      | -      | -     |        | -      | -     |        | -      | -     |        | -      | -     |        | 0.105  | 3.17  | **     | 0.076  | 2.52  | **     |
| Province FE (Kabul as reference)                      | -      | -     |        | -      | -     |        | -      | -     |        | -      | -     |        | -      | -     |        | -      | -     |        |
| Badakhshan  | -      | -     |        | 0.071  | 2.24  | *      | -      | -     |        | 0.117  | 2.96  | **     | -      | -     |        | 0.085  | 1.97  |        |
| Balkh   | -      | -     |        | 0.036  | 1.18  |        | -      | -     |        | 0.037  | 1.22  |        | -      | -     |        | 0.066  | 2.23  | *      |
| Bamyan  | -      | -     |        | 0.016  | 0.35  |        | -      | -     |        | 0.059  | 1.14  |        | -      | -     |        | -0.067 | -0.81 |        |
| Faryab  | -      | -     |        | -0.061 | -1.32 |        | -      | -     |        | -0.014 | -0.27 |        | -      | -     |        | -0.036 | -0.73 |        |
| Herat   | -      | -     |        | 0.147  | 3.89  | **     | -      | -     |        | 0.149  | 3.9   | **     | -      | -     |        | 0.137  | 3.61  | **     |
| Kandahar  | -      | -     |        | -0.128 | -4.62 | **     | -      | -     |        | -0.127 | -4.64 | **     | -      | -     |        | -0.082 | -3.61 | **     |
| Khost   | -      | -     |        | 0.069  | 0.77  |        | -      | -     |        | 0.099  | 1.15  |        | -      | -     |        | -0.054 | -0.48 |        |
| Kunduz  | -      | -     |        | 0.047  | 1.60  |        | -      | -     |        | 0.056  | 1.81  |        | -      | -     |        | 0.085  | 2.70  | **     |
| Nangarhar   | -      | -     |        | 0.036  | 0.86  |        | -      | -     |        | 0.040  | 0.95  |        | -      | -     |        | 0.052  | 1.29  |        |
| Constant  | 0.648  | 40.93 | **     | 0.610  | 32.05 | **     | 0.631  | 29.56 | **     | 0.564  | 18.63 | **     | 0.555  | 11.80 | **     | 0.608  | 12.0  | **     |

\*p<0.05. \*\*p<0.01

**Table 9: Comparisons of selected pharmacy-related indicators between Afghanistan and its comparators**

|                          | Licensed pharmacies per 10,000 population | Licensed pharmacists per 10,000 population | Pharmacy Technicians/ Assistants per 10,000 population |
|--------------------------|---|--|--|
| Afghanistan <sup>a</sup> | 4.27                                      | 0.80                                       | 0.47   |
| Pakistan <sup>b</sup>    | 0.43                                      | 0.61                                       | 1.22   |
| Iraq <sup>c</sup>        | 2.94                                      | 3.47                                       | 1.83   |
| Nepal <sup>d</sup>       | 4.53                                      | 0.26                                       | 0.53   |
| Sudan <sup>e</sup>       | 0.59                                      | 1.53                                       | 0.64   |

Source: WHO. Development of Country Profiles and Monitoring of the Pharmaceutical Situation in Countries. (<sup>a</sup>2011, <sup>b</sup>2010, <sup>c</sup>2011, <sup>d</sup>2011, <sup>e</sup>2010 ). Available from: [http://www.who.int/medicines/areas/coordination/coordination\\_assessment/en/index1.html](http://www.who.int/medicines/areas/coordination/coordination_assessment/en/index1.html)

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## Chapter 3

### **Prices and Affordability of Essential Medicines in Afghanistan:**

#### **The Role of Service Quality, Licensure Status, and Other Factors**

##### **Introduction**

Essential medicines continue to be inaccessible by the poor in low- and middle-income countries (LMICs) due to scarce availability and high prices [1]. It is well established that there is considerable variability in the prices of essential medicines both among countries and within countries across regions of the world [2]. Cameron et al. reported that patients who purchase medicines from private sector pharmacies paid 9-25 times the international reference prices for the lowest-priced generic products and over 20 times the international reference prices for originator products across WHO regions [3]. In a study of 52 LMICs, Baber et al. reported considerable variability in pricing and affordability of essential asthma medicines across countries that included Afghanistan [4]. As shown in Chapter 2, this variability is also evident for essential medicines in Afghanistan. Lack of affordability to essential medicines creates barriers to access to care leading to negative health consequences, such as persistent ill health, disability and/or death [5].

Factors that determine the price of essential medicines in the global market are complex, and directly and indirectly affect the prices among LMICs [6, 7]. The poor pay for the medicines at the expense of other basic goods needed for living in these countries, and are often driven to impoverishment [8, 9]. To make essential medicines more affordable in LMICs, the international community has made considerable effort including the promotion of differential pricing and generic competition [5]. At a country level, governments in LMICs implement policies and regulations to address the affordability problems. These include use of an essential medicines list, international and national reference price lists, rational medicines use policies, and medicines law [10, 11]. Previous studies suggest there are interventions to improve the pharmacy service quality [12-14]. However, governments' efforts to regulate private markets appear to not be directly translated to improved affordability in some of the countries [15-18]. There is a paucity of evidence to understand the factors that influence the affordability of

essential medicines in relation to quality of pharmacy services at a country level. This chapter explores the relationship between the retail prices of essential medicines, pharmacy service quality-related characteristics, and other factors that might play a role in Afghanistan.

## **Background**

The government of Afghanistan attempts to promote access to essential medicines through establishing requirements for licensed pharmacies and by placing controls on the prices that licensed pharmacies may charge. Private pharmacies that are licensed by the Afghan national regulatory authority are allowed to set a markup on the medicines that they sell of up to 15% of the wholesale price of the medicine [19]. However, unlicensed pharmacies are free from the regulation and able to set market-based prices that presumably reflect the market in which they operate. In the Chapter 2, we estimated the proportion of unlicensed pharmacies in the total private pharmacies to be 10.5% in Afghanistan. While the exact number of private pharmacies is unknown to the Ministry of Public Health (MoPH), using the total number of private pharmacies estimated by the MoPH, approximately 1,400 unlicensed pharmacies exist in the country [20]. Relative to the size of the population, this estimate indicates a large-scale operation of unlicensed private pharmacies in the country [21].

This analysis seeks to understand factors that influence the observed prices for essential medicines in private pharmacies—both licensed and unlicensed— in Afghanistan. One hypothesis to be tested is whether and to what extent the provision of services of a higher quality are associated with higher prices, assuming that quality is costly to produce. Despite the controls on prices in licensed pharmacies, the presence of unlicensed pharmacies and competition among licensed pharmacies is likely to affect observed pricing in this market.

## **Methods**

### Data sources

The data were obtained from the national survey on private pharmacies in Afghanistan, Afghanistan Retail Pharmacy Survey 2013 (ARPS 2013). Using a structured questionnaire, survey interviews were conducted in ten provinces: Kabul, Nangarhar, Khost, Kandahar, Herat, Badakhshan, Kunduz, Balkh, Faryab, and Bamyán (Figure 1). These ten provinces were selected in consultation with the MoPH and GDPA. They have commercial hubs of domestic and

imported commerce including pharmaceutical products and represent geographical and ethnic characteristics of the country. To be conservative about response to a potentially challenging survey, we oversampled 881 pharmacies relative to an originally calculated sample size of 644. Pharmacy were sampled across the 10 provinces using probability-proportional-to-size method. In the absence of a sampling frame for the private pharmacies, in order to obtain the best possible and reasonable basis for sample weights calculations, the MoPH's estimated number of private pharmacies by province was used and assumed that private pharmacies were distributed proportionately to the size of population by district [22]. The population estimates developed by the Central Statistics Organization were used as reference for the district-level pharmacy population distribution [23]. Table 1 shows total number of pharmacies by province for those provinces in the study.

Prior to the field survey, the questionnaire was pre-tested in Kabul. The surveyors were trained on how to sample pharmacy outlets, administer the questionnaire and record data by the provincial supervisors in each of the provincial capital. Only the surveyors who attained satisfactory scores at the post-training quiz were invited to the fieldwork.

This study interviewed staff located at 881 pharmacies in 10 representative provinces throughout the country of Afghanistan. Two were excluded from the study due to considerable missing data. The survey questionnaire contained over 200 questions pertaining to staffing level, staff knowledge, stock management, physical structure, record keeping and hygienic standards. In addition to the information about characteristics of private pharmacies, the study collected data on the lowest acquisition price of 30 essential medicines of national priority (Table 2). The lowest acquisition price was selected to understand how medicine price variations might affect access for the poor. Selected medicines were not differentiated as to whether they were generic products or originator brand. When the field surveyors submitted complete questionnaires to provincial supervisors, the supervisors performed spot-checks of the questionnaires by comparing with the recorded data. If the spot-check detected an error, the supervisors called back the respondents and validated the response. The study was approved by the Institutional Review Board (IRB) of the Afghan Ministry of Public Health and by the Research Ethics Board (REB) of Population Services International (PSI), a global health organization located in Virginia, USA. The field survey was conducted between April and May 2013.

### Data analyses

Descriptive bivariate analyses were conducted to determine how the price of each essential medicine was associated with key covariates of interest that include variables related to service quality and other variables (Table 3). Based on the results of test for equal variance, a non-parametric comparison was employed considering unequal variance of the covariates of interest. Multiple regression models were then developed to determine how price was associated with these covariates presented in Table 3. In the regression analyses, one essential medicine from each of the Anatomical Therapeutic Chemical codes (ATC) was selected to determine their relationships with service quality variables—namely, amoxicillin 500mg, condoms, paracetamol 500mg, aminophylline 100mg and Ringer lactate solution. The significance level was set at 0.0005 as there were effectively 150 comparisons that were implemented. To make the best use of the data, the ones found to be more available in the outlets were selected. The selected ATC categories and products were as follows:

- Antibacterials: *amoxicillin 500mg*
- Reproductive health-related: *condom*
- Analgesics: *paracetamol 500mg*
- Respiratory system: *aminophylline 100mg*
- Other categories: Ringer lactate solution

### Price information

Medicine unit price can vary from one pharmaceutical preparation to the other since both can have the same active pharmaceutical ingredients but be produced by different manufacturers. Therefore, we standardized the price unit for the analyses and for international comparisons: that is, unit price was defined as a dispensing unit price a package price divided by package size. Depending on a product, a package size can be the total number of tablets that are contained in the package, capsules, bottles, ampules, vials, sachets for oral rehydration solution (ORS), or cycles for contraceptives.

To assess how much local prices deviate from the international reference price (IPR), the median price ratio (MPR) was calculated [25]. In addition, ratios of minimum price to maximum price were calculated for each of the essential medicines to see the price variability for a particular medicine. The price information collected in the local currency was converted to the US dollar values in mid-April of 2013 when the data was collected.

As secondary analyses, in order to understand the magnitude of financial burden for an average Afghan patient to bear if seeking pharmaceutical care in the private pharmacy, the unit price information was adjusted to the price for the full adult-equivalent treatment dosage (AETD) and compared with AETD based on the international reference price (IRP). In the analyses of affordability, two health conditions were chosen on the basis of diseases that contribute to the greatest gains in disability-adjusted life years (DALYs) in Afghanistan [26]: lower respiratory infections and diarrheal diseases. More specifically, we examined two hypothetical adult cases with severe pneumonia and with acute diarrheal without blood. Using the median price information, a course of full medication derived from the Afghanistan National Standard Treatment Guidelines (NSTG) was translated into monetary value in 2013 US dollars [27].

#### Measurement of pharmacy service quality

Our study defined the pharmacy service quality as a central value of the broad concept of access to care that is comprised of four dimensions (Figure 2) proposed by Peters and his colleagues: availability, affordability, acceptability and geographic accessibility [28]. The measures of the quality of pharmacy services were based on the Afghanistan's Pharmacy Regulation document and extracted regulatory requirements that the government prioritized to maintain and improve the pharmacy service quality of the private pharmacies [29]. Each of the dimensions has elements that were derived from the Afghanistan's Private Pharmacy Regulation and the Medicines Law, which served as key reference material for the development of survey questions [19, 29].

Table 3 shows the pharmacy service quality-related variables that were examined in this study. Other variables were included in the model if they were deemed *a priori* to be potentially influential to both price and service quality. These variables were: years in business, location, number of pharmacies in proximity, past experience with supply chain problems, and licensure status.

### Statistical models

Linear regression models for the five medicines were developed using the Model 1 described below. This model was also used to assess the determinants of the price including the pharmacy service quality variables with varying specifications.

Model 1:

$$\begin{aligned} \ln PRICE_i = & \beta_0 + \beta_1 PHARMACIST_i + \beta_2 ROOM_i + \beta_3 STOCK_i + \beta_4 REFRIG_i + \beta_5 RECORD_i \\ & + \beta_6 DISPENSE_i + \beta_7 KNOW_i + C\beta_8 LEAN_i + \beta_9 AVAILABLE_i + \beta_{10} EXPIRE_i \beta_{11} URBAN_i + \\ & + URBA + \beta_{12} YEARS_i + \beta_{13} LICENSE_i + \beta_{14} OTHPHARM_i + \beta_{15} SUPPLY_i + \varepsilon_{ij} \end{aligned}$$

where  $PRICE_i$  is the  $j$ th medicine price ( $j=1, 2, \dots, 30$ ) at the  $i$ th pharmacy and is log-transformed ( $i = 1, 2, \dots, 879$ ),  $LICENSE_i$  is the licensure status of the  $i$ th pharmacy,  $OTHPHARM_i$  is the number of other pharmacies within a 200-meter radius of the  $i$ th pharmacy,  $SUPPLY_i$  is whether the  $i$ th pharmacy experienced supply chain problems.  $\varepsilon_{ij}$  is an error term. Definitions for the other covariates are explained in Table 3.

## **Results**

### Characteristics of private pharmacies

A total of 879 private pharmacies were included in the study. Table 4 summarizes the estimated characteristics of the private pharmacies included in the study. The estimated values that are presented in Table 4 consider sample weight and sampling features.

Three-quarters of the private pharmacies were located in urban areas (75.5%, 95% CI 66.8, 84.2). The mean number of years for which the private pharmacies had been in business was 12 years (95%CI 10.7, 13.3). Approximately 84% of private pharmacies in the surveyed provinces had a pharmacist on site at the time of study visit (83.7%, 95%CI 79.3, 88.1). Of the private pharmacies, 54.5% were able to produce a license, 10.5% did not have licensure, and 35.0% claimed that they were licensed but were unable to produce the license at the time of the study visit. Few of the private pharmacies, 2.6% (95%CI 0.8, 4.3), met the regulatory standards for pharmacy rooms.

Eighteen percent of the private pharmacies had a functional refrigerator at the site (95%CI 12.3, 24.3). Fifteen percent of the private pharmacies kept the record of dispensed prescription

medicines (15.1%, 95%CI 11.0, 19.2). Sixteen percent of the private pharmacies had a systematic stock management method. Fifteen percent of the private pharmacies could provide the patient with sufficient information with respect to the dispensed medicines (15.1%, 95%CI 9.6, 20.6).

The vast majority of the private pharmacies were lacking at least one essential medicine from each of the list of thirty essential medicines included in the study (98.7%, 95%CI 97.1, 100.3). Less than one percent of the private pharmacies carried expired medicines in the basket of 30 essential medicines at the time of data collection (0.6%, 95%CI 0.01, 1.1). Only a fraction of the private pharmacy staff could correctly answer the question about first-line medications used for three key disease conditions, i.e., asthma, tuberculosis and urinary tract infection (3.4%, 95%CI 1.7, 5.1). Seventy-one percent of the private pharmacies met the hygienic standards required by regulations (71.7%, 95%CI 65.2, 78.1). Thirty percent (30.2%, 95%CI 22.3, 38.1) of the private pharmacies reported ever encountering problems with their medicines supplier.

### Medicine prices

The variability in the lowest acquisition prices of essential medicines is shown in Figures 3 and 4 (2013 US dollars). Table 5 shows median, mean, minimum and maximum values of unit price, IRP, and median price ratios (MPR) by each of the essential medicines.

The unit price of an essential medicine ranged from 0.50 US cents to 1.90 US dollars. Median price ratios (MPR) ranged from 0.006 times the IRP for norgestrel (progesterone only pill, POP) to 3.96 for magnesium trisilactate + aluminum hydroxide (Table 5). An average MPR of the basket of 30 essential medicines was 1.25 times the IRP. A ratio of minimum to maximum price ranged from a factor of 6 for tetracycline eye ointment to a factor of 45 for a condom.

The prices of five selected essential medicines were compared to pharmacy service quality-related variables and other key variables. Table 6 shows the rank test results. Statistically significant differences in prices were observed for some of the pharmacy characteristics for amoxicillin 500mg cap/tab, aminophylline 100mg cap/tab, and Ringer lactate after taking into account of multiple comparisons. That is, the price of amoxicillin 500mg cap/tab significantly differed between pharmacies having and not having at least one medicine expired at the time of data collection. The price of aminophylline 100mg cap/tab was significantly different between pharmacies with and without licensure. The price of Ringer lactate differed significantly

between pharmacies keeping and not keeping the premise hygienic as per the regulation, and with and without licensure.

### Multivariate analyses

For each of the five medicines, multivariate regressions were estimated to assess the association between service quality-related exposure variables and the price of selected essential medicines with other control variables as potential confounders. These medicines were: amoxicillin 500mg cap/tab, paracetamol 500mg cap/tab, aminophylline 100mg cap/tab, condom and Ringer lactate (Tables 7). After controlling for the potential confounders, the association between the prices of these five medicines and service quality indices varied.

The price of three of five medicines examined showed a significant association with licensure status. For amoxicillin and aminophylline, the unlicensed private pharmacies had significantly higher price compared to licensed pharmacies. The unit price of amoxicillin 500mg tab/cap at the unlicensed pharmacies was higher by 19.5% compared to that at licensed pharmacies ( $p=0.003$ , 95%CI 6.2, 34.4). The unit price of aminophylline 100mg cap/tab sold at the unlicensed pharmacies was 4.4 times the price at the licensed pharmacy ( $p<0.0005$ , 95%CI 3.5, 5.4). The unit price of Ringer lactate on average was lower by 21.0% at the unlicensed pharmacies as compared to licensed pharmacies. The 100mg tab/cap was significantly higher at urban pharmacies than rural pharmacies ( $p = 0.02$  and  $p<0.0005$  respectively). The price of aminophylline 100mg tab/cap was negatively associated with the presence of pharmacist and existence of prescription record. The price of ringer lactate was lower by 12.1% at the pharmacies with systematic stock management compared to the pharmacies without systematic stock management ( $p=0.008$ , 95%CI 3.4, 20.0). On the other hand, the price of Ringer lactate at the pharmacies that met hygienic standards (“cleanliness”) was higher by 11.0% than the pharmacies that did not meet when controlled for the potential confounders ( $p=0.007$ , 95%CI 3.0, 19.7).

### Affordability

The estimated direct and minimal pharmaceutical treatment cost for a pediatric pneumonia case was estimated at US 60 cents per episode in 2013 US dollar values based on the Integrated Management of Childhood Illnesses (IMCI) treatment protocol (Table 8). The estimated medication costs for an adult severe pneumonia and acute diarrhea without blood were USD 57 cents per case and USD 95 cents per case respectively. In Afghanistan, the lowest monthly

salary for a non-technical civil servant is about USD 95.1 in 2013 US dollars. An Afghan family headed by the government officer appears to be able to afford the cost of medication without financial catastrophe based on medicine price alone (i.e., assuming that other direct and indirect costs, such as a consultation fee and diagnostic testing and transportation, could be ignored).

## **Discussion**

This analysis found that there was a wide variation in the price of essential medicines available at the private pharmacies in Afghanistan. The median price ratios ranged from 0.006 times the IRP for norgestrel (progesterone only pill, POP) to 3.96 for magnesium trisilactate + aluminium hydroxide. The mean MPR for the 30 essential medicines under study was 1.25. Affordability analyses for two case studies indicated that an average Afghan household could afford the minimal pharmacological treatment for two example diseases of national priority.

Although the survey method and essential medicines examined differ, when compared with the findings of WHO/HAI study, these MPR values observed in Afghanistan were smaller than the countries surveyed under the WHO/HAI [3]. Since this study intended to specifically capture the lowest acquisition prices of the medicines in the private sector, the data may have converged toward lower values as compared to a study aiming to obtain more general price information. In addition, the prices of originator brand products than generic products were not differentiated, and the obtained price data were an amalgamation of two extremes. However, the presumption is that the collected price information was mostly for generic medicines. Nonetheless, this approach could have contributed to wide variability of the prices.

The association between the price and service quality-related variable was not pronounced in this analysis. The alternative regression models that employed varying service quality-related indicators did not yield conclusive evidence. Moreover, the results sometimes disagreed with the prior assumption that the medicines would be priced higher at private pharmacies that provide better quality, but also indicated in some models that the direction of association was opposite. There are several possible reasons for this. For example, the selected service quality-related variables may not be those that are mostly closely tied to price. Or some may not be readily observable to those purchaser, or some may not cost substantially more to provide. .

While research that examines medicine price and service quality is scarce, the association between pharmacopoeial quality of essential medicines and price has been explored by others. Bate and his colleagues reported that the medicines that failed the analytical quality testing tended to be priced lower than the medicines that passed [30]. Although the association was not statistically significant, the analysis of the quality for the selected five medicines support their finding: the medicine prices were higher in private pharmacies having no expired medicines than the pharmacies having expired medicines at the time of data collection (Tables 7). The price could be more responsive to the quality of medicines than other attributes of pharmacy services; however, actual assessment of the quality of medicines was beyond the scope of the survey.

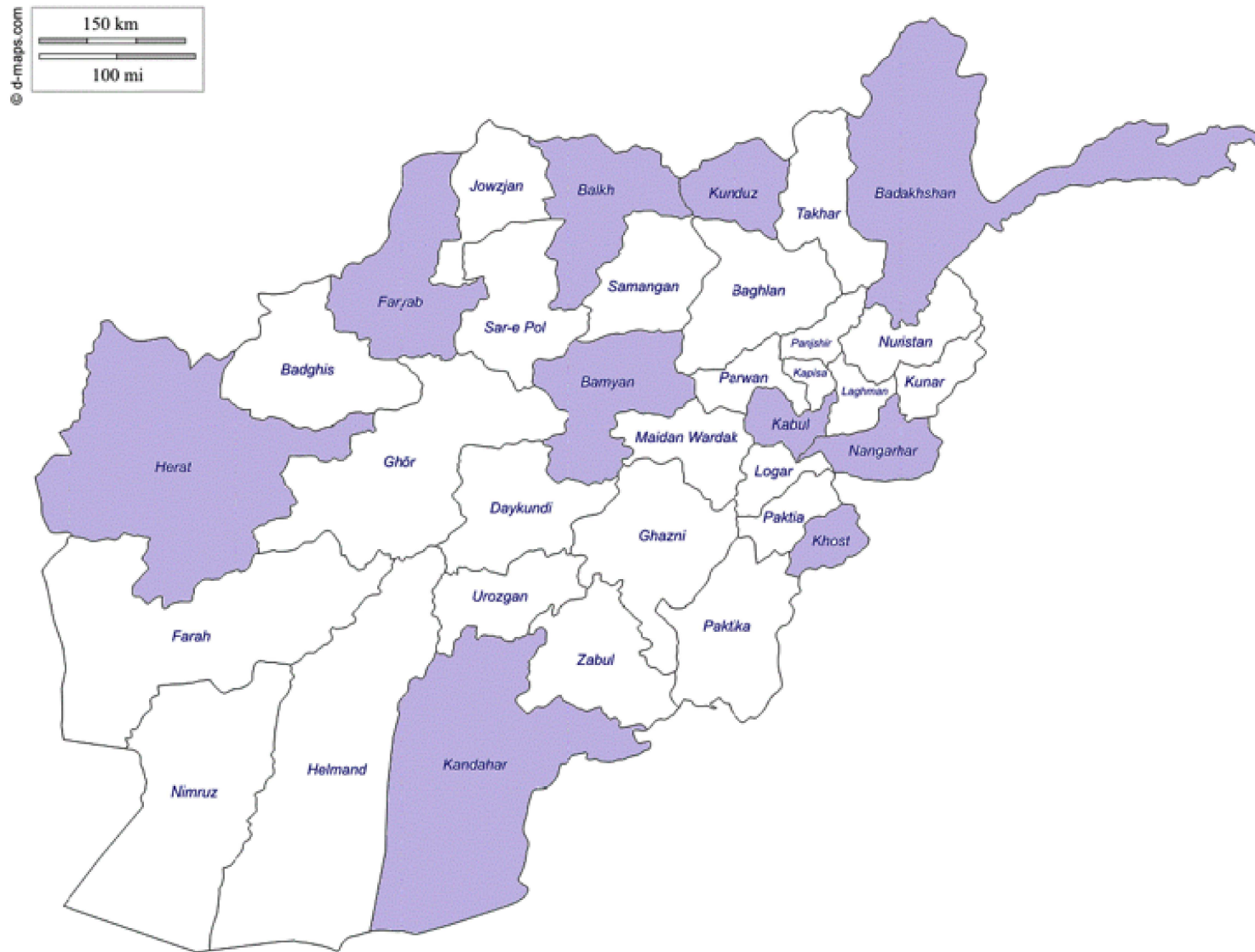
The focus here is on pharmacies: no data were collected from individuals who pay for the medicinal products and services at private pharmacies. Thus, pharmacy service quality was defined predominantly from a perspective of the regulatory requirements. Previous studies in LMICs suggest that the price was a weaker determinant for the service utilization than the service quality perceived by community [31, 32, 33]. Future studies are needed to explore what elements of the service quality that are perceived by patients and whether they influence their intent to pay for the essential medicines at private pharmacies.

## **Conclusion**

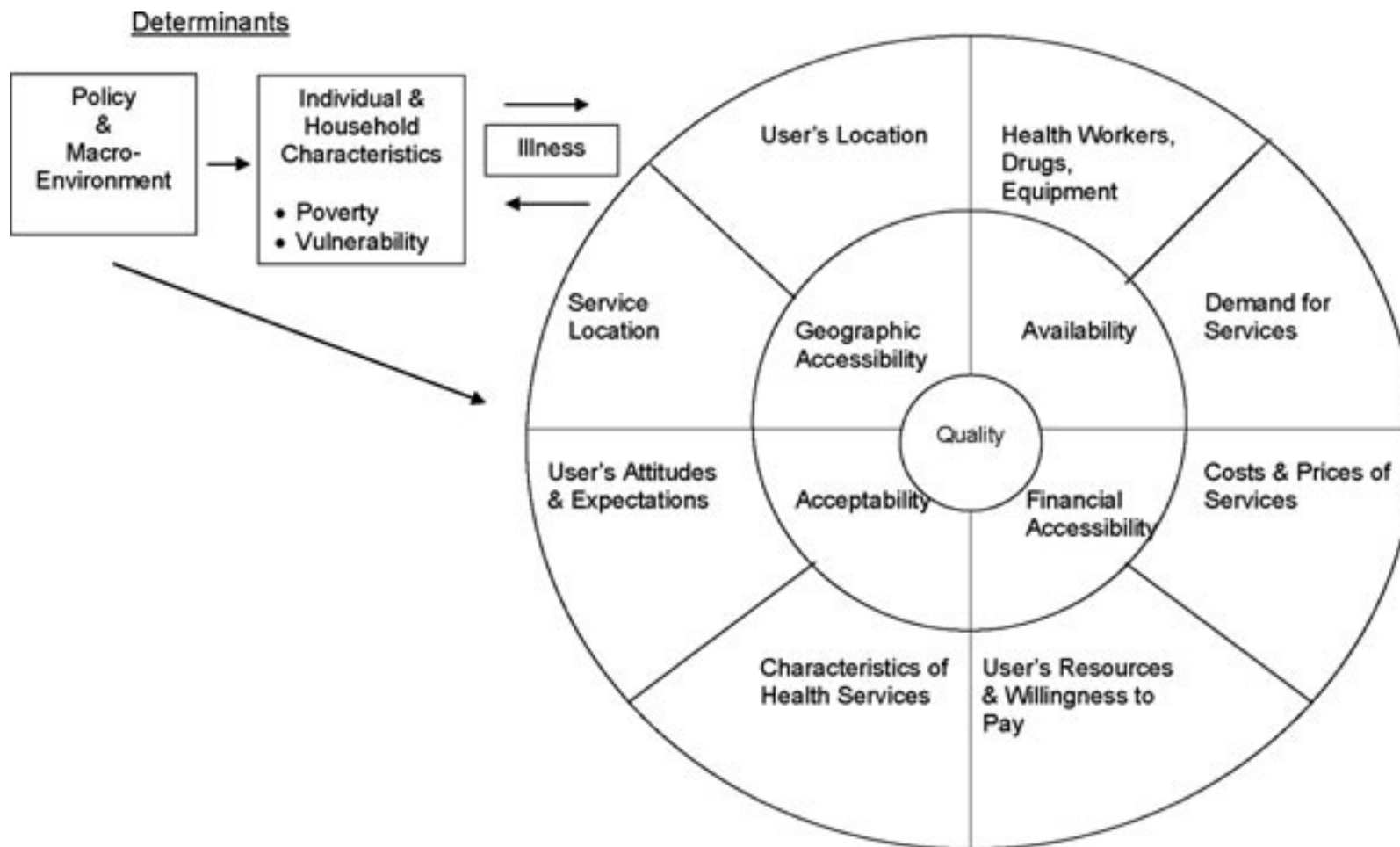
The price of essential medicines was not significantly associated with the pharmacy service quality in Afghanistan. Moreover, our findings provided a mixed picture with some examples of higher prices in pharmacies with seemingly lower quality. Further studies are needed to understand what elements of the quality of pharmacy services affect the patients' behavior perceptions of quality and their willingness to pay for essential medicines.

### Chapter 3 Figures and Tables

**Figure 1: Provinces where the interviews were conducted.**

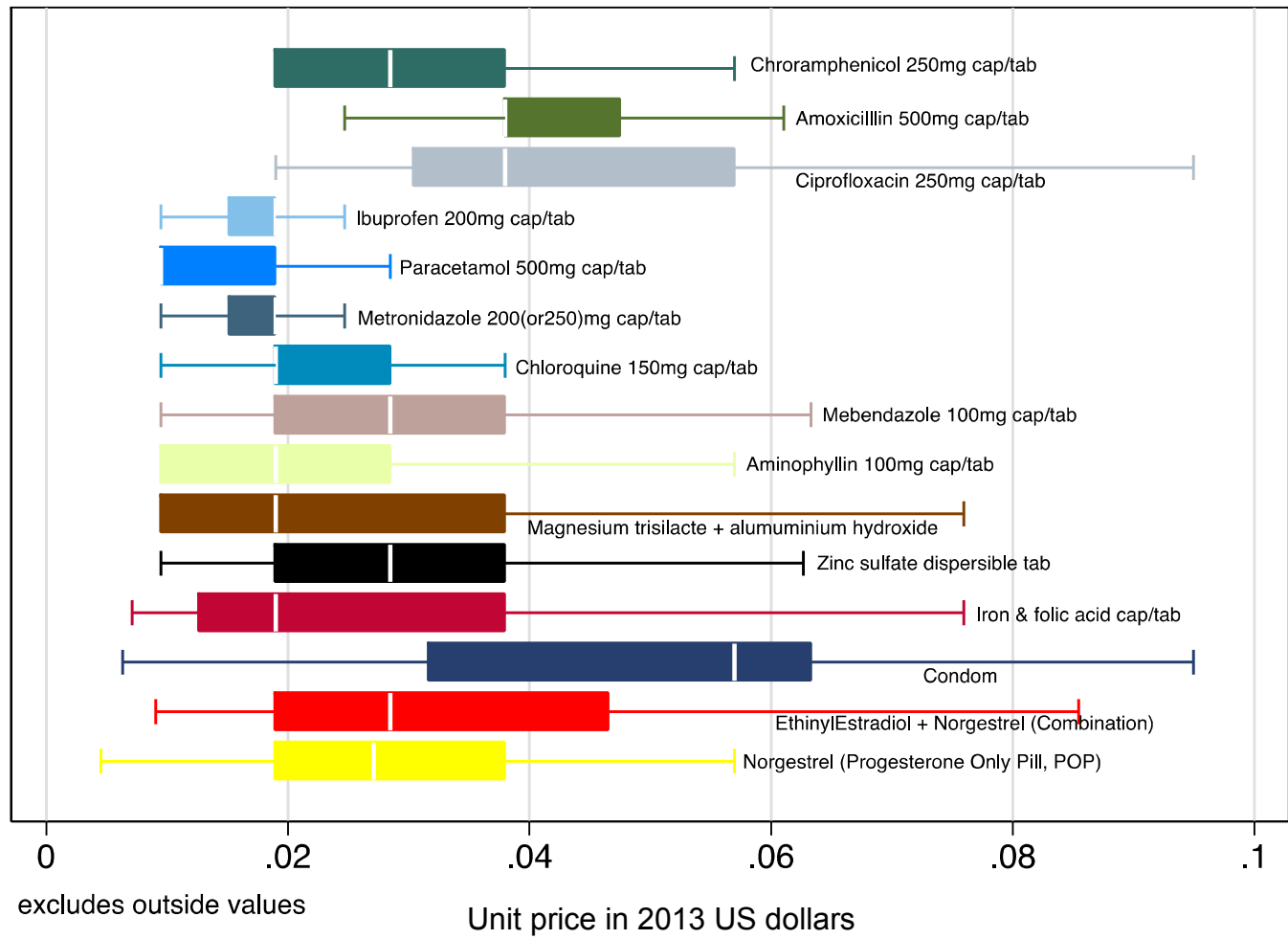


**Figure 2: Conceptual framework for assessing access to health services (Peters et al. 2008).**

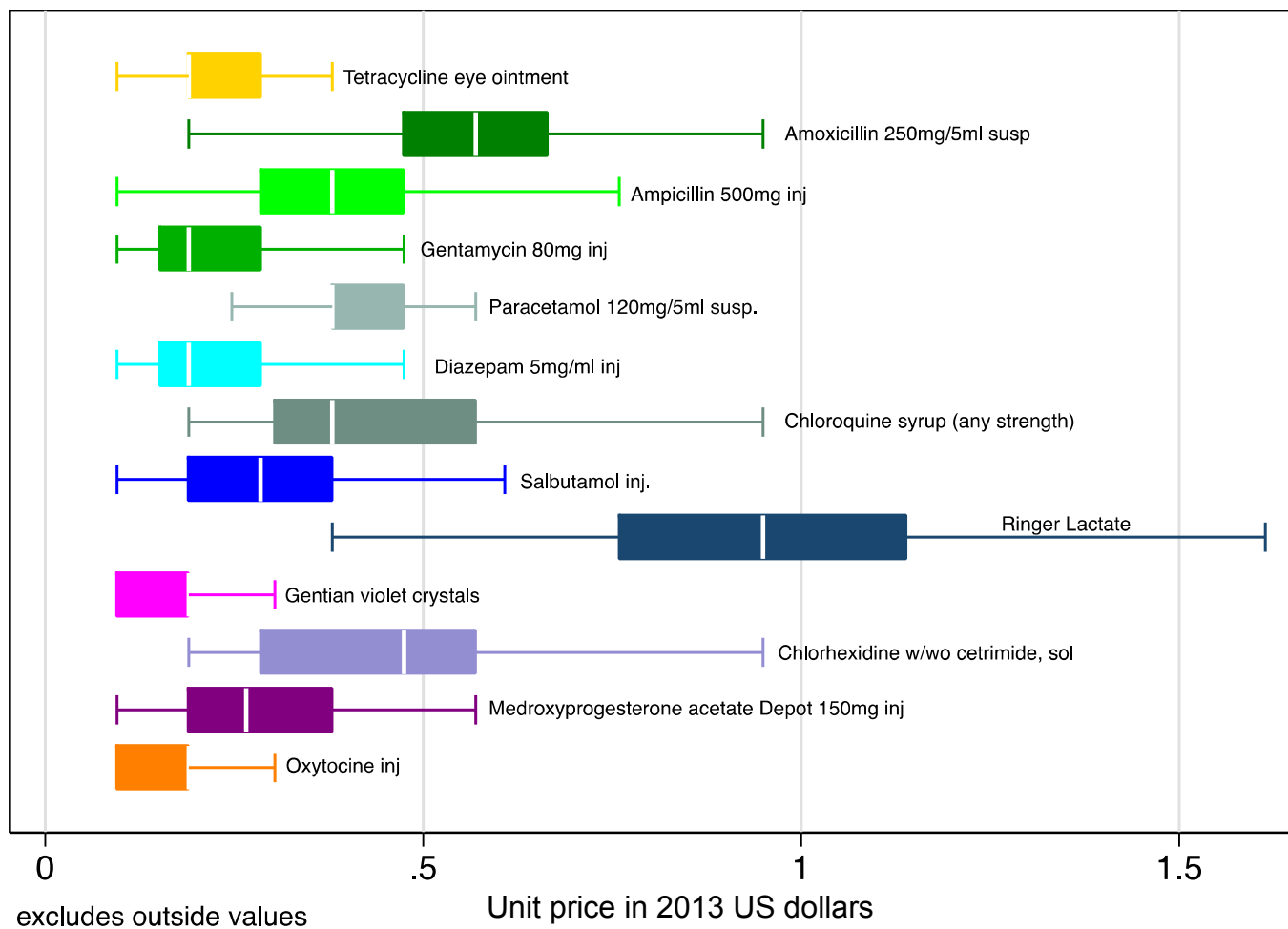


Peters DH, Garg A, Bloom G, Walker DG, Brieger WR, Rahman MH. Poverty and access to health care in developing countries. *Ann N Y Acad Sci.* [Internet]. 2008 [cited 2015 March 18];1136:161-71. Epub 2007. Figure 1, Conceptual framework for assessing access to health services; p. 162. Available from: *Annals of the New York Academy of Sciences.* The copyright license number: 3591970219671.

**Figure 3: Variability of lowest acquisition prices of essential medicines**



**Figure 4: Variability of lowest acquisition prices of essential medicines**



Note: Cotrimoxazole 480mg tab/cap and ORS are not plotted due to lack of variability in the data.

**Table 1: Distribution of Pharmacy Samples by Province By Licensure Status**

| Provinces  | Licensed | Unlicensed | Unverifiable | Total | % of total |
|------------|----------|------------|--------------|-------|------------|
| Badakhshan | 13       | 0          | 4            | 17    | 1.9%       |
| Balkh      | 59       | 0          | 27           | 86    | 9.8%       |
| Bamyan     | 6        | 4          | 1            | 11    | 1.3%       |
| Faryab     | 24       | 0          | 10           | 34    | 3.9%       |
| Herat      | 63       | 1          | 47           | 111   | 12.6%      |
| Kabul      | 189      | 0          | 204          | 393   | 44.7%      |
| Kandahar   | 21       | 6          | 30           | 57    | 6.5%       |
| Khost      | 1        | 29         | 0            | 30    | 3.4%       |
| Kunduz     | 31       | 0          | 1            | 32    | 3.6%       |
| Nangarhar  | 92       | 2          | 14           | 108   | 12.3%      |
| Total      | 499      | 42         | 338          | 879   | 100%       |

**Table 2: List of 30 Essential Medicines in ARPS 2013**

| #  | Name of product                  | Unit    | #  | Name of product                             | Unit   |
|----|----------------------------------|---------|----|---|--------|
| 1  | Tetracycline eye ointment        | Tube    | 16 | Mebendazole 100mg                           | Tablet |
| 2  | Chloramphenicol 250mg            | Capsule | 17 | Salbutamol injection                        | Ampule |
| 3  | Amoxicillin 250mg/5ml suspension | Bottle  | 18 | Aminophylline 100mg                         | Tablet |
| 4  | Amoxicillin 500mg                | Capsule | 19 | Magnesium trisilicate +aluminium hydroxide  | Tablet |
| 5  | Ampicillin 500mg injection       | Vial    | 20 | ORS packets                                 | Pack   |
| 6  | Cotrimoxazole 480mg              | Tablet  | 21 | Zinc sulfate, dispersible tablets           | Tablet |
| 7  | Gentamycin 80mg injection        | Ampule  | 22 | Iron & folic acid (any strength)            | Tablet |
| 8  | Ciprofloxacin 250mg              | Tablet  | 23 | Ringer lactate                              | Bag    |
| 9  | Ibuprofen 200mg                  | Tablet  | 24 | Gentian violet crystals                     | Bottle |
| 10 | Paracetamol 120mg/5ml suspension | Bottle  | 25 | Chlorhexidine w/wo cetrimide, solution      | Bottle |
| 11 | Paracetamol 500mg                | Tablet  | 26 | Condom                                      | Piece  |
| 12 | Diazepam 5mg/ml injection        | Ampule  | 27 | Ethinylestradiol +Norgestrel (Combination)  | Cycle  |
| 13 | Metronidazole 200(or 250) mg     | Tablet  | 28 | Medroxyprogesterone acetate 150mg injection | Vial   |
| 14 | Chloroquine 150mg                | Tablet  | 29 | Norgestrel (Progesterone Only Pill: POP)    | Cycle  |
| 15 | Chloroquine syrup (any strength) | Bottle  | 30 | Oxytocin injection                          | Ampule |

**Table 3: Service quality related variables and other key variables included in the analyses**

| Variable   | Definition  | Notation   |
|--|---|------------|
| <b>Variables related to pharmacy service quality</b> |   |            |
| Presence of pharmacist at the time of visit (yes/no) | Pharmacist was present at the time data collection.   | PHARMACIST |
| Standard rooms (yes/no)                              | Whether or not the pharmacy has appropriate rooms as per the regulation.  | ROOM       |
| Systematic stock arrangement (yes/no)                | Any one or more of systematic stock management put in place.  | STOCK      |
| Having functional refrigerator (yes/no)              | Functional refrigerator used at the time of data collection.  | REFRIG     |
| Prescription record (yes/no)                         | Prescription records kept.  | RECORD     |
| Unexpired medicines in stock (yes/no)                | The basket of 30 essential medicines included expired medicine(s) at the time of data collection.   | EXPIRE     |
| Standard dispensing practice (yes/no)                | Necessary information provided to patient when dispensing   | DISPENSE   |
| Staff knowledge (yes/no)                             | Staff knew the first-line pharmacological treatment regime for three major disease conditions, i.e. asthma, tuberculosis and urinary tract infection. | KNOW       |
| Cleanliness (yes/no)                                 | Whether or not the pharmacy met the hygienic standards as per the regulation.   | CLEAN      |
| <b>Other key variables</b>                           |   |            |
| Licensing status                                     | The pharmacy produced a licensure at the time of data collection: licensed, unlicensed and uncertain.   | LICENSE    |
| Availability of essential medicines (yes/no)         | The basket of 30 essential medicine was available at the time of data collection.   | AVAILABLE  |
| Location, urban/ rural                               | The pharmacy was located in urban or rural.   |            |
| Number of years in business: years                   | Number of years that the pharmacy had been in business longer than or equal to 12 years.  | URBAN      |
| Supply chain constraints (yes/no)                    | The pharmacy experienced with problem(s) with the medicine suppliers in the last one year.  |            |
| Other pharmacies in proximity (yes/no)               | Log of number of other pharmacies within a 200-meter radius of the interviewed pharmacy.  |            |

**Table 4: Private Pharmacy Characteristics (n=879)**

| Characteristics   | Estimate | Standard Error | 95% CI |       |
|---|----------|----------------|--------|-------|
| Proportion of pharmacies operating in urban area, %   | 75.5     | 4.4            | 66.8   | 84.2  |
| Pharmacies with pharmacist present at the time of data collection, %                            | 83.7     | 2.2            | 79.3   | 88.1  |
| Mean number of years in business, years   | 12.0     | 0.7            | 10.7   | 13.3  |
| Licensure status, %   |          |                |        |       |
| <i>Licensed pharmacies</i>  | 54.5     | 4.3            | 46.3   | 62.8  |
| <i>Unlicensed pharmacies</i>  | 10.5     | 3.7            | 5.2    | 20.3  |
| <i>Pharmacies with uncertain licensure status</i>   | 35.0     | 4.1            | 27.3   | 43.4  |
| Proportion of pharmacies that met the service quality standards at the time of data collection§ |          |                |        |       |
| Standard rooms, %   | 2.6      | 0.9            | 0.8    | 4.3   |
| Having functional refrigerator, %   | 18.3     | 3.0            | 12.3   | 24.3  |
| Existence of prescription record, %   | 15.1     | 2.1            | 11     | 19.2  |
| Necessary information is provided for patient when dispensing, %                                | 15.1     | 2.8            | 9.6    | 20.6  |
| Staff knowledge at satisfactory level, %  | 3.4      | 0.9            | 1.7    | 5.1   |
| Stock management, %   | 15.5     | 2.4            | 10.7   | 20.4  |
| Cleanliness, %  | 71.7     | 3.3            | 65.2   | 78.1  |
| Pharmacies that did not have at least one essential medicines at the time of data collection, % | 98.7     | 0.8            | 97.1   | 100.3 |
| Proportion of pharmacies that carried expired medicine(s) at the time of data collection %      | 0.6      | 0.3            | 0.01   | 1.1   |
| Average number of pharmacy outlets in proximity at the time of data collection                  | 3.3      | 0.4            | 2.6    | 4.0   |
| Proportion of pharmacies that have ever had a supply chain problems, %                          | 30.2     | 4.0            | 22.3   | 38.1  |
| Mean score of composite service quality variable: score 0-1 (low to high quality)               | 0.373    | 0.014          | 0.346  | 0.401 |

Note: the values are estimated means after accounting for sample weights and sampling features unless otherwise stated.

§ Proportion of pharmacy outlets that met the service quality standards defined by MoPH.

**Table 5: Lowest acquisition price of 30 essential medicines (in 2013 US dollars)**

| Medicine Name                                | n   | Mean price | Standard Deviation | Minimum price | Maximum price | Median price | Ratio of Max / Min | Mean price with sample weight | Standard error | 95%CI       | IRP 2013¶ |
|--|-----|------------|--------------------|---------------|---------------|--------------|--------------------|-------------------------------|----------------|-------------|-----------|
| Tetracycline eye ointment                    | 805 | 0.226      | 0.087              | 0.095         | 0.570         | 0.190        | 6.0                | 0.230                         | 0.008          | 0.213 0.246 | 0.060     |
| Chloramphenicol 250mg                        | 402 | 0.030      | 0.013              | 0.019         | 0.076         | 0.028        | 4.0                | 0.030                         | 0.001          | 0.028 0.033 | 0.038     |
| Amoxicillin 250mg/5ml susp                   | 816 | 0.602      | 0.193              | 0.190         | 1.519         | 0.570        | 8.0                | 0.578                         | 0.013          | 0.552 0.603 | 0.750     |
| Amoxicillin cap 500                          | 827 | 0.043      | 0.015              | 0.019         | 0.114         | 0.038        | 6.0                | 0.043                         | 0.001          | 0.040 0.045 | 0.031     |
| Ampicillin 500mg inj                         | 669 | 0.361      | 0.152              | 0.095         | 0.949         | 0.380        | 10.0               | 0.364                         | 0.011          | 0.342 0.385 | 0.219     |
| Cotrimoxazole tab 480                        | 720 | 0.021      | 0.010              | 0.009         | 0.076         | 0.019        | 8.0                | 0.022                         | 0.001          | 0.020 0.023 | 0.016     |
| Gentamycin 80mg inj                          | 708 | 0.255      | 0.189              | 0.095         | 1.519         | 0.190        | 16.0               | 0.257                         | 0.017          | 0.224 0.290 | 0.207     |
| Ciprofloxacin tab 250                        | 581 | 0.049      | 0.029              | 0.019         | 0.228         | 0.038        | 12.0               | 0.049                         | 0.002          | 0.044 0.053 | 0.036     |
| Ibuprofen 200mg                              | 651 | 0.021      | 0.010              | 0.009         | 0.095         | 0.019        | 10.0               | 0.020                         | 0.001          | 0.019 0.021 | 0.009     |
| Paracetamol 120 mg/5ml                       | 758 | 0.435      | 0.161              | 0.190         | 1.709         | 0.380        | 9.0                | 0.425                         | 0.012          | 0.401 0.449 | 0.380     |
| Paracetamol 500mg                            | 823 | 0.015      | 0.010              | 0.009         | 0.095         | 0.009        | 10.0               | 0.016                         | 0.001          | 0.014 0.018 | 0.006     |
| Diazepam 5mg/ml inj                          | 429 | 0.235      | 0.140              | 0.095         | 0.949         | 0.190        | 10.0               | 0.264                         | 0.015          | 0.234 0.295 | 0.109     |
| Metronidazole 200(or250) mg tab              | 638 | 0.019      | 0.009              | 0.009         | 0.095         | 0.019        | 10.0               | 0.018                         | 0.001          | 0.017 0.020 | 0.007     |
| Chloroquine 150mg                            | 415 | 0.024      | 0.013              | 0.009         | 0.095         | 0.019        | 10.0               | 0.025                         | 0.002          | 0.022 0.028 | 0.052     |
| Chloroquine syrup (any strength)             | 314 | 0.445      | 0.167              | 0.190         | 1.139         | 0.380        | 6.0                | 0.413                         | 0.020          | 0.373 0.454 | 0.440     |
| Mebendazole 100mg                            | 620 | 0.032      | 0.019              | 0.009         | 0.158         | 0.028        | 16.7               | 0.031                         | 0.001          | 0.029 0.034 | 0.017     |
| Salbutamol inj                               | 294 | 0.302      | 0.161              | 0.095         | 0.949         | 0.285        | 10.0               | 0.300                         | 0.016          | 0.269 0.332 | 2.382     |
| Aminophyllin 100mg tab                       | 469 | 0.021      | 0.016              | 0.009         | 0.095         | 0.019        | 10.0               | 0.026                         | 0.002          | 0.021 0.030 | 0.006     |
| Magnesium trisilactate + aluminium hydroxide | 347 | 0.024      | 0.016              | 0.009         | 0.076         | 0.019        | 8.0                | 0.024                         | 0.002          | 0.021 0.027 | 0.005     |
| ORS packets                                  | 789 | 0.108      | 0.056              | 0.038         | 0.475         | 0.095        | 12.5               | 0.109                         | 0.004          | 0.102 0.116 | 0.110     |
| Zinc sulfate dispersible tablets             | 288 | 0.031      | 0.019              | 0.009         | 0.114         | 0.028        | 12.0               | 0.030                         | 0.002          | 0.026 0.033 | 0.013     |
| Iron & folic acid (any strength)             | 579 | 0.027      | 0.022              | 0.007         | 0.133         | 0.019        | 18.7               | 0.030                         | 0.003          | 0.025 0.035 | 0.033     |
| Ringer lactate                               | 777 | 0.933      | 0.276              | 0.380         | 1.899         | 0.949        | 5.0                | 0.924                         | 0.022          | 0.882 0.967 | 1.000     |

| Medicine Name                               | n   | Mean price | Standard Deviation | Minimum price | Maximum price | Median price | Ratio of Max / Min | Mean price with sample weight | Standard error | 95%CI | IRP 2013¶ |       |
|---|-----|------------|--------------------|---------------|---------------|--------------|--------------------|-------------------------------|----------------|-------|-----------|-------|
| Gentian violet crystals                     | 618 | 0.208      | 0.167              | 0.095         | 0.949         | 0.190        | 10.0               | 0.212                         | 0.016          | 0.179 | 0.244     | 0.105 |
| Chlorhexidine w/wo cetrимide, sol *         | 200 | 0.484      | 0.208              | 0.190         | 0.949         | 0.475        | 5.0                | 0.454                         | 0.018          | 0.418 | 0.490     | 3.650 |
| Condom                                      | 720 | 0.061      | 0.042              | 0.006         | 0.285         | 0.057        | 45.0               | 0.061                         | 0.003          | 0.054 | 0.067     | 0.259 |
| EthinylEstradiol + Norgestrel (Combination) | 212 | 0.035      | 0.020              | 0.009         | 0.085         | 0.028        | 9.5                | 0.038                         | 0.004          | 0.030 | 0.047     | 0.450 |
| Medroxyprogesterone acetate Depot 150mg inj | 387 | 0.296      | 0.191              | 0.095         | 1.139         | 0.266        | 12.0               | 0.268                         | 0.019          | 0.231 | 0.306     | 0.769 |
| Norgestrel (Progesterone Only Pill, POP)    | 214 | 0.030      | 0.018              | 0.005         | 0.095         | 0.027        | 21.0               | 0.029                         | 0.002          | 0.025 | 0.032     | 3.414 |
| Oxytocine inj                               | 454 | 0.205      | 0.163              | 0.095         | 1.139         | 0.190        | 12.0               | 0.212                         | 0.021          | 0.170 | 0.254     | 0.219 |

¶ IRP: International Reference Price

**Table 6: Relationships between price and selected essential medicines**

| Variables<br>SN | Amoxicillin 500mg cap/tab |     |           | Paracetamol 500mg cap/tab |     |           | Aminophylline 100mg cap/tab |     |           | Condom     |     |           | Ringer Lactate |     |           |
|-----------------|---------------------------|-----|-----------|---------------------------|-----|-----------|-----------------------------|-----|-----------|------------|-----|-----------|----------------|-----|-----------|
|                 | Rank means                |     | p- values | Rank means                |     | p- values | Rank means                  |     | p- values | Rank means |     | p- values | Rank means     |     | p- values |
|                 | Yes                       | No  |           | Yes                       | No  |           | Yes                         | No  |           | Yes        | No  |           | Yes            | No  |           |
| 1               | -                         | -   | -         | -                         | -   | -         | -                           | -   | -         | -          | -   | -         | -              | -   | -         |
| 2               | -                         | -   | -         | -                         | -   | -         | -                           | -   | -         | -          | -   | -         | -              | -   | -         |
| 3               | -                         | -   | -         | -                         | -   | -         | -                           | -   | -         | -          | -   | -         | 320            | 399 | 0.000646  |
| 4               | -                         | -   | -         | -                         | -   | -         | -                           | -   | -         | -          | -   | -         | -              | -   | -         |
| 5               | -                         | -   | -         | -                         | -   | -         | 208                         | 242 | 0.01519   | -          | -   | -         | -              | -   | -         |
| 6               | -                         | -   | -         | -                         | -   | -         | -                           | -   | -         | -          | -   | -         | -              | -   | -         |
| 7               | -                         | -   | -         | -                         | -   | -         | 317                         | 233 | 0.017372  | -          | -   | -         | -              | -   | -         |
| 8               | -                         | -   | -         | -                         | -   | -         | -                           | -   | -         | -          | -   | -         | 406            | 333 | 0.000061  |
| 9               | -                         | -   | -         | -                         | -   | -         | -                           | -   | -         | -          | -   | -         | -              | -   | -         |
| 10              | 554                       | 409 | 0.0012    | 499                       | 409 | 0.03087   | -                           | -   | -         | 466        | 357 | 0.00416   | -              | -   | -         |
| 11              | 404                       | 441 | 0.02314   | -                         | -   | -         | -                           | -   | -         | 351        | 390 | 0.01747   | -              | -   | -         |
| 12              | 388                       | 443 | 0.00045   | 390                       | 435 | 0.00323   | 224                         | 250 | 0.021341  | -          | -   | -         | -              | -   | -         |
| 13              | 248                       | 336 | 0.00042   | -                         | -   | -         | 138                         | 274 | 0         | -          | -   | -         | 251            | 152 | 0.000017  |
| 14              | -                         | -   | -         | -                         | -   | -         | -                           | -   | -         | -          | -   | -         | -              | -   | -         |
| 15              | -                         | -   | -         | -                         | -   | -         | -                           | -   | -         | -          | -   | -         | -              | -   | -         |

**Table 8: Results of regression analysis of key control variables on price variable for selected five medicines**

|  | Amoxicillin 500mg<br>cap/tab (n=701) |       |         | Paracetamol 500mg<br>tb/cap (n=704) |       |         | Aminophyllin 100mg<br>cap/tab (n=395) |       |         | Condom (n=614) |       |         | Ringer lactate (n=673) |       |         |
|--|--------------------------------------|-------|---------|-------------------------------------|-------|---------|---------------------------------------|-------|---------|----------------|-------|---------|------------------------|-------|---------|
|  | Coef.                                | SE    | p-value | Coef.                               | SE    | p-value | Coef.                                 | SE    | p-value | Coef.          | SE    | p-value | Coef.                  | SE    | p-value |
| Licensure  |                                      |       |         |                                     |       |         |                                       |       |         |                |       |         |                        |       |         |
| Unlicensed   | 0.178                                | 0.060 | **      | -0.125                              | 0.094 |         | 1.477                                 | 0.109 | **      | 0.096          | 0.159 |         | -0.235                 | 0.048 | **      |
| Uncertain  | 0.074                                | 0.051 |         | -0.009                              | 0.074 |         | -0.146                                | 0.117 |         | 0.076          | 0.094 |         | 0.017                  | 0.052 |         |
| Presence of pharmacist at the time of visit (yes/no) | 0.013                                | 0.075 |         | -0.156                              | 0.098 |         | -0.278                                | 0.124 | *       | 0.120          | 0.089 |         | -0.036                 | 0.038 |         |
| Systematic stock arrangement (yes/no)                | -0.010                               | 0.055 |         | -0.110                              | 0.074 |         | 0.139                                 | 0.098 |         | 0.067          | 0.100 |         | -0.129                 | 0.048 | **      |
| Prescription record (yes/no)                         | 0.035                                | 0.051 |         | -0.017                              | 0.072 |         | -0.264                                | 0.083 | **      | 0.054          | 0.102 |         | 0.073                  | 0.039 |         |
| Standard dispensing practice (yes/no)                | -0.075                               | 0.058 |         | -0.072                              | 0.084 |         | -0.031                                | 0.094 |         | -0.094         | 0.101 |         | -0.044                 | 0.045 |         |
| Cleanliness (yes/no)                                 | 0.047                                | 0.068 |         | 0.015                               | 0.064 |         | 0.045                                 | 0.099 |         | -0.025         | 0.129 |         | 0.105                  | 0.038 | **      |
| Location, urban/ rural                               | -0.055                               | 0.042 |         | 0.166                               | 0.075 | **      | 0.397                                 | 0.101 | **      | -0.115         | 0.108 |         | -0.081                 | 0.052 |         |
| Supply chain problems                                | -0.062                               | 0.070 |         | 0.058                               | 0.087 |         | 0.004                                 | 0.103 |         | -0.184         | 0.109 |         | 0.005                  | 0.037 |         |
| Competitor pharmacies within 200m                    | -0.031                               | 0.056 |         | 0.017                               | 0.073 |         | -0.147                                | 0.143 |         | 0.103          | 0.098 |         | -0.019                 | 0.055 |         |
| Constant   | -3.205                               | 0.086 | **      | -4.238                              | 0.130 | **      | -3.995                                | 0.175 | **      | -3.050         | 0.150 | **      | -0.066                 | 0.056 |         |

\*p<.05. \*\*p<.01

**Table 9: Minimalistic cost estimates for the major disease conditions**

| Case                                    | Standard treatment   | Minimalistic medication cost per medicine (in 2013 US dollars) | Estimated total cost (in 2013 US dollars)       |
|---|--|--|---|
| Adult with severe pneumonia             | Amoxicillin 500mg tab/cap three times a day for five days. | 0.038 per capsule or tablet                                    | USD 0.57 = (3caps/day)*(5days)* (USD 0.038/cap) |
| Adult with acute diarrhea without blood | 5 ORS packs per day for 2 days                             | 0.095 per pack   | USD 0.95 = (5packs/day)*(2days)*(USD0.095/pack) |

## Chapter 3 References

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## Conclusion

Factors affecting access to essential medicines are complex in low and middle-income countries (LMICs), but even more so in a post-conflict settings like Afghanistan. Decades of war destroyed the government regulatory system and allowed for a constellation of intermediates and service providers to play out in the pharmaceutical market with little control over the quality of products and services provide to the population. Therefore, this study was motivated by the need to explore and understand the determinants of access to essential medicines in private pharmacy sector Afghanistan. The data for the study was obtained from a national-level survey implemented by the Management Sciences for Health (MSH) and the United States Agency for International Development (USAID) in 2013. The author contributed on a *pro bono* basis to the survey by providing extensive technical input in terms of survey design, survey tools development, training, data analyses and report writing during the time period between November 2012 and February 2014.

The national survey collected data from 879 private pharmacies in 10 representative provinces. The collected data included characteristics of pharmacy outlets with regard to licensure status, staffing level, staff knowledge, stock management, building infrastructure and equipment, availability and quality of selected essential medicines, and price information of essential medicines. Using the data, the study aimed to estimate the relative prevalence and types of private pharmacies (i.e., licensed and unlicensed) and to assess the relationships among pharmacy licensure status, the availability of essential medicines, pharmacy service quality, and essential medicine prices in Afghanistan. More specifically, the study objectives were set out: (1) to estimate the availability of essential medicines sold at licensed and unlicensed private pharmacies and examine its relationship with service quality, characteristics of the regulatory framework, market structure, and other factors, and (2) to assess the relationship between the price of essential medicines sold at licensed and unlicensed pharmacies and their service quality.

This study found that:

- Private pharmacies have an important role to play in improving access to care by making essential medicines available for the population in need in Afghanistan. As a proportion of a basket of 30 essential medicines, national-level availability of essential medicines at private pharmacies was estimated to be 63.7%.

- Point prevalence of private pharmacies with licensure as a percentage of all private pharmacies was estimated to be 54.5%, private pharmacies with no licensure was 10.5% and those with unverifiable licensure was 35.0% in Afghanistan. However, the availability of essential medicines as a proportion of a basket of 30 pharmaceutical products was not significantly different between the licensed and unlicensed pharmacies though there was a consistent trend to slightly lower availability in unlicensed pharmacies. In addition, associations between licensure status and other factors that constitute pharmacy service quality were also less pronounced in our study. Considerable price variation of medicines sold at the licensed pharmacies indicates that the regulatory requirement to control the price does not function as intended in providing the population with financial access.
- Greater availability of essential medicines was significantly associated with number of medicines per prescription, number of years in business, and fewer supply chain constraints.
- The price of essential medicines was not significantly associated with the pharmacy service quality in Afghanistan. Moreover, our findings provided a mixed picture with some examples of higher prices in pharmacies with seemingly lower quality.
- While the licensure system as a regulatory intervention does not substantially affect the availability of essential medicines in Afghanistan, further research is required to understand what other regulatory interventions are needed to improve access to pharmacy services in terms of the availability and affordability of essential medicines.

Given an opportunity, a future study to examine Afghan private pharmaceutical affairs should introduce more robust verification method of licensure so as to reducing the number of unverifiable licensure. This may include redefining of the unlicensed outlets as those who did not produce the licensure at the time of data collection regardless of the self-claim of licensure status. In addition, to better understand how the private healthcare providers behave in the market for essential medicines and how they interact with public health care providers in terms of access to essential medicines, the public health service providers need to be assessed using comparable metrics.

The study concludes with possible policy recommendations based on the findings:

- The current regulations fail to influence the factors that potentially ensure the people's access to essential medicines. The regulatory requirements set by the government do not guarantee the pharmacy service-related quality for the patients. These requirements include physical structure, staff knowledge, prescription records, etc. Moreover, licensure status appeared to play a nominal role in improving the availability of essential medicines and controlling prices of essential medicines. For example, the regulation requires the licensed pharmacies to operate 200 meters away from each other in a view to distribute the service points evenly and thus serve the hard-to-reach population. None of the interviewed pharmacies complied with this regulation. Regardless of licensure status, which in part demonstrates willingness to comply with the regulations, the private pharmacies operate wherever the demand is high. In lieu of the current 200-meter rule, the regulatory authority should incentivize the private pharmacies to provide the services of good quality for the hard-to-reach by accreditation of "quality pharmacy" [1]
- By regulation, the medicines sold at the licensed pharmacies are price-capped with up to 15% of its wholesale price. If this regulation worked to control the price of essential medicines as intended, the lowest acquisition prices would have converged into a narrower certain range. The findings here did not suggest so. Instead, there was considerable price variation across pharmacies and within a given pharmacy, indicating that regardless of licensure status the private pharmacies adjust prices to market conditions: the price mark-up rule is not working in Afghanistan. Among options for the price regulation in LMICs, price controls are thought to be the best option to reduce high out-of-pocket contributions to total expenditure on medicines [2]. Similar approaches could be considered by the Afghan medicines regulatory authority.
- Our study revealed that inspection history had a significant impact on the availability of essential medicines. Currently, the Afghan medicines regulatory authority suffers from fragmentation of regulatory functions across multiple departments of Ministry of Public Health (MoPH). In other words, the private pharmacies are "inspected" by multiple authorities with unclear and possibly different objectives and interests. Even the current inspection system helps essential medicines more available, potential inefficiency that arises from the fragmentation could be enormous. MoPH need to

consider integration and restructuring of the medicines regulatory authority for greater effectiveness and efficiency.

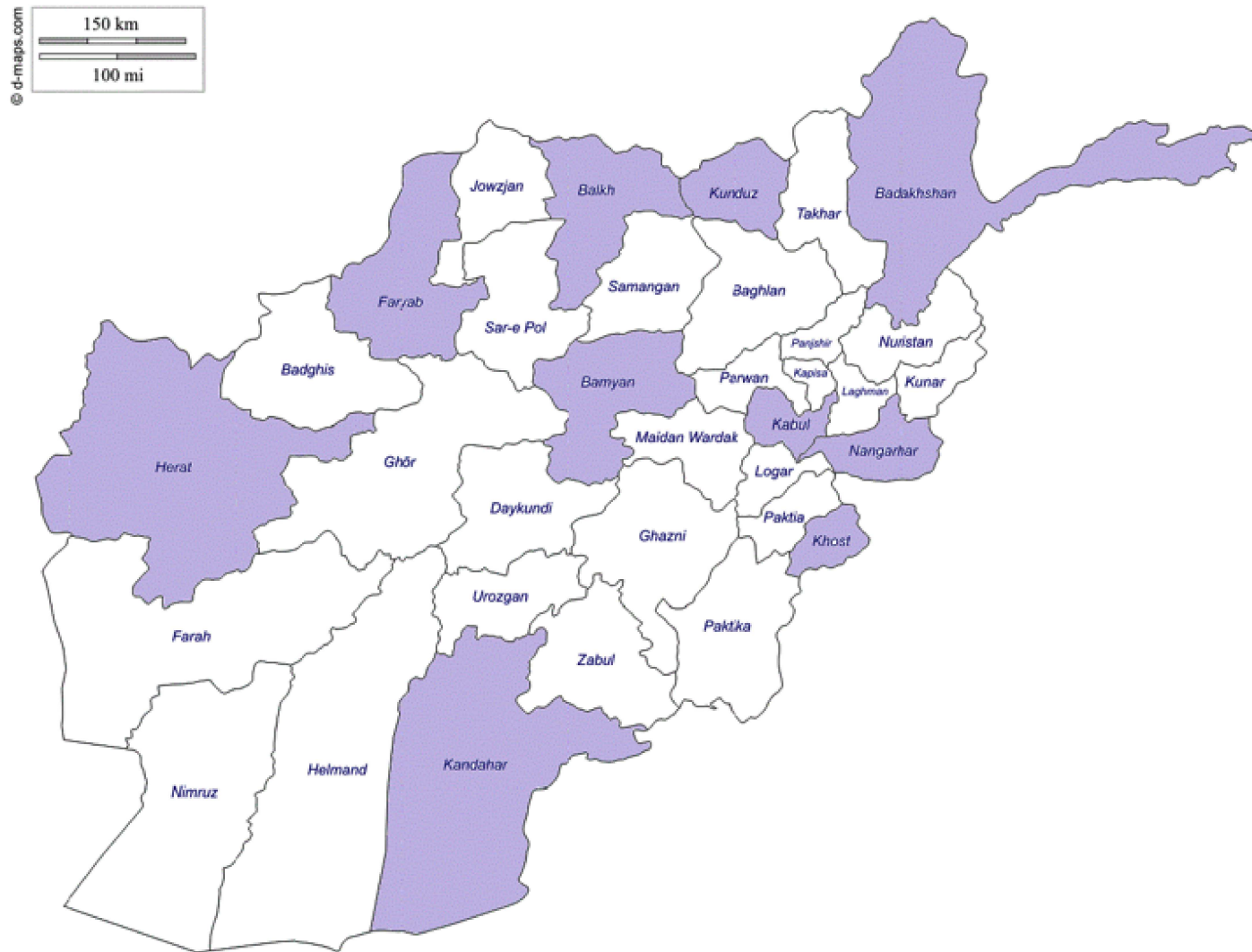
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**Appendices:**

**Appendix A: Map of Afghanistan and study sites.**



## Appendix B. List of variables included in the study.

| Variable   | Format      | Data source   |
|--|-------------|---------------|
| Aim 1: To estimate the availability of essential medicines sold at licensed private pharmacies and unlicensed private pharmacies and examine the relationship between availability and licensing status. |             |               |
| Exposure   |             |               |
| Licensing status (yes/no)  | Categorical | Questionnaire |
| Covariate  |             |               |
| Inspection in the last year (yes/no)   | Categorical | Questionnaire |
| Location, urban/ rural   | Continuous  | Questionnaire |
| Number of pharmacies in proximity (number)   | Continuous  | Questionnaire |
| Quality of medicine (standard/substandard)   | Categorical | Questionnaire |
| Presence of pharmacist at time of visit (yes/no)   | Categorical | Questionnaire |
| Frequency of prescriptions (number in the last 10 dispensing episodes)   | Continuous  | Questionnaire |
| Number of suppliers (number)   | Continuous  | Questionnaire |
| Number of years in business (number)   | Continuous  | Questionnaire |
| Outcome  |             |               |
| Availability (yes/no)  | Categorical | Questionnaire |
| Aim 2: To assess the relationship between the price of essential medicines sold at pharmacy outlets and the quality of pharmacy services.  |             |               |
| Exposure   |             |               |
| Presence of pharmacist at time of visit (yes/no)   | Categorical | Questionnaire |
| Storage condition of medicines (standard/substandard)  | Categorical | Questionnaire |
| Systematic stock arrangement (yes/no)  | Categorical | Questionnaire |
| Use of refrigerator (yes/no)   | Continuous  | Questionnaire |
| Record Keeping (yes/no)  | Categorical | Questionnaire |
| Dispensing practice (standard/substandard)   | Categorical | Questionnaire |
| Knowledge (yes/no)   | Continuous  | Questionnaire |
| Cleanliness (standard/substandard)   | Categorical | Questionnaire |
| Sales of licensed medicine (yes/no)  | Categorical | Questionnaire |
| Quality of medicine (standard/substandard)   | Categorical | Questionnaire |
| Covariate  |             |               |
| Inspection in the last year (yes/no)   | Categorical | Questionnaire |
| Licensing status (yes/no)  | Categorical | Questionnaire |
| Location, urban/ rural   | Continuous  | Questionnaire |
| Number of pharmacies in proximity (number)   | Continuous  | Questionnaire |
| Frequency of prescriptions (number in the last 10 dispensing episodes)   | Continuous  | Questionnaire |
| Number of suppliers (number)   | Continuous  | Questionnaire |
| Number of years in business (number)   | Continuous  | Questionnaire |
| Outcome  |             |               |
| Price of selected essential medicine (number)  | Continuous  | Questionnaire |

## Appendix C: Sample size calculation.

The minimum number of total respondents needed for the survey data analysis is 630 pharmacies. Factors considered for the sample size calculations are:

- Anticipated percentage of unlicensed private pharmacies: 40%
- Required confidence level (cl): 95%
- Required confidence interval (ci): <6% [to detect a difference of >12% in key outcome variables when compared against the comparator group]
- Design effect: 2
- Non-respondent: 20%

The formula used to calculate the sample size is given below.

$$n = \frac{Deff \times \left( Z_{1-\alpha} \sqrt{2P(1-P)} + Z_{1-\beta} \sqrt{P_1(1-P_1) + P_2(1-P_2)} \right)^2}{(P_1 - P_2)^2}$$

$n$  represents desired sample size for the survey,

$P_1$  for the estimated value of the key outcome variable in reference group

$P_2$  for the expected value of the key outcome variable in comparator group,

$P = (P_1 + P_2) / 2$ ,

$Z_{1-\alpha}$  for the standard normal ( $1-\alpha$ ) quintile corresponding to a type I error with one-sided test,

$Z_{1-\beta}$  for the standard normal ( $1-\beta$ ) quintile corresponding to the power of the test, and

$Deff$  represents the design effect for cluster sampling.

| Variable     | Estimated parameters             | Required sample size in one arm | Other factors   |
|--------------|----------------------------------|---------------------------------|---|
| Availability | Licensed: .62<br>Unlicensed: .50 | 380                             | $Z_{1-\alpha}$ : 1.64<br>$Z_{1-\beta}$ : .84<br>None-response rate: .65 |

**Appendix D:. Selected Essential Medicines by Anatomical Therapeutic Chemical classification and clinical indications.**

| # | Name of product             | Unit | Anatomical Therapeutic Chemical (ATC) classification |  | Clinical indication (FDA-labeled indications)   |
|---|-----------------------------|------|--|--|---|
| 1 | Tetracycline eye ointment   | tube | JO1A   | Antibacterials for systemic use, Tetracyclines       | Acute conjunctivitis, trachoma, glaucoma  |
| 2 | Chloramphenicol 250mg       | cap  | JO1B   | Antibacterials for systemic use, Amphenicols         | <ul style="list-style-type: none"> <li>• Bacterial meningitis</li> <li>• Chlamydomphila psittaci infection</li> <li>• Cystic fibrosis</li> <li>• Disease caused by rickettsiae</li> <li>• Haemophilus influenzae infection</li> <li>• Intraocular infection</li> <li>• Lymphogranuloma venereum</li> <li>• Otitis externa</li> <li>• Salmonella infection</li> <li>• Typhoid fever</li> </ul>   |
| 3 | Amoxicillin 250mg/5ml susp. | btl  | JO1C   | Antibacterials for systemic use, Penicillins         | <ul style="list-style-type: none"> <li>• Acute otitis media</li> <li>• Ear, nose, and throat infection</li> <li>• Gonorrhoea, Acute uncomplicated anogenital and urethral infections due to N gonorrhoeae</li> <li>• Helicobacter pylori gastrointestinal tract infection</li> <li>• Infection of skin AND/OR subcutaneous tissue</li> <li>• Infectious disease of genitourinary system</li> <li>• Lower respiratory tract infection</li> <li>• Pharyngitis - Tonsillitis</li> <li>• Streptococcal pharyngitis</li> </ul> |
| 4 | Amoxicillin 500mg           | cap  | JO1C   | Antibacterials for systemic use, Penicillins         |   |
| 5 | Ampicillin 500mg inj.       | vial | JO1C   | Antibacterials for systemic use, Penicillins         | <ul style="list-style-type: none"> <li>• Gonorrhoea</li> <li>• Infection of digestive system</li> <li>• Infectious disease of genitourinary system</li> <li>• Respiratory tract infection</li> </ul>  |
| 6 | Cotrimoxazole 480mg         | tab  | JO1E   | Antibacterials for systemic use, Sulfonamides&Trimet | <ul style="list-style-type: none"> <li>• Acute infective exacerbation of chronic obstructive pulmonary disease</li> <li>• Acute otitis media</li> </ul>   |

| # | Name of product         | Unit | Anatomical Therapeutic Chemical (ATC) classification |  | Clinical indication (FDA-labeled indications)  |
|---|-------------------------|------|--|--|--|
|   |                         |      |  | hoprim   | <ul style="list-style-type: none"> <li>• HIV infection - Pneumocystis pneumonia</li> <li>• HIV infection - Pneumocystis pneumonia; Prophylaxis</li> <li>• Pneumocystis pneumonia</li> <li>• Pneumocystis pneumonia; Prophylaxis</li> <li>• Shigellosis</li> <li>• Traveler's diarrhea</li> <li>• Urinary tract infectious disease</li> </ul>   |
| 7 | Gentamycin<br>80mg inj. | amp  | JO1G   | Antibacterials for systemic use, Aminoglycoside          | <ul style="list-style-type: none"> <li>• Bacterial infection due to Klebsiella pneumoniae</li> <li>• Bacterial infection due to Pseudomonas</li> <li>• Bacterial meningitis</li> <li>• Bacterial sepsis of newborn</li> <li>• Bacterial septicemia</li> <li>• Citrobacter infection</li> <li>• Eye infection</li> <li>• Infection due to Enterobacteriaceae</li> <li>• Infection due to Escherichia coli</li> <li>• Infection of bone</li> <li>• Infection of skin AND/OR subcutaneous tissue</li> <li>• Infective endocarditis</li> <li>• Peritoneal dialysis-associated peritonitis, Due to Pseudomonas and other gram-negative organisms</li> <li>• Peritonitis, and other gastrointestinal tract infections</li> <li>• Proteus infection</li> <li>• Respiratory tract infection</li> <li>• Serratia marcescens infection</li> <li>• Staphylococcal infectious disease</li> <li>• Urinary tract infectious disease</li> </ul> |
| 8 | Ciprofloxacin<br>250mg  | tab  | JO1M   | Antibacterials for systemic use, Quinolone antibacterial | <ul style="list-style-type: none"> <li>• Bacterial conjunctivitis,</li> <li>• Bacterial prostatitis, chronic</li> <li>• Bronchitis, chronic, acute exacerbations</li> <li>• Corneal ulcer</li> <li>• Gonorrhea</li> <li>• Infection of bone - Infectious disorder of joint</li> </ul>  |

| #  | Name of product                   | Unit | Anatomical Therapeutic Chemical (ATC) classification |   | Clinical indication (FDA-labeled indications)   |
|----|-----------------------------------|------|--|---|---|
|    |                                   |      |  |   | <ul style="list-style-type: none"> <li>• Infection of skin AND/OR subcutaneous tissue</li> <li>• Infectious diarrheal disease</li> <li>• Infectious disease of abdomen, complicated</li> <li>• Inhalational anthrax, Postexposure; Prophylaxis</li> <li>• Lower respiratory tract infection</li> <li>• Otitis externa, acute</li> <li>• Pyelonephritis, Complicated</li> <li>• Sinusitis, acute</li> <li>• Typhoid fever</li> <li>• Urinary tract infectious disease</li> </ul> |
| 9  | Ibuprofen<br>200mg                | tab  | MO1A   | Antiinflammatory and antirheumatic products, Non-steroids | <ul style="list-style-type: none"> <li>• Fever</li> <li>• Headache</li> <li>• Migraine</li> <li>• Osteoarthritis</li> <li>• Pain</li> <li>• Primary dysmenorrhea</li> <li>• Rheumatoid arthritis</li> </ul>   |
| 10 | Paracetamol<br>120mg/5ml<br>susp. | btl  | N02B   | Analgesics, other analgesics & Antipyretics               | <ul style="list-style-type: none"> <li>• Fever</li> <li>• Pain (Mild to Moderate)</li> <li>• Pain (Moderate to Severe); Adjunct</li> </ul>  |
| 11 | Paracetamol<br>500mg              | tab  | N02B   | Analgesics, other analgesics & Antipyretics               |   |
| 12 | Diazepam<br>5mg/ml inj.           | amp  | N05B   | Nervous system, psycholeptics, Anxiolytics                | <ul style="list-style-type: none"> <li>• Alcohol withdrawal syndrome</li> <li>• Anxiety</li> <li>• Sedation, Premedication before surgery, endoscopic procedures and cardioversion</li> <li>• Seizure, Refractory, increased frequency</li> <li>• Seizure; Adjunct</li> <li>• Skeletal muscle spasm; Adjunct</li> <li>• Skeletal muscle spasm - Tetanus</li> <li>• Status epilepticus</li> </ul>  |

| #  | Name of product                  | Unit | Anatomical Therapeutic Chemical (ATC) classification |   | Clinical indication (FDA-labeled indications)  |
|----|----------------------------------|------|--|---|--|
| 13 | Metronidazole 200(or 250) mg     | tab  | P01A   | Antiparasitic products, Antiprotozoals, Agents against amoebiasis                   | <ul style="list-style-type: none"> <li>• Abscess, Anaerobic</li> <li>• Amebic dysentery, acute</li> <li>• Amebic liver abscess</li> <li>• Anaerobic infection</li> <li>• Bacterial meningitis</li> <li>• Bacterial vaginosis</li> <li>• Operation on gastrointestinal tract, Colorectal - Postoperative infection; Prophylaxis</li> <li>• Rosacea</li> <li>• Trichomoniasis</li> </ul> |
| 14 | Chloroquine 150mg                | tab  | P01B   | Antiparasitic products, Antiprotozoals, Antimalarials                               | <ul style="list-style-type: none"> <li>• Malaria, acute</li> <li>• Malaria, Suppression</li> <li>• Non-intestinal amebic infection</li> </ul>  |
| 15 | Chloroquine syrup (any strength) | btl  | P01B   | Antiparasitic products, Antiprotozoals, Antimalarials                               |  |
| 16 | Mebendazole 100mg                | tab  | P02-   | Antiparasitic products, Anthelmintics, Antitrematodals                              | <ul style="list-style-type: none"> <li>• Ancylostomiasis - Necatoriasis</li> <li>• Ascariasis</li> <li>• Enterobiasis</li> <li>• Trichuriasis</li> </ul>   |
| 17 | Salbutamol inj.                  | amp  | R03C   | Respiratory system, Obstructive airway diseases, Beta-2-adrenoreceptor agonists     | <ul style="list-style-type: none"> <li>• Asthma</li> <li>• Exercise-induced asthma; Prophylaxis</li> </ul>   |
| 18 | Aminophylline 100mg              | tab  | R03D   | Respiratory system, Obstructive airway diseases, Xanthines, LT receptor antagonists | <ul style="list-style-type: none"> <li>• Asthma</li> <li>• Chronic obstructive pulmonary disease</li> </ul>  |
| 19 | Magnesium trisilicate            | tab  | A02A   | Alimentary tract & metabolism, Antacids,  | <ul style="list-style-type: none"> <li>• PEPTIC ULCER DISEASE</li> </ul>   |

| #  | Name of product                            | Unit  | Anatomical Therapeutic Chemical (ATC) classification |   | Clinical indication (FDA-labeled indications)   |
|----|--|-------|--|---|---|
|    | +aluminium hydroxide                       |       |  | Magnesium compounds   |   |
| 20 | ORS packets                                | pck   | A07C   | Alimentary tract & metabolism, Intestinal, Electrolytes with carbohydrates        | <ul style="list-style-type: none"> <li>• Diarrhea</li> </ul>  |
| 21 | Zinc sulfate, dispersible tablets          | tab   | A12C   | Alimentary tract & metabolism, Mineral supplements, Sodium                        | <ul style="list-style-type: none"> <li>• Diarrhea</li> </ul>  |
| 22 | Iron & folic acid (any strength)           | tab   | B03A   | Anti-anemic preparations, Iron preparations, Iron in combination w folic acid     | <ul style="list-style-type: none"> <li>• Iron deficiency anemia</li> <li>• Iron deficiency anemia; Prophylaxis</li> <li>• Megaloblastic anemia</li> </ul> |
| 23 | Ringer lactate                             | bag   | B05B   | Blood & Blood Forming Organs, Blood substitutes and refusion sol., i.v. solutions | <ul style="list-style-type: none"> <li>• source of electrolytes and water for hydration.</li> </ul>   |
| 24 | Gentian violet crystals                    | btl   | D01A   | Dermatologicals, Antifungals for dermatological use, Antibiotics                  | <ul style="list-style-type: none"> <li>• Infectious disease; Prophylaxis - Skin cleansing procedure</li> </ul>  |
| 25 | Chlorhexidine w/wo cetrimide, sol.         | btl   | D08-   | Dermatologicals, Antiseptics and disinfectants                                    | <ul style="list-style-type: none"> <li>• For cleaning the skin and dirty wounds</li> </ul>  |
| 26 | Condom                                     | piece | G02-   | Genito urinary system & sex hormones,   |   |
| 27 | Ethinylestradiol +Norgestrel (Combination) | cycle | G03A   | Genito urinary system & sex hormones, Hormonal contraceptives for systemic use    | Contraception   |

| #  | Name of product                          | Unit  | Anatomical Therapeutic Chemical (ATC) classification |  | Clinical indication (FDA-labeled indications)   |
|----|--|-------|--|--|---|
| 28 | Medroxy progesterone 150mg inj           | vial  | G03A   | Genito urinary system & sex hormones, Hormonal contraceptives for systemic use | <ul style="list-style-type: none"> <li>• Abnormal uterine bleeding unrelated to menstrual cycle, Hormonal imbalance-induced</li> <li>• Contraception</li> <li>• Endometrial hyperplasia, Estrogen-induced; Prophylaxis</li> <li>• Endometriosis - Pain</li> <li>• Secondary physiologic amenorrhea</li> </ul> |
| 29 | Norgestrel (Progesterone Only Pill, POP) | cycle | G03A   | Genito urinary system & sex hormones, Hormonal contraceptives for systemic use | Contraception   |
| 30 | Oxytocin inj.                            | amp   | H01B   | Systemic hormonal preparations, Posterior pituitary lobe hormones              | Prevention and treatment of PPH   |

**Appendix E: ARPS 2013 Survey Questionnaire.**

***Survey Management Information***

**M-1. Respondent Identification Number (1-4)**

**M-2. Card Number 1 (5)**

**M-3. Wave Number (6-8)**

**M-4. Region (9)**

- |                  |                  |                     |
|------------------|------------------|---------------------|
| 1. Central/Kabul | 4. South Western | 7. Central/Hazarjat |
| 2. Eastern       | 5. Western       |                     |
| 3. South Central | 6. Northern      |                     |

**M-5. Sampling Point/District Where the Interview Was Completed: \_\_\_\_\_ (10-12)**

**M-6. Geographic Code (13)**

- |             |          |         |                   |
|-------------|----------|---------|-------------------|
| 1. Villages | 2. Towns | 3. City | 4. Metros (Kabul) |
|-------------|----------|---------|-------------------|

**M-7. Province (14-15)**

- |            |                |               |              |
|------------|----------------|---------------|--------------|
| 1. Kabul   | 9. Khost       | 17. Kunduz    | 25. Farah    |
| 2. Kapisa  | 10. Ningarhar  | 18. Balkh     | 26. Nimroz   |
| 3. Parwan  | 11. Laghman    | 19. Samangan  | 27. Helmand  |
| 4. Wardak  | 12. Kunar      | 20. Juzjan    | 28. Kandhar  |
| 5. Logar   | 13. Nooristan  | 21. Sar-I-Pul | 29. Zabul    |
| 6. Ghazni  | 14. Badakhshan | 22. Faryab    | 30. Uruzgan  |
| 7. Paktia  | 15. Takhar     | 23. Badghis   | 31. Ghor     |
| 8. Paktika | 16. Baghlan    | 24. Herat     | 32. Bamyán   |
|            |                |               | 33. Panjshir |
|            |                |               | 34. Dehkondi |

**M-8. Year of Interview: 2013 (16-19)**

**M-9. Month of Interview (20-21)**

- |             |          |              |              |
|-------------|----------|--------------|--------------|
| 1. January  | 4. April | 7. July      | 10. October  |
| 2. February | 5. May   | 8. August    | 11. November |
| 3. March    | 6. June  | 9. September | 12. December |

**M-10. Date of Interview: \_\_\_\_ (22-23)**

**M-11. Day of Week of Interview (24)**

- |           |           |             |
|-----------|-----------|-------------|
| 1. Friday | 4. Monday | 7. Thursday |
|-----------|-----------|-------------|

- 2. Saturday
- 3. Sunday
- 5. Tuesday
- 6. Wednesday

**M-12. Interviewer Code:** \_\_\_\_\_ (25-30)

**M-13. Interview Completed on the ... (31)**

- 1. First Contact
- 2. Second Contact
- 3. Third Contact

**M-14. Supervisor Code:** \_\_\_\_\_ (32-34)

**M-15. Record Time (using 24 hour clock) Interview Began:** \_\_\_\_: \_\_\_\_ (35-38)  
(Record Time Began Starting With W-1)

**M-16. Record Time (using 24 hour clock) Interview Ended:** \_\_\_\_: \_\_\_\_ (39-42)  
(Fill in all four data positions)

**M-17. Record Length of Interview in Minutes:** \_\_\_\_\_ (43-44)

**M-18. Date Formatted Field:** APR 2013 (45-52)

**M-19. Keypuncher Code** \_\_\_\_ (53-54)

**M-20. Language of Interview**

- 1. Pashto
- 2. Dari
- 3. Other (55)

**M-21. Coder Code** \_\_\_\_ (56-57)

**M-22. Language of the Questionnaire**

- 1. Pashtu
- 2. Dari

*Interviewer: Ask to speak with the most senior staff member in the pharmacy.*

Asalaam Wa Aleikum, I am from an independent research organization. We are conducting a survey of pharmacies in this area in order to improve pharmacy service and public health in Afghanistan. We have no relation to the government. I would like to ask you some questions about this pharmacy. The questionnaire will address a variety of items related to registration, storage, and facilities. I am interested in your thoughts, observations, and experiences. Your answers will be kept confidential, your name will not be given to anyone, and your responses will be analyzed only as part of an aggregate. This interview is voluntary and involves no direct benefits to the participants. Once we begin, you may refuse to answer any questions you do not wish to answer. Do you agree to continue?

S-1. Are you the most senior person responsible for dispensing medication present today?

- 1. Yes                SKIP TO S-3a
- 2. No                 GO TO S-2

S-2. When is the best time for me to return so I can speak with the most senior person responsible for dispensing medication? *(If no person with responsibility for dispensing medication is available, make an appointment to return). When you contact the respondent, ask S-3.*

S-3a How old were you on your last birthday? *(Estimate if necessary)*  
(write number of years) \_\_\_\_\_

S-3b. **Is this an actual age or an estimated age?**

- 1. Actual age
- 2. Estimated age

IF RESPONDENT IS UNDER 18 YEARS OLD, THANK THEM AND END THE INTERVIEW. IF OVER 18, PROCEED TO Q-1.

**Q-1. In the past six months, has business gotten better, gotten worse, or stayed about the same?**

- 1. Better
- 2. Worse
- 3. About the same

- 98. Refused (vol.)
- 99. Don't know (vol.)

**Q-2. In the next six months, do you expect business will get better, get worse, or stay about the same?**

1. Better
2. Worse
3. About the same

98. Refused (vol.)  
99. Don't know (vol.)

**Q-3. In the past six months, has stocking the pharmacy become easier, harder, or stayed about the same?**

1. Easier
2. Harder
3. About the same

98. Refused (vol.)  
99. Don't know (vol.)

**Q-4. In the past six months, has it become easier or harder for you to find employees?**

1. Easier
2. Harder
3. About the same

98. Refused (vol.)  
99. Don't know (vol.)

**Q5a. Title of staff member interviewed: \_\_\_\_\_ (open-ended, write down response)**

**Q5c. Respondent Gender (do not ask, code by observation)**

1. Male
2. Female

**Q5d. Number of years of schooling: \_\_\_ \_\_\_**

**Q5e. What level of degree have you achieved?**

1. Illiterate / No School
  2. Less than 9<sup>th</sup> grade/class 9<sup>th</sup> grade complete
  3. 12<sup>th</sup> grade complete
  4. Assistant Pharmacist
  5. Bachelor Pharmacist
  6. Master of Pharmacy
  7. PhD of Pharmacy
  8. Medical doctor (MD).
98. Refused  
99. Don't know

**Q5f. Have you completed any other pharmacy training courses?**

1. Yes                      GO TO Q-5G
  2. No                        SKIP TO Q6
98. Ref                      SKIP TO Q6  
99. DK                        SKIP TO Q6

**Q5g. What were the course(s)?**

|                        | <b>Q-5g_1</b> |
|------------------------|---------------|
| <b>Write response:</b> |               |
|                        |               |
| <b>Not asked</b>       | 97            |
| <b>Refused</b>         | 98            |
| <b>Don't know</b>      | 99            |

|                        |               |
|------------------------|---------------|
|                        | <b>Q-5g_2</b> |
| <b>Write response:</b> |               |
|                        |               |
| <b>Not asked</b>       | 97            |
| <b>Refused</b>         | 98            |
| <b>Don't know</b>      | 99            |

|                        |               |
|------------------------|---------------|
|                        | <b>Q-5g_3</b> |
| <b>Write response:</b> |               |
|                        |               |
| <b>Not asked</b>       | 97            |
| <b>Refused</b>         | 98            |
| <b>Don't know</b>      | 99            |

**Q6. (Ask All) How many people are working at the pharmacy at the time of visit?  
(DO NOT ASK, code by observation)**

(Write number) \_\_\_\_\_  
 98. Refused (vol.)  
 99. Don't know (vol.)

**Q7. (ASK INTERVIEWEE) How many people work for the pharmacy?**

(write number) \_\_\_\_\_  
 98. Refused (vol.)  
 99. Don't know (vol.)

**Q8. Of the staff who work for the pharmacy, how many people are full-time?**

(Write number) \_\_\_\_\_  
 98. Refused (vol.)  
 99. Don't know (vol.)

**Q9. Is a pharmacist/pharmacy technician present on the day of the visit?**

1. Yes  
 2. No  
 998. Refused (vol.)  
 999. Don't know (vol.)

**Q10. Normal opening hours of the pharmacy [24 Hour clock]**

|       | Day                  | a) Open  | b) Close   | c) Is a pharmacist available in the pharmacy?      | d) If yes, is the pharmacist present:   |
|-------|----------------------|--|--|--|---|
| Q10_1 | Saturday – Wednesday | __ : __<br>98) refused<br>99) don't know                 | __ : __<br>98) refused<br>99) don't know                 | 1. Yes<br>2. No<br><br>8. Refused<br>9. Don't know | 1. The entire time the pharmacy is open<br>2. Some of the time the pharmacy is open<br>3. On call<br>97. Not asked<br>98. Refused<br>99. Don't know |
| Q10_2 | Thursday             | __ : __<br>97) not open<br>98) refused<br>99) don't know | __ : __<br>97) not open<br>98) refused<br>99) don't know | 1. Yes<br>2. No<br>8. Refused<br>9. Don't know     | 1. The entire time the pharmacy is open<br>2. Some of the time the pharmacy is open<br>3. On call<br>97. Not asked<br>98. Refused<br>99. Don't know |
| Q10_3 | Friday               | __ : __<br>97) not open<br>98) refused<br>99) don't know | __ : __<br>97) not open<br>98) refused<br>99) don't know | 1. Yes<br>2. No<br>8. Refused<br>9. Don't know     | 1. The entire time the pharmacy is open<br>2. Some of the time the pharmacy is open<br>3. On call<br>97. Not asked<br>98. Refused<br>99. Don't know |

**PHYSICAL STRUCTURE**

**Q-11. What is the total area of your pharmacy, including the back room and storage area? (READ OUT categories)**

1. Less than 38 square meters
2. 38 or more but less than 43 square meters
3. 43 or more but less than 53 square meters
4. 53 or more square meters

98. Refused (vol.)  
99. Don't know (vol.)

**Q-12. Does the pharmacy have:**

|   | Yes | No | Do not count or mix drugs | Refused (vol.) | Don't know (vol.) |
|---|-----|----|---------------------------|----------------|-------------------|
| <b>Q-12a.</b> A dispensary room   | 1   | 2  | 3                         | 98             | 99                |
| <b>Q-12b.</b> Sleeping room for night duty staff (must be a separate room from the main sales area) | 1   | 2  |                           | 98             | 99                |
| <b>Q-12c.</b> Washing room/toilet   | 1   | 2  |                           | 98             | 99                |
| <b>Q-12d.</b> Private consultation space for customers  | 1   | 2  |                           | 98             | 99                |
| <b>Q-12e.</b> Stock room / storage room   | 1   | 2  |                           | 98             | 99                |

**Q-13. Does the pharmacy have:**

|  | Yes           | No | Ref./DK |
|--|---------------|----|---------|
| <b>Q13a.</b> Electricity from Municipality   | 1             | 2  | 9       |
| <b>Q13b.</b> Electricity from generator      | 1             | 2  | 9       |
| <b>Q13c.</b> Electricity from solar panels   | 1             | 2  | 9       |
| <b>Q13d.</b> Electricity from another source | Write source: | 2  | 9       |

**STORAGE CONDITIONS**

**Q-14. Do you store any of the following in the pharmacy?  
 ...Do you store them on a shelf or in a cupboard?  
 ...(if in a cupboard) what color is the cupboard window pane?**

|                              | Q14_1 a. On shelf  | Q14_1b. Cupboard with window pane                           | Q14_1c. Storage area without window pane                    | Q14_1d. Color of pane or covering (if "yes" (codes 1 or 2) to part B or C, otherwise circle 97 "not asked") |
|------------------------------|--|---|---|---|
| <b>Q-14_1. Morphine</b>      | 1. Yes (Go to Q-14_1b)<br>2. No(Go to Q-14_1b)<br>3. Do not stock(Skip to Q-14_2a) | 1. Yes, unlocked<br>2. Yes, locked<br>3. No<br>4. Not asked | 1. Yes, unlocked<br>2. Yes, locked<br>3. No<br>4. Not asked | 1. Red<br>2. Green<br>3. Blue<br>4. White<br>5. Transparent<br><br>97. Not applicable                       |
|                              | Q14_2 a. On shelf  | Q14_2b. Cupboard with window pane                           | Q14_2c. Storage area without window pane                    | Q14_2d. Color of pane or covering (if "yes" (codes 1 or 2) to part B or C, otherwise circle 97 "not asked") |
| <b>Q-14_2. Atropine</b>      | 1. Yes(Go to Q-14_2b)2. No(Go to Q-14_2b)<br>3. Do not stock(Skip to Q-14_3a)      | 1. Yes, unlocked<br>2. Yes, locked<br>3. No<br>4. Not asked | 1. Yes, unlocked<br>2. Yes, locked<br>3. No<br>4. Not asked | 1. (Red<br>2. Green<br>3. Blue<br>4. White<br>5. Transparent<br><br>97. Not applicable                      |
|                              | Q14_3a. On shelf   | Q14_3b. Cupboard with window pane                           | Q14_3c. Storage area without window pane                    | Q14_3d. Color of pane or covering (if "yes" (codes 1 or 2) to part B or C, otherwise circle 97 "not asked") |
| <b>Q-14_3. Phenobarbital</b> | 1. Yes(Go to Q-14_3b)<br>2. No(Go to Q-14_3b)<br>3. Do not stock(Skip to Q-14_4a)  | 1. Yes, unlocked<br>2. Yes, locked<br>3. No<br>4. Not asked | 1. Yes, unlocked<br>2. Yes, locked<br>3. No<br>4. Not asked | 1. Red<br>2. Green<br>3. Blue<br>4. White<br>5. Transparent<br><br>97. Not applicable                       |

|                              |  |   |   |  |
|------------------------------|--|---|---|--|
|                              | Q14_4a. On shelf   | Q14_4b. Cupboard with window pane                           | Q14_4c. Storage area without window pane                    | Q14_4d. Color of pane or covering (if “yes” (codes 1 or 2) to part B or C, otherwise circle 97 “not asked) |
| <b>Q-14_4. Adrenaline</b>    | 1. Yes(Go to Q-14_4b)<br>2. No(Go to Q-14_3b)<br>3. Do not stock(Skip to Q-14_5a)  | 1. Yes, unlocked<br>2. Yes, locked<br>3. No<br>4. Not asked | 1. Yes, unlocked<br>2. Yes, locked<br>3. No<br>4. Not asked | 1. Red<br>2. Green<br>3. Blue<br>4. White<br>5. Transparent<br><br>97. Not applicable                      |
|                              | Q14_5a. On shelf   | Q14_5b. Cupboard with window pane                           | Q14_5c. Storage area without window pane                    | Q14_5d. Color of pane or covering (if “yes” (codes 1 or 2) to part B or C, otherwise circle 97 “not asked) |
| <b>Q-14_5. Cotrimoxazole</b> | 1. Yes(Go to Q-14_5b)<br>2. No(Go to Q-14_5b)<br>3. Do not stock (Skip to Q-14_5a) | 1. Yes, unlocked<br>2. Yes, locked<br>3. No<br>4. Not asked | 1. Yes, unlocked<br>2. Yes, locked<br>3. No<br>4. Not asked | 1. Red<br>2. Green<br>3. Blue<br>4. White<br>5. Transparent<br><br>97. Not applicable                      |
|                              | Q14_6a. On shelf   | Q14_6b. Cupboard with window pane                           | Q14_6c. Storage area without window pane                    | Q14_6d. Color of pane or covering (if “yes” (codes 1 or 2) to part B or C, otherwise circle 97 “not asked) |
| <b>Q-14_6. Paracetamol</b>   | 1. Yes (Go to Q-14_6b)<br>2. No(Go to Q-14_6b)<br>3. Do not stock (Skip to Q-15a)  | 1. Yes, unlocked<br>2. Yes, locked<br>3. No<br>4. Not asked | 1. Yes, unlocked<br>2. Yes, locked<br>3. No<br>4. Not asked | 1. Red<br>1. Green<br>2. Blue<br>3. White<br>4. Transparent<br><br>97. Not applicable                      |

**Q-15. On each shelf of the cupboard, how is the stock arranged? (read all categories, mark all that apply)**

|   | Mentioned | Not mentioned |
|---|-----------|---------------|
| <b>Q15a.</b> By complaint (clinical indication)     | 1         | 2             |
| <b>Q15b.</b> How the drug works (therapeutic class) | 1         | 2             |
| <b>Q15c.</b> Alphabetical                           | 1         | 2             |
| <b>Q15d.</b> By form (oral, injectable, topical)    | 1         | 2             |
| <b>Q15e.</b> Other:                                 | 1         | 2             |
| <b>Q15_ref. Refused</b>                             | 1         | 2             |
| <b>Q15_DK. Don't know</b>                           | 1         | 2             |

**Q-16. Do you have a refrigerator reserved for medicines and/or vaccines in working order?**

- 1. Yes                   **Go to Q-17a**
- 2. Yes, offsite       **Skip to Q-17k**
- 3. No                   **Skip to Q-17k**

**Q-17a. (If code 1. Yes in Q-16) Is the refrigerator placed outside direct sunlight and away from heating elements?**

- 1. Yes
- 2. No

- 97. Not asked
- 98. Refused
- 99. Don't know

**Q-17b. (If code 1 in Q-16) Is there a thermometer in the refrigerator?**

- 1. Yes
- 2. No

- 97. Not asked
- 98. Refused
- 99. Don't know

**Q-17c. (If code 1 in Q-16) Is the refrigerator working on the day of the visit?**

- 1. Yes
- 2. No

- 97. Not asked
- 98. Refused
- 99. Don't know

**Q-17d. (If code 1 in Q-16) Would you mind if I take a look inside the refrigerator to write down the temperature?**

(write temperature ° C)\_\_\_\_\_

- 95. No thermometer, not possible to check

- 97. Not asked
- 98. Did not allow

**Q-17e. (If code 1 in Q-16) Is there a temperature sheet?**

- 1. Yes
- 2. No

- 97. Not asked
- 98. Refused
- 99. Don't know

**Q-17f. (If code 1 in Q-16) Is the temperature sheet updated?**

- 1. Yes
- 2. No
- 95. No temperature sheet, not possible to check
- 97. Not asked
- 98. Refused
- 99. Don't know

**Q-17g. (If code 1 in Q-16) What is the energy source? (Multiple response, READ OUT, code all that apply)**

|   | Use<br>d | Not<br>Use<br>d | Not<br>aske<br>d | Re<br>f | D<br>K |
|---|----------|-----------------|------------------|---------|--------|
| Q-17g_1.<br>Electricity<br>(municipal)                    | 1        | 2               | 97               | 98      | 99     |
| Q-17g_2.<br>Generator<br>(gas, diesel,<br>petrol)         | 1        | 2               | 97               | 98      | 99     |
| Q-17g_3.<br>Kerosene                                      | 1        | 2               | 97               | 98      | 99     |
| Q-17g_4. Solar<br>panel<br>(dedicated to<br>refrigerator) | 1        | 2               | 97               | 98      | 99     |
| Q-17g_5. Solar<br>panel (for<br>building or<br>generator) | 1        | 2               | 97               | 98      | 99     |
| Q-17g_6. Gas  | 1        | 2               | 97               | 98      | 99     |
| Q-17g_7.<br>Other (specify<br>_____ )                     | 1        | 2               | 97               | 98      | 99     |

**Q-17h-j. (If code 1 in Q-16) Is there anything else in the refrigerator aside from vaccines or medicines? (Open-ended, write 3 most numerous objects)**

|                 | <b>Q-17h</b> |
|-----------------|--------------|
| Write response: |              |
|                 |              |
| Not asked       | 97           |
| Refused         | 98           |
| Don't know      | 99           |

|                 | <b>Q-17i</b> |
|-----------------|--------------|
| Write response: |              |
|                 |              |
| Not asked       | 97           |
| Refused         | 98           |
| Don't know      | 99           |

|                 | <b>Q-17j</b> |
|-----------------|--------------|
| Write response: |              |
|                 |              |
| Not asked       | 97           |
| Refused         | 98           |
| Don't know      | 99           |

**Q-17k. (Ask all) Do you sell the following medicines in your pharmacy?**

|   | Yes           | No | Refused | Don't Know |
|---|---------------|----|---------|------------|
| <b>a. Oxytocin</b>                                | 1 (Ask Q-17l) | 2  | 98      | 99         |
| <b>b. Methergine (Methylergometrine maleate )</b> | 1 (Ask Q-17l) | 2  | 98      | 99         |
| <b>c. Insulin</b>                                 | 1 (Ask Q-17l) | 2  | 98      | 99         |

**Q-17l. (If code 1. Yes to any medicine in Q-17ka, Q-17kb, or Q-17kc) Do you keep these medicines in the refrigerator?**

|            |    |
|------------|----|
| Yes        | 1  |
| No         | 2  |
| Not asked  | 97 |
| Refused    | 98 |
| Don't know | 99 |

**ITEMS SOLD IN THE PHARMACY**

**Q-18. (Ask All) Does the pharmacy sell any of the following items (multiple responses, mark all that apply):**

|  | Yes | No | Refused | Don't know |
|--|-----|----|---------|------------|
| Q-18_1. Vaccines   | 1   | 2  | 98      | 99         |
| Q-18_2. Diagnostics  | 1   | 2  | 98      | 99         |
| Q-18_3. Dental Products  | 1   | 2  | 98      | 99         |
| Q-18_4. Products for treating eye problems   | 1   | 2  | 98      | 99         |
| Q-18_5. Over the counter drugs listed in the Licensed Drug List (LDL) for common ailments (diarrhea, fever, headache, skin conditions, etc.) | 1   | 2  | 98      | 99         |
| Q-18_6. Contraceptives   | 1   | 2  | 98      | 99         |
| Q-18_7. Medical supplies (eg, syringes, gauzes, bandages, etc.)  | 1   | 2  | 98      | 99         |
| Q-18_8. Medical equipment  | 1   | 2  | 98      | 99         |
| Q-18_9. Traditional or herbal medicines  | 1   | 2  | 98      | 99         |
| Q-18_10. Personal hygiene products   | 1   | 2  | 98      | 99         |
| Q-18_11. Cosmetics   | 1   | 2  | 98      | 99         |
| Q-18_12. Dietary products and supplements  | 1   | 2  | 98      | 99         |
| Q-18_13. Cigarettes  | 1   | 2  | 98      | 99         |
| Q-18_14. Bottled beverages   | 1   | 2  | 98      | 99         |
| Q-18_15. General   | 1   | 2  | 98      | 99         |

|            |  |  |  |  |
|------------|--|--|--|--|
| food items |  |  |  |  |
|------------|--|--|--|--|

**Q-19. Does the pharmacy keep a record of prescriptions dispensed? (read out responses)**

1. All of them
  2. Some of them
  3. None
98. Refused (vol.)  
99. Don't know (vol.)

**Q-20. Now I would like to verify a few common registries that you may have at the pharmacy. Please show me the following registries if you have them:**

|   | a.                                   | b.  |
|---|--------------------------------------|---|
| If, yes to part a, ask if it is possible to see it                  | Does the pharmacy have a...          | Shown the register?                                   |
| <b>Q20_1. Stock register</b>  | 1. Yes<br>2. No<br>98. Ref<br>99. DK | 1. Yes<br>2. No<br>97. Not asked<br>98. Ref<br>99. DK |
| <b>Q20_2. Purchase register</b>                                     | 1. Yes<br>2. No<br>98. Ref<br>99. DK | 1. Yes<br>2. No<br>97. Not asked<br>98. Ref<br>99. DK |
| <b>Q20_3. Dispensing register</b>                                   | 1. Yes<br>2. No<br>98. Ref<br>99. DK | 1. Yes<br>2. No<br>97. Not asked<br>98. Ref<br>99. DK |
| <b>Q20_4. Separate Narcotics and controlled substances register</b> | 1. Yes<br>2. No<br>98. Ref<br>99. DK | 1. Yes<br>2. No<br>97. Not asked<br>98. Ref<br>99. DK |
| <b>Q20_5. Computerized register</b>                                 | 1. Yes<br>2. No<br>98. Ref<br>99. DK | 1. Yes<br>2. No<br>97. Not asked<br>98. Ref<br>99. DK |

**Q-21.1-21.3. Apologies for the inconvenience, but I would like to ask you to show another set of documents. Have you been provided with a Licensed Drug List, Essential Drug List, or the National Formulary? If yes, can you show me the list and what year it was published?**

|   | a.                                   | b.                                   | c.                              |
|---|--------------------------------------|--------------------------------------|---------------------------------|
| READ DOWN ALL AT ONCE<br>FIRST, do not repeat the question. If not shown, ask if they keep the register | Does the pharmacy have a...          | Shown the document?                  | Year Published                  |
| Q-21_1. Licensed Drug List  | 1. Yes<br>2. No<br>98. Ref<br>99. DK | 1. Yes<br>2. No<br>98. Ref<br>99. DK | _____<br>97. Document not shown |
| Q-21_2. Essential Drug List   | 1. Yes<br>2. No<br>98. Ref<br>99. DK | 1. Yes<br>2. No<br>98. Ref<br>99. DK | _____<br>97. Document not shown |
| Q-21_3. National Formulary  | 1. Yes<br>2. No<br>98. Ref<br>99. DK | 1. Yes<br>2. No<br>98. Ref<br>99. DK | _____<br>97. Document not shown |

**Q-22. Of the last 10 customers who have come to the pharmacy, how many have come with prescriptions?**

- \_\_\_\_ (code 0-10)
- 98. Refused (vol.)
- 99. Don't know (vol.)

**Q-23. Procurement:**

|      | <b>1. Please list the top 3 suppliers which your pharmacy buys its drugs from (largest in quantity)</b> | <b>2 &amp; 3. Location of the supplier (town, city and Country)</b> |  | <b>4. How often do you place an order with this supplier?</b>  | <b>5. In the last year did the pharmacy receive products with any of the following problems from a supplier?</b>   |
|------|---|---|--|--|--|
| 23a. | 1. _____  | 2. City:<br><br>98. Refused<br>99. Don't know                       | 3. Country:<br><br>98. Refused<br>99. Don't know | 1. At least once a week<br>2. Every 1-2 weeks<br>3. Every 3-4 weeks<br>4. Less often than every 4 weeks<br>5. When needed<br>6. Other:<br>_____<br>98. Refused (vol.)<br>99. Don't know (vol.) | 1. Item not requested<br>2. Damaged products<br>3. Unexpected price change<br>4. Expired/close to expiry<br>5. Wrong drug/ form/ strength/ formulation etc.<br>6. Quality concerns<br>7. Other (specify)<br>97. No problems<br>99. Refused<br>99. Don't know |

|      |          |   |  |  |  |
|------|----------|---|--|--|--|
| 23b. | 1. _____ | 2. City:<br>98. Refused<br>99. Don't know | 3. Country<br>98. Refused<br>99. Don't know: | 1. At least once a week<br>2. Every 1-2 weeks<br>3. Every 3-4 weeks<br>4. Less often than every 4 weeks<br>5. When needed<br>6. Other:<br>_____<br>98. Refused (vol.)<br>99. Don't know (vol.) | 1. Item not requested<br>2. Damaged products<br>3. Unexpected price change<br>4. Expired/close to expiry<br>5. Wrong drug/ form/ strength/ formulation etc.<br>6. Quality concerns<br>7. Other (specify)<br>97. No problems<br>98. Refused<br>99. Don't know |
| 23c. | 1. _____ | 2. City:<br>98. Refused<br>99. Don't know | 3. Country:<br>98. Refused<br>99. Don't know | 1. At least once a week<br>2. Every 1-2 weeks<br>3. Every 3-4 weeks<br>4. Less often than every 4 weeks<br>5. When needed<br>6. Other:<br>_____<br>98. Refused (vol.)<br>99. Don't know (vol.) | 1. Item not requested<br>2. Damaged products<br>3. Unexpected price change<br>4. Expired/close to expiry<br>5. Wrong drug/ form/ strength/ formulation etc.<br>6. Quality concerns<br>7. Other (specify)<br>97. No problems<br>98. Refused<br>99. Don't know |

**Q-24. When you receive medicines from suppliers that are not good quality, what do you do with it?**

|  | Always | Sometimes<br>(between<br>about 50%-<br>75% of the<br>time) | Rarely (Less<br>than half of<br>the time) | Never | Have not<br>received poor<br>quality<br>medicines | Refused | Don't<br>Know |
|--|--------|--|---|-------|---|---------|---------------|
| Q-24_1) Dispose of it  | 1      | 2  | 3   | 4     | 5   | 98      | 99            |
| Q-24_2) Request<br>new medicine or a<br>refund from your<br>supplier         | 1      | 2  | 3   | 4     | 5   | 98      | 99            |
| Q-24_3) Sell it at a<br>discount   | 1      | 2  | 3   | 4     | 5   | 98      | 99            |
| Q-24_4) Sell it at the<br>usual price because<br>customer is in dire<br>need | 1      | 2  | 3   | 4     | 5   | 98      | 99            |

**Q-25. When you have different batches of the same medicines, how do you decide which medicine to sell first (READ OUT):**

1. First Expiry, First Out
2. First In, First Out
3. First on shelf
4. Other (specify): \_\_\_\_\_
98. Refused
99. Don't know

## DISPENSING

**Q-26. What information would you provide to a patient when they receive medicine? (multiple answer, don't prompt)**

|   | Mentioned | Not Mentioned |
|---|-----------|---------------|
| 1. Dosage   | 1         | 2             |
| 2. Frequency  | 1         | 2             |
| 3. Length of treatment                                | 1         | 2             |
| 4. When to take it                                    | 1         | 2             |
| 5. How to take it                                     | 1         | 2             |
| 6. How to store it                                    | 1         | 2             |
| 7. Common side effects                                | 1         | 2             |
| 8. Pregnancy-related issues                           | 1         | 2             |
| 9. Ask if they understand how to prepare the medicine | 1         | 2             |
| 10. Other   | 1         | 2             |
| 98. Refused (vol.)                                    | 1         | 2             |
| 99. Don't know (vol.)                                 | 1         | 2             |

**Q-27. What side effects would you warn patients about when they receive amoxicillin? (multiple response, DO NOT READ LIST)**

|                       | Mentioned | Not Mentioned |
|-----------------------|-----------|---------------|
| 1. Skin rash          | 1         | 2             |
| 2. Stomach problems   | 1         | 2             |
| 3. Headache           | 1         | 2             |
| 4. Heart problems     | 1         | 2             |
| 5. Nausea             | 1         | 2             |
| 6. Diarrhea           | 1         | 2             |
| 7. Death              | 1         | 2             |
| 8. Other              | 1         | 2             |
| 97. None              | 1         | 2             |
| 98. Refused (vol.)    | 1         | 2             |
| 99. Don't know (vol.) | 1         | 2             |

**Q-28. If a patient comes into your pharmacy complaining of coughing and night sweats, what would you recommend that the patients do? (do not prompt, list first three responses)**

|                                      | Q-28a | Q-28b | Q-28c |
|--------------------------------------|-------|-------|-------|
| Suggest an over-the-counter medicine | 1     | 1     | 1     |
| Suggest a prescription medicine      | 2     | 2     | 2     |
| Refer to a doctor                    | 3     | 3     | 3     |

|                         |    |    |    |
|-------------------------|----|----|----|
| Other (write response): | 4  | 4  | 4  |
| Refused                 | 98 | 98 | 98 |
| Don't know              | 99 | 99 | 99 |

**Q-29. A father of a 3-year old child is asking for a drug, saying that his son was diagnosed with bronchial asthma. Which one of the following drugs would you instruct him to give his child? (Read out the list)**

1. Propranolol tablet
2. Salbutamol inhaler
3. Cimetidine tablet
4. Azithromycin syrup
5. Amoxicillin
6. Ceftriaxone injectable
7. Other (specify)\_\_\_\_\_

97. Refer patient to a doctor (vol.)

98. Refused (vol.)

99. Don't know (vol.)

**Q-30. A 20-year old woman is asking for drug after she was diagnosed with urinary tract infection. Which one of the following drugs would you instruct her to take? (Read out the list)**

1. Cotrimoxazole (Sulfamethoxazole-trimethoprim)
2. Amoxicillin
3. Nitrofurantoin
4. Ampicillin
5. Ciprofloxacin (Cipro)
6. Levofloxacin
7. Cephalexin
8. Doxycycline
9. Rifampicin
10. Other (specify)\_\_\_\_\_

97. Refer patient to a doctor (vol.)

98. Refused (vol.)

99. Don't know (vol.)

**WASTE MANAGEMENT****Q-31. How do you dispose of unsold medicines that are expired? (Multiple answers, do not prompt)**

|   | Mentioned | Not Mentioned |
|---|-----------|---------------|
| 1. Return to the manufacturer                                 | 1         | 2             |
| 2. Dispose of in the trash                                    | 1         | 2             |
| 3. Encapsulation  | 1         | 2             |
| 4. Inertization   | 1         | 2             |
| 5. Dispose of in the sewer                                    | 1         | 2             |
| 6. Burn in open container                                     | 1         | 2             |
| 7. Incineration   | 1         | 2             |
| 8. Decompose with chemicals                                   | 1         | 2             |
| 9. Other: _____   | 1         | 2             |
| 10. The pharmacy does not dispose of unsold expired medicines | 1         | 2             |
|   |           |               |
| 98. Refused   | 1         | 2             |
| 99. Don't know  | 1         | 2             |

**Q-32. How do you dispose of used syringes/needles? (Multiple answers do not prompt)**

|   | Mentioned | Not Mentioned |
|---|-----------|---------------|
| 1. Send to local hospital                                 | 1         | 2             |
| 2. Dispose of in trash                                    | 1         | 2             |
| 3. Buried on premises                                     | 1         | 2             |
| 4. Encapsulation  | 1         | 2             |
| 5. Incineration   | 1         | 2             |
| 6. Sanitize for reuse                                     | 1         | 2             |
| 7. Other: _____   | 1         | 2             |
| 8. The pharmacy does not dispose of used syringes/needles | 1         | 2             |
| 9. The pharmacy does not carry syringes/needles           | 1         | 2             |
|   |           |               |
| 98. Refused   | 1         | 2             |
| 99. Don't know  | 1         | 2             |

Interviewer: Please ask to see the least expensive brand and package of the following drugs and fill in the chart below.

**Q-33. Now I would like to collect some information about a list of drugs that are considered important for the People of Afghanistan. (Interviewer: please work with pharmacy employee to find the lowest-price example of each of these drugs on the list below and take down the information on the label.)**

**Availability of tracer drugs (ask for least expensive)**

|   |                            |      | a.  | b.  | c.   | d.  | e.   |
|---|----------------------------|------|---|---|--|---|--|
| # | Name of product            | Unit | Available (Code "1" if yes and "2" if no) | In original packaging with label intact (Code "1" if yes and "2" if no) | Unexpired? (Code "1" if yes and "2" if no) | Number of units in one dispensing pack (write number) | Price of one dispensing pack (write price in Afghanis) |
| 1 | Tetracycline eye ointment  | Tub  | 1. Yes<br>2. No                           | 1. Yes<br>2. No<br>97. Not asked  | 1. Yes<br>2. No<br>97. Not asked           | 97. Not asked   | 997. Not Asked   |
| 2 | Chloramphenicol 250mg      | cap  | 1. Yes<br>2. No                           | 1. Yes<br>2. No<br>97. Not asked  | 1. Yes<br>2. No<br>97. Not asked           | 97. Not asked   | 997. Not Asked   |
| 3 | Amoxicillin 250mg/5ml susp | btl  | 1. Yes<br>2. No                           | 1. Yes<br>2. No<br>97. Not asked  | 1. Yes<br>2. No<br>97. Not asked           | 97. Not asked   | 997. Not Asked   |
| 4 | Amoxicillin cap 500        | Cap  | 1. Yes<br>2. No                           | 1. Yes<br>2. No<br>97. Not asked  | 1. Yes<br>2. No<br>97. Not asked           | 97. Not asked   | 997. Not Asked   |
| 5 | Ampicillin 500mg inj       | vial | 1. Yes<br>2. No                           | 1. Yes<br>2. No<br>97. Not asked  | 1. Yes<br>2. No<br>97. Not asked           | 97. Not asked   | 997. Not Asked   |
| 6 | Cotrimoxazole tab 480      | tab  | 1. Yes                                    | 1. Yes  | 1. Yes                                     | 97. Not   | 997. Not   |

|    |                                  |         |                 |                                  |                                  |               |                |
|----|----------------------------------|---------|-----------------|----------------------------------|----------------------------------|---------------|----------------|
|    |                                  |         | 2. No           | 2. No<br>97. Not asked           | 2. No<br>97. Not asked           | asked         | Asked          |
| 7  | Gentamycin 80mg inj              | Am<br>p | 1. Yes<br>2. No | 1. Yes<br>2. No<br>97. Not asked | 1. Yes<br>2. No<br>97. Not asked | 97. Not asked | 997. Not Asked |
| 8  | Ciprofloxacin tab 250            | tab     | 1. Yes<br>2. No | 1. Yes<br>2. No<br>97. Not asked | 1. Yes<br>2. No<br>97. Not asked | 97. Not asked | 997. Not Asked |
| 9  | Ibuprofen 200mg                  | Tab     | 1. Yes<br>2. No | 1. Yes<br>2. No<br>97. Not asked | 1. Yes<br>2. No<br>97. Not asked | 97. Not asked | 997. Not Asked |
| 10 | Paracetamol 120 mg/5ml           | Btl     | 1. Yes<br>2. No | 1. Yes<br>2. No<br>97. Not asked | 1. Yes<br>2. No<br>97. Not asked | 97. Not asked | 997. Not Asked |
| 11 | Paracetamol 500mg                | Tab     | 1. Yes<br>2. No | 1. Yes<br>2. No<br>97. Not asked | 1. Yes<br>2. No<br>97. Not asked | 97. Not asked | 997. Not Asked |
| 12 | Diazepam 5mg/ml inj              | Am<br>p | 1. Yes<br>2. No | 1. Yes<br>2. No<br>97. Not asked | 1. Yes<br>2. No<br>97. Not asked | 97. Not asked | 997. Not Asked |
| 13 | Metronidazole 200(or250) mg tab  | Tab     | 1. Yes<br>2. No | 1. Yes<br>2. No<br>97. Not asked | 1. Yes<br>2. No<br>97. Not asked | 97. Not asked | 997. Not Asked |
| 14 | Chloroquine 150mg                | tab     | 1. Yes<br>2. No | 1. Yes<br>2. No<br>97. Not asked | 1. Yes<br>2. No<br>97. Not asked | 97. Not asked | 997. Not Asked |
| 15 | Chloroquine syrup (any strength) | btl     | 1. Yes<br>2. No | 1. Yes<br>2. No<br>97. Not asked | 1. Yes<br>2. No<br>97. Not asked | 97. Not asked | 997. Not Asked |
| 16 | Mebendazole 100mg                | Tab     | 1. Yes<br>2. No | 1. Yes<br>2. No                  | 1. Yes<br>2. No                  | 97. Not asked | 997. Not Asked |

|    |  |        |                 |                                  |                                  |               |                |
|----|--|--------|-----------------|----------------------------------|----------------------------------|---------------|----------------|
|    |  |        |                 | 97. Not asked                    | 97. Not asked                    |               |                |
| 17 | Salbutamol inj                                 | Am p   | 1. Yes<br>2. No | 1. Yes<br>2. No<br>97. Not asked | 1. Yes<br>2. No<br>97. Not asked | 97. Not asked | 997. Not Asked |
| 18 | Aminophyllin 100mg tab                         | tab    | 1. Yes<br>2. No | 1. Yes<br>2. No<br>97. Not asked | 1. Yes<br>2. No<br>97. Not asked | 97. Not asked | 997. Not Asked |
| 19 | Magnesium trisilactate + alumuminium hydroxide | Tab    | 1. Yes<br>2. No | 1. Yes<br>2. No<br>97. Not asked | 1. Yes<br>2. No<br>97. Not asked | 97. Not asked | 997. Not Asked |
| 20 | ORS packets                                    | Pck    | 1. Yes<br>2. No | 1. Yes<br>2. No<br>97. Not asked | 1. Yes<br>2. No<br>97. Not asked | 97. Not asked | 997. Not Asked |
| 21 | Zinc sulfate dispersible tablets               | Tab    | 1. Yes<br>2. No | 1. Yes<br>2. No<br>97. Not asked | 1. Yes<br>2. No<br>97. Not asked | 97. Not asked | 997. Not Asked |
| 22 | Iron & folic acid (any strength)               | Tab    | 1. Yes<br>2. No | 1. Yes<br>2. No<br>97. Not asked | 1. Yes<br>2. No<br>97. Not asked | 97. Not asked | 997. Not Asked |
| 23 | Ringer lactate                                 | Bag    | 1. Yes<br>2. No | 1. Yes<br>2. No<br>97. Not asked | 1. Yes<br>2. No<br>97. Not asked | 97. Not asked | 997. Not Asked |
| 24 | Gentian violet crystals                        | Btl    | 1. Yes<br>2. No | 1. Yes<br>2. No<br>97. Not asked | 1. Yes<br>2. No<br>97. Not asked | 97. Not asked | 997. Not Asked |
| 25 | Chlorhexidine w/wo cetrimide, sol *            | btl    | 1. Yes<br>2. No | 1. Yes<br>2. No<br>97. Not asked | 1. Yes<br>2. No<br>97. Not asked | 97. Not asked | 997. Not Asked |
| 26 | Condom   | piec e | 1. Yes<br>2. No | 1. Yes<br>2. No<br>97.           | 1. Yes<br>2. No<br>97. Not       | 97. Not asked | 997. Not Asked |

|    |   |       |                 |                                  |                                  |               |                |
|----|---|-------|-----------------|----------------------------------|----------------------------------|---------------|----------------|
|    |   |       |                 | Not asked                        | asked                            |               |                |
| 27 | EthinylEstradiol + Norgestrel (Combination) | Cycle | 1. Yes<br>2. No | 1. Yes<br>2. No<br>97. Not asked | 1. Yes<br>2. No<br>97. Not asked | 97. Not asked | 997. Not Asked |
| 28 | Medroxy progesterone 150mg inj              | Vial  | 1. Yes<br>2. No | 1. Yes<br>2. No<br>97. Not asked | 1. Yes<br>2. No<br>97. Not asked | 97. Not asked | 997. Not Asked |
| 29 | Norgestrel (Progesterone Only Pill, POP)    | Cycle | 1. Yes<br>2. No | 1. Yes<br>2. No<br>97. Not asked | 1. Yes<br>2. No<br>97. Not asked | 97. Not asked | 997. Not Asked |
| 30 | Oxytocine inj                               | Am p  | 1. Yes<br>2. No | 1. Yes<br>2. No<br>97. Not asked | 1. Yes<br>2. No<br>97. Not asked | 97. Not asked | 997. Not Asked |

**Q-34. In what year was the pharmacy first opened?**

(write year) \_\_\_\_\_

98. Refused (vol.)

99. Don't know (vol.)

**Q-35. Is there a hospital or a doctor's office close to the pharmacy?**

1. Yes

2. No

98. Refused (vol.)

99. Don't know (vol.)

**Q36. Does the pharmacy work closely with any of the following public or private health centers? [Read all responses and record all that apply: MULTIPLE RESPONSE]**

|                                 | Mentioned | Not Mentioned |
|---------------------------------|-----------|---------------|
| 1. Doctor's office              | 1         | 2             |
| 2. Private Clinic               | 1         | 2             |
| 3. Public Clinic                | 1         | 2             |
| 4. Private Hospital             | 1         | 2             |
| 5. Public Hospital              | 1         | 2             |
| 6. Other health center          | 1         | 2             |
|                                 |           |               |
| 96. No relationship/affiliation | 1         | 2             |
| 98. Refused                     | 1         | 2             |

|                |   |   |
|----------------|---|---|
| 99. Don't know | 1 | 2 |
|----------------|---|---|

**Q-37. Has this pharmacy ever been registered?**

- 1. Yes Go to Q-38
- 2. No Skip to Q-41
  
- 98. Refused Skip to Q-41
- 99. Don't know (vol.) Skip to Q-41

**Q-. (If code 1. Yes in Q-37) Is your pharmacy registered with the GDPA, with the Qawanin, or someone else? (Code all that apply: multiple response)**

|                                       | Mentioned | Not Mentioned | Not Asked |
|---------------------------------------|-----------|---------------|-----------|
| 1. With the GDPA                      | 1         | 2             | 97        |
| 2. With the Qawanin-e-Sehi-wa-Barrasi | 1         | 2             | 97        |
| 3. Other (specify)                    | 1         | 2             | 97        |
| 98. Refused (vol.)                    | 1         | 2             | 97        |
| 99. Don't know (vol.)                 | 1         | 2             | 97        |

**Q-39. (If code 1. Yes in Q-37) In what month was your first license issued?**

Q39a: Write month \_\_\_\_\_

- 1. January    4. April    7. July    10. October
- 2. February    5. May    8. August    11. November
- 3. March    6. June    9. September    12. December
- 97. Not asked    98. Refused    99. Don't know

Q39b: Write year \_\_\_\_\_

- 97. Not asked
- 98. Refused
- 99. Don't know

**Q-40. (If code 1. Yes in Q-37) Could I please see the license to understand the grade level you registered for?**

|   |  |              |
|---|--|--------------|
| Q-40a. License year (write year) _ _ _ _          | Q40b. Grade of Pharmacy  |              |
| 96. Pharmacy registered but license not available | 1. First Class   | SKIP TO Q-45 |
| 97. Not asked                                     | 2. Second Class  | SKIP TO Q-45 |
|   | 3. Third Class   | SKIP TO Q-45 |
|   | 96. Pharmacy registered but license not available SKIP TO Q-45 |              |
|   | 97. Not asked  | GO TO Q-41   |

**Q-41. (If code 2. No at Q-37) What prevents your pharmacy from being registered? (Open Ended. Record First and Second Responses.)**

Q-41a) Write first response: \_\_\_\_\_  
 97. Not asked  
 98. Refused (vol.)  
 99. Don't know (vol.)

Q-41b) Write second response: \_\_\_\_\_  
 97. Not asked  
 98. Refused (vol.)  
 99. Don't know (vol.)

**Q-42. (If code 2. No at Q-37) How likely is the pharmacy to be registered in the next six months?**

- 1. Very likely                      Go to Q-43
- 2. Somewhat likely                Go to Q-43
- 3. Not very likely                      Go to Q-44
- 4. Not at all likely                      Go to Q-44
  
- 97. Not asked
- 98. Refused (vol.)                      Go to Q-45
- 99. Don't know (vol.)                      Go to Q-45

**Q-43. (If “somewhat” or “very likely, codes 1 or 2 in Q-42) Why is the pharmacy likely to be registered in the next six months?**

- 
- 97. Not asked
  - 98. Refused (vol.)
  - 99. Don't know

**Q-44. (If “somewhat” or “very unlikely, codes 3 or 4 in Q-42) Why is the pharmacy unlikely to be registered in the next six months?**

- 
- Open-ended, record response
- 97. Not asked
  - 98. Refused (vol.)
  - 99. Don't know

**Q-45. (Ask all) Was the pharmacy ever visited by an inspector?**

- 1. Yes (GO TO Q-46)
- 2. No (Skip to Q-51)
  
- 98. Refused (vol.) (Skip to Q-51)
- 99. Don't know (vol.) (Skip to Q-51)

**Q-46. (If code 1. Yes in Q-45) Was the pharmacy visited by an inspector within the last year?**

- 1. Yes Go to Q-47
- 2. No Skip to Q-51
- 97. Not asked Skip to Q-51
- 98. Refused (vol.) Skip to Q-51
- 99. Don't know Skip to Q-51

**Q-47. (If code 1. Yes in Q-45) When was the last inspection?**

Q47a: Write month \_\_\_\_\_

- |             |          |              |              |
|-------------|----------|--------------|--------------|
| 1. January  | 4. April | 7. July      | 10. October  |
| 2. February | 5. May   | 8. August    | 11. November |
| 3. March    | 6. June  | 9. September | 12. December |
- 97. Not asked
  - 98. Refused
  - 99. Don't know

Q47b: Write year \_\_\_\_\_

- 97. Not asked
- 98. Refused
- 99. Don't know

**Q-48. (If code 1. Yes in Q-45) Which department or agency was the inspector from?  
[OPEN ENDED, DO NOT READ CODES]**

Record Response

1. MoPH – specific department unknown
2. General Directorate of Pharmacy Affairs (GDPA)
3. Qawanin-e-Sehi-wa-Barrasi
4. Provincial public health office

96. Other (specify: \_\_\_\_\_)

97. Not asked

98. Refused

99. Don't know

**Q-49. (If code 1. Yes in Q-45) Did the inspector leave any proof of inspection?**

1. Yes

Go to Q-50

2. No

Skip to Q-51

97. Not asked

98. Refused

Skip to Q-51

99. Don't know

Skip to Q-51

**Q-50. (If code 1. Yes in Q-49) May I see what the inspector left to see if he did his job or not?**

|  |   |
|--|---|
| Q-50a. Date (write date)                 | 97. Not asked<br>98. Refused<br>99. Don't know  |
| Q-50b. Month (write month)               | 1. January    4. April    7. July    10. October<br>2. February    5. May    8. August    11. November<br>3. March    6. June    9. September    12. December<br>97. Not asked    98. Refused    99. Don't know |
| Q-50c. Year (write year)                 | 97. Not asked<br>98. Refused<br>99. Don't know  |
| Q-50d. Source (write name of government) | 97. Not asked<br>98. Refused  |

|                                     |                    |
|-------------------------------------|--------------------|
| department that did the inspection) | 99. Don't know     |
| Q-50_95. Would not show             | 95. Would not show |
| Q-50_96. Cannot show                | 96. Cannot show    |
| Q-50_97. Not asked                  | 97. Not asked      |

**INTERVIEWER SELF-COMPLETED ITEMS ABOUT PHYSICAL INFRASTRUCTURE**

**Q-51. (Ask All) If the pharmacy has a window, is there any protection for the shelf/cabinet from direct sunlight?**

1. Yes (curtain, painted window pane, etc.)
2. There is a window without protection
3. No window

**Q-52. Is dust visible on the cupboards/shelves? (do not ask, code by observation)**

1. Yes
2. No

**Q-53. Describe the following (do not ask, code by observation):**

|                            |     |    |
|----------------------------|-----|----|
| Entrance                   | Yes | No |
| Q-53a. Covered by concrete | 1   | 2  |

|                                      |     |    |
|--------------------------------------|-----|----|
| Walls                                | Yes | No |
| Q-53b. Holes?                        | 1   | 2  |
| Q-53c. Smoothly painted or plastered | 1   | 2  |
| Q-53d. Signs of moisture or leaks    | 1   | 2  |
| Q-53e. Thermometer                   | 1   | 2  |

|                                   |     |    |
|-----------------------------------|-----|----|
| Floor                             | Yes | No |
| Q-53f. Level                      | 1   | 2  |
| Q-53g. Concrete                   | 1   | 2  |
| Q-53h. Signs of moisture or leaks | 1   | 2  |

|   |     |    |            |
|---|-----|----|------------|
| Ceiling   | Yes | No | Don't know |
| Q-53i. Wooden   | 1   | 2  |            |
| Q-53j. Hole through which you can see outside or into the next room | 1   | 2  |            |
| Q-53k. Signs of moisture or leaks                                   | 1   | 2  | 99         |
| Q-53l. Insulated  | 1   | 2  | 99         |

|                       |     |    |
|-----------------------|-----|----|
| Windows               | Yes | No |
| Q-53m. Broken panes   | 1   | 2  |
| Q-53o. Insect screens | 1   | 2  |

|                       |     |    |            |
|-----------------------|-----|----|------------|
| Pests                 | Yes | No | Don't know |
| Q-53p. Signs of pests | 1   | 2  |            |

|  |                              |   |    |
|--|------------------------------|---|----|
| Q-53q. (if yes in Q-53p) Type of pest: | Write type of pest:<br>_____ | 2 | 99 |
|--|------------------------------|---|----|

**Q54. Does the pharmacy display a night duty listing?**

1. Yes                      Go to Q-55a  
 2. No                        Skip to Q-56

|   | Yes | No | Not asked | Refused | Don't know |
|---|-----|----|-----------|---------|------------|
| <b>Q55a.</b> (Ask if code 1. Yes in Q- 54) Is the list displayed in a box next to the door? | 1   | 2  | 97        | 98      | 99         |
| <b>Q55b.</b> (Ask if code 1. Yes in Q- 54) Is the list readable from the outside?           | 1   | 2  | 97        | 98      | 99         |

**Q56. Quality of medicines:**

Interviewer: please pick up the first drug from the extreme left bottom of the shelf (1), the second drug from the extreme left top of the shelf (2), the third from the very middle (3), the fourth from the extreme right top (4), and the fifth from the extreme right bottom of the shelf (5). Do not to take the first drug in the front of the row. The information should be copied from the label on the drug. If any information is not on the label, mark "NA" in the corresponding space.

|           | a.                      | b.            | c.        | d.  | e.  | f.                   | g.                    | h.                 | i.                    | j.                                | k.                       | l.                                 | m.                     |
|-----------|-------------------------|---------------|-----------|---|---|----------------------|-----------------------|--------------------|-----------------------|-----------------------------------|--------------------------|------------------------------------|------------------------|
|           | Gen<br>eric<br>Nam<br>e | Brand<br>Name | Batc<br>h | Expiry date<br>(if there is no<br>expiry<br>date, code 97<br>"NA"<br>and write the date<br>of<br>manufacture in<br>the<br>next column if<br>available)<br>Please write in the<br>following<br>format:<br>DD/MM/YYYY | Date of<br>Manufacture<br>(only if no<br>expiry date<br>available)<br>Please write<br>in the<br>following<br>format:<br>DD/MM/YYYY<br>Y | Manu<br>factur<br>er | Count<br>ry of<br>Mfg | Dosag<br>e<br>form | Stren<br>gth/<br>unit | ##<br>uni<br>ts<br>in<br>pac<br>k | Visible<br>damage<br>Y/N | Cost<br>/pack (in<br>Afghanis<br>) | Over<br>the<br>counter |
| Q56<br>_1 |                         |               |           | 97. NA  | 97. NA  |                      |                       |                    |                       |                                   | 1. Yes<br>2. No          |                                    | 1. Yes<br>2. No        |
| Q56<br>_2 |                         |               |           | 97. NA  | 97. NA  |                      |                       |                    |                       |                                   | 1. Yes<br>2. No          |                                    | 1. Yes<br>2. No        |
| Q56<br>_3 |                         |               |           | 97. NA  | 97. NA  |                      |                       |                    |                       |                                   | 1. Yes<br>2. No          |                                    | 1. Yes<br>2. No        |
| Q56<br>_4 |                         |               |           | 97. NA  | 97. NA  |                      |                       |                    |                       |                                   | 1. Yes<br>2. No          |                                    | 1. Yes<br>2. No        |
| Q56<br>_5 |                         |               |           | 97. NA  | 97. NA  |                      |                       |                    |                       |                                   | 1. Yes<br>2. No          |                                    | 1. Yes<br>2. No        |

**Q-57.** Thank you very much for your time. What is the phone number of the pharmacy or a person working here who we can re-contact if necessary?

(write number) \_\_\_\_\_

98. Refused

99. Don't know

***End of Interview***

**Q-58.** How many people were present for the interview? \_\_\_\_\_

**Q-59.** Of these, how many participated in the interview? \_\_\_\_\_

**Q-60. [Interviewer]:**

Which of the following statements do you think best describes the level of comprehension of the survey questionnaire by the respondent?

1. The respondent understood all of the questions
2. The respondent understood most of the questions
3. The respondent understood most of the questions but with some help.
4. The respondent had difficulty understanding most of the questions, even with help from me

**Q61. Interviewer:**

Which of the following statements best describes the level of comfort or unease that the respondent had with the survey questionnaire?

1. The respondent was comfortable (at ease) with the entire questionnaire
2. The respondent was comfortable with most of the questions
3. The respondent was comfortable with only some of the questions
4. The respondent was generally uncomfortable with the survey questionnaire

**Q62. (Interviewer Code):**

Please indicate which, if any, of the questions caused this respondent any uneasiness or decreased cooperation during the interview. **(Write down no more than three question numbers, in order of mention).**

- a. First Mention \_\_\_\_\_
- b. Second Mention \_\_\_\_\_
- c. Third Mention \_\_\_\_\_

---

**D1. Interviewer: Write pharmacy name and address:**

---

**D-2a. Interviewer: Walk 300 paces east of the pharmacy where you conducted the interview. Do you pass any other pharmacies?**

---

- 1. Yes                    GO TO D2A\_1
- 2. No                     SKIP TO D2B

D2a\_1. (If yes to D-2a) How many pharmacies did you pass?

Write number: \_\_\_\_\_  
97. Not asked

D2a\_2. (If yes to D-2a) Of these, how many displayed registration from the outside?

Write number: \_\_\_\_\_  
97. Not asked

**D-2b. Interviewer: Walk 300 paces west of the pharmacy where you conducted the interview. Do you pass any other pharmacies?**

- 1. Yes                    GO TO D2B\_1
- 2. No                     SKIP TO D2C

D2b\_1. (If yes to D-2b) How many pharmacies did you pass?

Write number: \_\_\_\_\_  
97. Not asked

D2b\_2. (If yes to D-2b) Of these, how many displayed registration from the outside?

Write number: \_\_\_\_\_  
97. Not asked

D-2c. Interviewer: Walk *n* paces north of the pharmacy where you conducted the interview. Do you pass any other pharmacies?

- 1. Yes                   GO TO D2C\_1
- 2. No                    SKIP TO D2D

D2c\_1. (If yes to D-2c) How many pharmacies did you pass?

Write number: \_\_\_\_\_

97. Not asked

D2c\_2. (If yes to D-2c) Of these, how many displayed registration from the outside?

Write number: \_\_\_\_\_

97. Not asked

D-2d. Interviewer: Walk *n* paces south of the pharmacy where you conducted the interview. Do you pass any other pharmacies?

- 1. Yes                   GO TO D2D\_1
- 2. No                    END OF INTERVIEW

D2d\_1. (If yes to D-2d) How many pharmacies did you pass?

Write number: \_\_\_\_\_

97. Not asked

D2d\_2. (If yes to D-2d) Of these, how many displayed registration from the outside?

Write number: \_\_\_\_\_

97. Not asked

**To Be Completed By The Supervisor:**

**D -3. Was the interview subject to quality control/back-check?**

1. Yes
2. No

**D -4. Method of quality control/back-check**

1. Direct supervision during interview
2. Back-check in person by supervisor
3. Back-check from the central office by phone
4. Not applicable

## Appendix F; Stata commands.

\*\*\*\*\*  
 \*\*\*\* Coding Provinces, Districts and Pharmacies \*\*\*\*\*

```

encode m7, gen(provid)
generate provid=1 if
sort provid
bysort provid: tabstat distrid, stat(n)
encode m5, gen(distrid)
sort distrid
codebook distrid
bysort provid: tabstat pharmid, stat(n)
  
```

| provid | Total #distrid | #distrid<br>sampled | Total<br>#pharmid | #pharmid<br>sampled |
|--------|----------------|---------------------|-------------------|---------------------|
| BDK    | 28             | 5                   | 247               | 17                  |
| BLK    | 15             | 8                   | 757               | 86                  |
| BMY    | 7              | 3                   | 131               | 11                  |
| FRB    | 14             | 9                   | 373               | 34                  |
| HRT    | 16             | 6                   | 1021              | 111                 |
| KBL    | 31             | 29                  | 3028              | 393                 |
| KDH    | 18             | 5                   | 444               | 57                  |
| KST    | 13             | 3                   | 249               | 30                  |
| KDZ    | 7              | 4                   | 337               | 32                  |
| NGH    | 22             | 11                  | 842               | 108                 |

```

drop prov_dist
gen prov_dist = 28 if provid==1
recode prov_dist (.=15) if provid==2
recode prov_dist (.=7) if provid==3
recode prov_dist (.=14) if provid==4
recode prov_dist (.=16) if provid==5
recode prov_dist (.=31) if provid==6
recode prov_dist (.=18) if provid==7
recode prov_dist (.=13) if provid==8
recode prov_dist (.=7) if provid==9
recode prov_dist (.=22) if provid==10
bysort provid: tabstat prov_dist, stat(n)
  
```

```

drop dist_sampled
gen dist_sampled = 5 if provid==1
recode dist_sampled (.=8) if provid==2
recode dist_sampled (.=3) if provid==3
recode dist_sampled (.=9) if provid==4
recode dist_sampled (.=6) if provid==5
recode dist_sampled (.=29) if provid==6
recode dist_sampled (.=5) if provid==7
recode dist_sampled (.=3) if provid==8
recode dist_sampled (.=4) if provid==9
recode dist_sampled (.=11) if provid==10
  
```

```

*****
*****
*****!!!!!!! PROPOP has been replaced by the CSO 2011 data. DON'T execute the following
commands.
drop provpop
gen provpop = 904700 if provid==1
recode provpop (.=1245100) if provid==2
recode provpop (.=425500) if provid==3
recode provpop (.=948000) if provid==4
recode provpop (.=1780000) if provid==5
recode provpop (.=3950300) if provid==6
recode provpop (.=1151100) if provid==7
recode provpop (.=546800) if provid==8
recode provpop (.=953800) if provid==9
recode provpop (.=1436000) if provid==10
*****
*****
drop popratio
gen popratio = dpop/provpop

drop prov_pharm
gen prov_pharm = 247 if provid==1
recode prov_pharm (.=757) if provid==2
recode prov_pharm (.=131) if provid==3
recode prov_pharm (.=373) if provid==4
recode prov_pharm (.=1021) if provid==5
recode prov_pharm (.=3028) if provid==6
recode prov_pharm (.=444) if provid==7
recode prov_pharm (.=249) if provid==8
recode prov_pharm (.=337) if provid==9
recode prov_pharm (.=842) if provid==10

*** Estimating the total#pharmacies in each District
drop dist_pharm
gen dist_pharm = prov_pharm*popratio
bysort provid: tabstat dist_pharm, stat(n)

drop pharm_sampled
gen pharm_sampled = 17 if provid==1
recode pharm_sampled (.=86) if provid==2
recode pharm_sampled (.=11) if provid==3
recode pharm_sampled (.=34) if provid==4
recode pharm_sampled (.=111) if provid==5
recode pharm_sampled (.=373) if provid==6
recode pharm_sampled (.=57) if provid==7
recode pharm_sampled (.=30) if provid==8
recode pharm_sampled (.=32) if provid==9
recode pharm_sampled (.=108) if provid==10

```

\*\*\*\*\*



## Curriculum Vitae – Norio Kasahara

### PERSONAL DATA

**Name:** Kasahara, Norio  
**Date of Birth:** 10 August 1967  
**Sex:** Male  
**Address:** #704 Daia Palace SA, 3221-1 Anesaki  
Ichihara-shi, Chiba 299-0111, Japan  
**Phone:** +81 (0) 436-62-8338 (Home)  
**Internet Address:** norio.kasahara at gmail.com; noriok at uw.edu  
**Skype Name:** kasaharan  
**Nationality:** Japanese citizen

### EDUCATION

**Ph.D. Candidate** (Pharmaceutical Science), October 2008 - March 2015 (anticipated)  
Major areas of study: Global Medicines, Health Economics, Epidemiology, Biostatistics  
Pharmaceutical Outcomes Research and Policy Program (PORPP), School of Pharmacy,  
University of Washington, Seattle WA, USA

**MPH** (Masters Degree in Public Health), July 1999 - May 2000  
Major areas of study: International Health, Health Policy, Integrated Management of  
Childhood Illnesses, Access to Essential Medicines  
Johns Hopkins School of Public Health, Baltimore MD, USA

**BSc** (Bachelor of Science in Pharmacy), April 1988 - March 1991  
Major area of study: Pharmacology  
Tokyo University of Pharmacy and Life Sciences, Tokyo, Japan  
Registered Pharmacist #291595 (December 1993; Ministry of Health, Labor and Welfare,  
Japan)

### KEY QUALIFICATIONS

Health Policy Analysis  
Program Development and Implementation  
Health Systems Strengthening (emphasis on urban health systems development)  
Subnational Health Governance Development  
Program Management  
Research  
Monitoring and Evaluation  
Economic Evaluation of Health Programs  
Planning and Budgeting

**LANGUAGE SKILLS:** Indicate competence on a scale of 1 to 5 (1 - excellent; 5 - basic)

| Language          | Reading | Speaking | Writing |
|-------------------|---------|----------|---------|
| English           | 1       | 1        | 1       |
| Japanese          | 1       | 1        | 1       |
| Chichewa (Malawi) | 2       | 2        | 3       |
| Nyanja (Zambia)   | 3       | 3        | 4       |
| Dari              | 5       | 4        | 5       |

## **CAREER HISTORY**

### **MARCH 2012 – MARCH 2014: EPOS HEALTH MANAGEMENT/AEDES, TECHNICAL COOPERATION PROGRAM FOR THE MINISTRY OF PUBLIC HEALTH, AFGHANISTAN, SENIOR TECHNICAL ADVISOR, KABUL, AFGHANISTAN**

In March 2012, the European Union Delegation (EU) to Afghanistan awarded a 2-year consultancy service contract to a joint venture of EPOS Health Management GmbH (Bad Homburg, Germany) and AEDES (Brussels, Belgium). The Technical Cooperation Program to the Ministry of Public Health Afghanistan is a € 5.4 million project which aims to support to the Ministry of Public Health (MoPH) in strengthening its stewardship role over the afghan public health system in the seven components:

- Grant and Contract Management
- Disability
- Mental Health
- Prison Health
- Human Resources for Health
- SWAps and Aid Coordination
- Support to Provincial Capacity and Coordination

Coordinated and managed activities for the component of “Support to provincial capacity and coordination”. Provided technical and managerial oversight on the assigned programmatic sub-components such as integrated health planning and budgeting, decentralization strategy development, provincial monitoring and evaluation, and maintaining verbal and written communications with the EU health team and, as appropriate, represented the EU health program in meetings with external partners including MoPH, WHO and other relevant development partners. Additional duties included:

- Coordinated the development and the update process of annual and quarterly program plans and budgets for the EU-funded Technical Cooperation Program in close consultations with the MoPH counterparts and key development partners in the sector including UN organizations, bilateral aid agencies and NGOs.
- Supported the existing coordination mechanisms between central and provincial authorities including Provincial Coordination Steering Committee and other relevant technical working groups pertinent to the development of policy framework, strengthening of subnational health system and improved health services.
- Provided technical assistance, coordinated the project development process and mobilized financial inputs for the subprograms under the Afghan health sector program titled the SEHAT program which is financed through the direct budget support to the Afghan Treasury by the World Bank, USAID and EU.
- Coordinated multiple task forces and working groups at central level and achieved greater effectiveness and efficiency for the central MoPH to communicate with the subnational public health administration.
- Designed and coordinated a series of capacity building workshops for the provincial public health officers to be able to plan, budget and implement the activities articulated in the provincial annual operational plans.
- Provided technical supervision to the Afghanistan Retail Pharmacy Survey 2013 implemented by the SPS Afghanistan and coordinated with a local contractor to carry out survey training sessions, field work, data collection and data analyses and reporting to the SPS Afghanistan.

- Coordinated the development, update and implementation of the program activities in consultation with the local program consultants, the Program Team Leader and Program Manager at the headquarters to ensure that the program activities are carried out in light of the EU's country assistance strategy.
- Managed the implementation of program technical activities ensuring that they achieve the expected results and were implemented as planned, contributed to enhancing specific building blocks for a universal health coverage, and fostered the national strategies to sustain them through robust local ownership.
- Identified quantitative and qualitative capacity gaps amongst the program technical staff and designed and implemented mentoring and capacity building activities ensuring that these gaps are addressed and that technical staff build confidence and capacity to deliver technical activities articulated in the Terms of Reference.
- Developed the technical assistance proposal required by the EU to support the Afghan pharmaceutical systems strengthening through close coordination with key partners in the subsector which included MoPH, SPS Afghanistan, WHO and HPIC to ensure that there is no overlapping efforts by the varying players.
- Assisted the Technical Cooperation Program Team Leader as needed in the development and the oversight of a knowledge management plan that assures appropriate dissemination of program results and success stories through presentations in public forums, conferences, journals, or newsletters.
- Supervised the program staff through regular meetings to track work progress and to provide guidance necessary for ensuring consistent quality of work performed and adherence to the EPOS/AEDES policies, guidelines, and values. Approve time sheets, conduct performance planning and reviews, and promote staff skills and knowledge through internal training sessions. Liaise with the Team Leader and Program Manager to identify and recommend local staffing needs ensuring that EPOS/AEDES administrative procedures for hiring are adequately adhered to.
- Performed all functions as Acting Team Leader when the Team Leader was absent.

**NOVEMBER 2012 – FEBRUARY 2014: AFGHANISTAN RETAIL PHARMACY SURVEY 2013, STRENGTHENING PHARMACEUTICAL SYSTEM (SPS) AFGHANISTAN, MANAGEMENT SCENARIOS FOR HEALTH, TECHNICAL CONSULTANT (PRO BONO), KABUL, AFGHANISTAN**

The Afghanistan Retail Pharmacy Survey 2013 was funded by USAID through the SPS Afghanistan and was carried out by a local survey company with an extensive technical support from SPS. The objective of the survey was to set a baseline for the specific conditions the SPS Afghanistan program is targeted to change, as well as others which will contribute to the MoPH's knowledge base. Of the total 34 provinces, ten national representative provinces were selected for the study in which 879 pharmacies were interviewed using a structured questionnaire. Technical Consultant oversees and, where necessary, assists a local survey company in:

- Obtaining swift approvals by the relevant IRB agencies for the survey.
- Finalizing survey sample size, survey sampling method, procedures.
- Developing a survey questionnaire that adequately captures the data necessary to calculate the SPS PMP indicators.
- Organizing a workshop for the MoPH stakeholders.
- Translating and back-translating the developed questionnaire.
- Developing and finalizing a detailed analysis plan, indicating how each indicator will be calculated from the collected data.

- Finalizing a field guide for the data collectors and supervisors, containing detailed description of procedures for:
  - Pre-sampling mapping, segmenting and listing pharmacies
  - Sample selection
  - Respondent identification for different sections of the questionnaire
  - Questionnaire application
  - Verification for completeness, including “missing” units
  - Safe transmission of completed data
  - Finalizing the supervisor control sheet
  - Conducting enumerator and supervisor training
  - Preparing questionnaires for data entry
  - Cleaning and entering survey data in SPSS, creating data tables in Excel
  - Providing descriptive analyses presenting frequencies and cross-tabs with analysis of variance, where appropriate
- Presenting results in a stakeholders’ workshop
- Reviewing local contractor’s deliverables for quality before acceptance by MSH as per Scope of Work
- Conducting secondary analysis of the data:
- Defining key practices of interest
- Implementing multivariate regression models to assess the relationships of strategic determinants of key practices

**SEPTEMBER 2008 – PRESENT: PHD PROGRAM AT PHARMACEUTICAL OUTCOMES RESEARCH AND POLICY PROGRAM (PORPP), SCHOOL OF PHARMACY, UNIVERSITY OF WASHINGTON, SEATTLE WA, USA.**

DECEMBER 2005 – JULY 2008: JAPAN INTERNATIONAL COOPERATION AGENCY (JICA), TECHNICAL ADVISOR FOR THE MINISTRY OF PUBLIC HEALTH, KABUL, AFGHANISTAN

As one of the Japan’s ODA schemes, the Japanese government via JICA provides health ministries in developing countries with technical advisors in a wide variety of areas on a long-term basis. These areas include health policies and planning, governance and leadership, maternal and child health, hospital management, infectious disease control etc. JICA and the Afghan MoPH agreed in 2002 to dispatch a Japanese expert to help MoPH develop, implement, monitor and assess health policies and to coordinate the Japan’s health development assistance for Afghanistan. Key tasks that Technical Advisor was engaged in included:

Provided technical assistance to the General Directorate of Policy and Planning (GDPP) of MoPH on health governance, policy development and analyses, health facility development strategy, aid coordination, planning and budgeting, and monitoring and evaluation of health activities.

Helped GDPP coordinate and facilitate technical task forces in maternal and child health, urban health, pharmaceutical affairs, health information systems, provincial health systems development etc.

Oversee the development, management and coordination of the health program supported by the Government of Japan and JICA. The health program development involved the Japanese Ministry of Foreign Affairs, JICA HQs, and JICA technical cooperation projects including Reproductive Health Project, Tuberculosis Control Project, Medical Education Project and Midwifery Education Project.

Coordinated to develop a monitoring framework for the Japan’s health program for Afghanistan in light of General Framework of Japanese ODA 2003. Coordination mechanism for the programmatic framework development created an extensive network with not only health

development partners in Kabul including USAID, the World Bank, European Union, WHO and UNICE but also universities and research institutions in Japan.

Represented the Government of Japan in government-wide meetings including the Afghanistan National Development Strategy Steering Committee, Consultative Group on Health and Nutrition, and Health Donor Meeting.

Supervised the team of local program staff who worked with the aforementioned JICA projects. Mentored them through regular consultative meeting to ensure that their performance satisfies the Terms of Reference and yields tangible results to meet the programmatic objectives.

Developed and implemented capacity development sessions for the staff.

Coordinated annual needs assessment for the assistance to the Afghan health sector, developed assessment reports, compiled and submitted the MoPH project proposals to the government of Japan.

Ensured the development of monthly activity updates and their timely submission to the JICA Afghanistan Office and the Japan's ODA Task Force meeting held in Kabul, and developed quarterly and annual progress reports for submission to the JICA HQs.

**OCTOBER 2002 – OCTOBER 2005: JAPAN INTERNATIONAL COOPERATION AGENCY (JICA), TECHNICAL ADVISOR FOR THE MINISTRY OF HEALTH AND PROJECT FORMULATION ADVISOR FOR JICA MALAWI OFFICE, LILONGWE, MALAWI**

Coordinated the formulation of Japanese government's country assistance strategy for Malawi's health sector. Organized high-level Official Development Assistance policy dialogue meetings between Japanese and Malawian government.

Coordinated the development and adaptation of formats, procedures, and regulations to be used for formulating, negotiating, monitoring, and reporting in accordance with JICA regulations.

Provided technical advisory services to the Planning Department of Ministry of Health in Malawi. Coordinated a task force comprising of national and international professionals to develop the guidelines for District Implementation Plan in accordance with the government-wide reform to enhance governance of local public health services.

Coordinated the team of international consultants seconded by different agencies including the UK Department for International Development (DfID), Norwegian Agency for Development Cooperation (Norad), Overseas Development Institute (ODI), UNICWF, WHO, the World Bank and Management Sciences for Health (MSH).

Coordinated the Sector Review Conference for the health SWAp in Malawi. Provided technical inputs to evaluate the Program of Work particularly in the District Implementation Plans (DIPs). Coordinated and participated in technical working groups to feed the relevant information to the Sector Review.

Coordinated and developed a comprehensive assistance strategy for the health-related volunteers dispatched by JICA to Malawi. Organized planning meetings with the volunteers and counterpart organizations including MoH and Christians Health Association of Malawi (CHAM). Developed and refined the scope of work of health volunteers and suggested JICA for more rationalized posting of the volunteers in the country.

**SEPTEMBER 1995 – MARCH 1998: PHARMACIST IN CHARGE, LIKUNI MISSION HOSPITAL, LIKUNI, MALAWI**

Worked as pharmacist in charge at Likuni Mission Hospital which is a 200-bed regional hub hospital in central Malawi serving the catchment population of 350,000. Dispatched by the Japan Overseas Cooperation Volunteer (JOCV) program under JICA. Coordinated procurement and logistics of medical consumables and food supplies to the hospital and community.

Developed and implemented a small-scale pediatric medicines production unit inside the hospital and improved access to pediatric meds in the target community.

Developed a grant proposal and awarded the Japan's Grant Assistance for Grassroots Project worth US\$ 150,000 for the hospital service quality improvement including pharmacy services and rational drug use.

Developed and implemented a stock and supply management system of medical consumables in the hospital wards. The system aimed to increase efficiency in the medical supply management for the in-patient care services by delegating a supply and stock management authority to heads of wards in lieu of central stock management approach. Compared to the conventional central management approach, a new system improved availability of essential inpatient care items in the wards and decreased waste and loss of the consumables.

Designed, coordinated and implemented a community medicines management pilot in order to improve access to essential medicines in peripheral of hospital catchment area. Community-based medicines management ensured stable supply of essential medicines of good quality. Managed the process and approval of monthly expenditure reports from the Hospital Executive Board.

## **SUMMARY OF RELEVANT CONSULTING EXPERIENCE**

### **JUNE 2014 – AUGUST 2014**

#### ***SEHAT PROPOSAL FINALIZATION***

##### **European Union Delegation to Afghanistan (EU)**

EPOS Health Management GmbH, Kabul, Afghanistan

Senior Technical Advisor

**Responsibilities:** To work with the System Enhancement for Health Action in Transition (SEHAT) Program Coordination Team at the Office of Deputy Minister Policy and Planning as well as with all relevant departments through workshops. The Senior Key Expert for SEHAT Proposal development is responsible for the following tasks:

Review of Proposals

To review all revised proposals in the light of the recommendations provided by the leadership of MOPH and the international development partners

To incorporate more evidence based background to the proposals and revise the backgrounds

To revise and review the log frames prepared for the proposals and refine them

To review the budget plan and ensure it is in line with the overall proposal

Improve the language level in order to make it fluent and donor friendly

Development of Operational Plan

To conduct a workshop with all the leaders of the thematic groups to finalize all the proposals and then work on a plan.

Any other tasks given in relation of the proposal development and plan for SEHAT

### **DECEMBER 2010 – DECEMBER 2011**

#### ***URBAN HEALTH SYSTEMS STRENGTHENING PROJECT***

##### **JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)**

System Science Consultants Inc., Kabul, Afghanistan

**Senior Technical Advisor**

**Responsibilities:** Worked as Deputy Project Leader and Project Leader in the absence of Project Leader. Coordinated a policy-level meeting with the central Ministry of Public Health, Kabul Provincial Public Health Directorate and other stakeholders associated with urban health systems development. Provided technical and managerial oversight to the project team members, mentoring them on a regular basis and providing with corrective measures to meet the project requirements. Managed to mobilize a small research team in the designing, field-testing and implementing of a pilot intervention in order to generate necessary evidence to help

MoPH make decisions for the improved urban health services utilizing a Public-Private Partnership in Kabul City. Developed and provided training sessions for the project members, MoPH counterparts and other stakeholders including NGOs, retail pharmacy staff and other health workers.

#### **DECEMBER 2001 - MARCH 2002**

##### ***HIV/AIDS LABORATORY CAPACITY ASSESSMENT IN MALAWI*** **JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)**

Community Health Sciences Unit, Ministry of Health, Lilongwe, Malawi

##### **Principal Researcher**

**Responsibilities:** Reviewed and analyzed existing reports and studies related to the HIV testing and medical laboratory capacity in Sub-Saharan Africa. Developed a research plan in collaboration with MoH and conducted a country-wide survey to understand and identify capacity gap in the hospital laboratory testing for HIV/AIDS in Malawi. Conducted interviews with relevant stakeholders including bilateral donors such as CIDA, USAID, DfID and Norad, UN agencies and NGOs. Duties also included developing a roadmap for laboratory capacity building and suggesting the JICA Malawi Office and Japanese Ministry of Foreign Affairs about the future assistance to improve HIV/AIDS laboratory capacity in Malawi.

#### **SEPTEMBER 2000 - AUGUST 2001**

##### ***POVERTY ASSESSMENT STUDY***

##### **JAPAN BANK OF INTERNATIONAL COOPERATION (JBIC)**

Global Link Management, Tokyo, Japan

##### **Researcher**

**Responsibilities:** Carried out comprehensive poverty assessment for fourteen countries in which JBIC provides annual financial assistance including Malaysia, Indonesia and Bangladesh in order to provide the client with seeds of potential loan projects. Reviewed and analyzed the existing reports and research paper that explored the different aspects of poverty in those countries with emphasis on public health problems. Carried out a field survey in Malaysia including focus-group interview and abridged household survey using a structured questionnaire.

#### **PUBLICATIONS**

Kasahara N. Cost-Utility Analysis on Hypothetical Neuroimaging Tracer for Diagnosis of Dementia of Alzheimer's Disease in Japan. Poster presented at; 15th Annual ISPOR Meeting; 2010 May 15-19; Atlanta GA, USA.

Johns Hopkins University and Indian Institute of Health Management Research. Drug Quality Assessment Study in Afghanistan 2007. Kabul: Islamic Republic of Afghanistan; 2008. Afghanistan. Ministry of Public Health and World Health Organization. TB Drug and Logistics Manual. Kabul: Islamic Republic of Afghanistan; 2006.

Kachale E., Kasahara N. HIV/AIDS Related Laboratory Testing Capacity in Malawi: Assessment Report Submitted to JICA Malawi. Lilongwe: Republic of Malawi; 2004.

#### **AWARDS AND HONORS**

*Appreciation Letter from HE Minister of Public Health, Dr. Fatimie, for the work as JICA Technical Advisor, Kabul, Afghanistan, 2008*

#### **COMPUTER SKILLS**

Microsoft Word/ Office Suite, PowerPoint, Word, Excel, Epi Info, STATA, SPSS

**PROFESSIONAL AFFILIATIONS**

**Member**, International Society for Pharmacoeconomics and Outcomes Research (ISPOR)

**Member**, American Public Health Association (APHA)

**Member**, Afghanistan National Public Health Association (ANPHA)

**REFERENCES AVAILABLE UPON REQUEST**