Availability of Essential Medicines in Sudan.

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Abstract

Introduction: Although availability of essential medicines is one of the most important objectives of national medicines' policies, the unavailability of essential medicines remains a major problem for poor countries.

Objective: The study was carried out to measure availability and duration of out of stock of essential medicines in Sudan.

Method: The study was carried out using the World Health Organization (WHO) Operational Package for Assessing and Monitoring Pharmaceutical Situation in Countries format for data collection. Results: On the average, availability of selected essential medicines at the public pharmacy, medicine stores and the private pharmacies was found to be 80.6%, 90.0% and 93.0%, respectively. The survey found the mean duration of stock out at medicines store was 26.5 days and no records available about inventory control at the pharmacy level. Among the states, the study found low availability of medicines at North Kordufan public pharmacies. The study found no statistical significant difference as far as a Developing country concerning availability of medicines at rural or urban areas (p > 0.05).

Conclusion: Generally availability and stock out duration of essential medicines in the Sudan were acceptable.

Key words: Availability, Stock-out, Essential medicines, Sudan

INTRODUCTION

Essential medicines

One-third of the global population does not have regular access to essential medicines and in some of the lowest-income countries in Africa and Asia, more than half of the population has no regular access to essential medicines [¹]. The World Health Organization (WHO) estimated that over 10.5 million lives a year could be saved by 2015 by expanding access to existing interventions (mostly depending on accessibility to essential medicines) for infectious diseases, maternal and child health and non-communicable diseases [²]. The quality of a public health care system is evaluated by the patients, primarily on the basis of the presence of appropriate medical staff members and availability of needed quality medicines [¹, ²]. Essential medicines should be selected in accordance to the public health care needs, which must be associated with appropriate efficacy and safety, and comparative cost-effectiveness [³, ⁴]. Essential medicines are intended to be available in adequate amounts with appropriate dosage forms, with assured quality and proper information at affordable prices for the individual and the community. However, lack of availability of essential medicines forms a problem for the treatment of diseases that predominantly affect the Developing world [⁵].
Profile of the country

Sudan is the largest country in Northern Africa; with a total area of 2,505,810 square kilometers, bordering the Red Sea and is bordered with nine countries. The country administratively was divided into 25 states, which were governed federally. Each state according to its size and density of population was subdivided into provinces and localities [6]. The population was estimated for the year 2007 (growth rate 2.53) to be 37.239. On the average urban population was 37.56%, adult literacy rate 49.9% and GDP per capita is about US$700 [6, 7].

Health sector

Since Sudan has a federal political system, health care provision was decentralized and primarily the responsibility of the state governments. The Federal Ministry of Health is responsible for national policies, planning, coordination and the implementation of the national health programs (for example; primary healthcare, leprosy, HIV/AIDS, tuberculosis and malaria) [8]. Communicable diseases are more prevalent, and the main causes of morbidity and mortality are infectious and parasitic diseases [8].

Pharmaceutical sector

Sudan National Drug Policy (NDP) was formulated in 1983 and last updated in 2005. The goal of the NDP is to use available resources to develop pharmaceutical services so as to meet the requirements of all Sudanese in the prevention, diagnosis and treatment of diseases using efficacious, high quality, safe and cost-effective pharmaceutical products. The NDP mainly promotes the essential drug concept and rational use to ensure constant availability and affordability of safe and effective drugs to all segments of the population [9]. There are fourteen registered pharmaceutical manufacturers in the Sudan which mostly produce generic medicines in oral and topical pharmaceutical dosage form. Local production represents only 5% of the need of essential medicines in the country. Pharmaceutical market for the year 2006 was estimated to be US$ 213 million for private and public sectors. The public sector represents about 22.6% of the total market value, covering more than half of the requirements [10].

MATERIALS AND METHODS

Study design

The study was conducted using the WHO Operational Package for Monitoring and Assessing the Pharmaceutical Situation in Countries (version 2005) as guidance with some modification on the data collection forms to include medicines that are selected on the basis of their importance in treating major health problems in the country [11]. The methodology used survey of the prices and availability of a core and a supplementary list of medicines. Selection included four states, in each of the four identified areas, six public health facilities with pharmacy outlet, six private pharmacies and one drug store were chosen.

Study population and sampling

Sampling was conducted taking into consideration the largest or capital city and the most rural or lowest income-generating areas. Four states were selected from different accessible geographical regions (Central, North, East and West). Khartoum state was selected as the capital city with the highest income-generating area, which represents the central region of the Sudan. North Kordufan state was chosen as the lowest income generating area which represents the West region of the country. The other two states (Northern and Gadaref) were randomly chosen using simple random sampling method and they represent the North and East regions. Southern and Darfur states were excluded from the sampling due to logistic problems. Each of the selected states was divided into five geographical areas (Central, North, East, South and West). From these areas, simple random sampling method was used for selection of six public health facilities with a pharmacy outlet and six private pharmacies. Two public health facilities with a pharmacy and two private pharmacies were chosen from the center of the state due to large numbers of facilities. One public health facility with a pharmacy was selected from each of the four remaining different areas. Selection of private pharmacies was carried out by choosing the nearest private pharmacy to selected public health facilities with a pharmacy outlet. In the sampled four states, main medicines store was selected for the study.

Study indicators
Indicators measuring availability and stock out duration were collected from the selected public and private pharmacies and state medicine stores included: percentage of availability of essential medicines, adequacy of record and duration of stock-out for essential medicines, operating period and percentage of facilities working on holidays and Fridays.

**List of surveyed medicines**

In the study a modified WHO medicines list was used. Taking into consideration that the selected medicines should be registered at Federal Pharmacy and Poison Board, included in the Essential Medicines List and treat the common high prevalence diseases as reported at the Federal Ministry of Health (Sudan Annual Health Statistical Report, 2005). A total of twenty four surveyed medicines include; Artesunate + Sulphadoxine + Pyrimethamin tablet, Quinine tablet, Amoxicillin capsule, Benzyl Penicillin injection, Ciprofloxacin tablet, Ceftriaxone, Oral rehydration, Salbutamol tablet, Diclofenac tablet, Cotrimoxazole tablet, Metronidazole tablet, Ceftriaxone, Paracetamol tablet, Cotrimoxazole tablet, Metronidazole tablet, Furosemide tablet, Glibenclamide tablet, Omeprazole tablet, Rifampicin/ Isoniazid capsule, Salbutamol tablet, Diclofenac tablet, Cotrimoxazole tablet, Metronidazole tablet, Furosemide tablet, Glibenclamide tablet, Omeprazole tablet, Rifampicin/ Isoniazid capsule, Streptomycin injection, Ethambutol capsule and Pyrazinamide capsule.

**Data collection**

The survey was carried out at public health facility pharmacies, medicine stores and private pharmacies during May 11- July 8, 2006. Data was collected by four teams, each of three data collectors, all of them followed the procedures and approaches learned from the WHO operational package during the training.

**Data analysis**

Data entry and analysis took place once each data collection form was reviewed for clarity and completeness using Statistical Package for the Social Sciences (SPSS) version 12.0 and Microsoft Excel (2007). Descriptive statistics including frequency, mean, and standard deviation were used. To determine if there is a relationship between two nominal variables or whether they are independent of each other, non-parametric Chi-square test was used. The non-parametric Kruskal-Wallis test was used when more than two independent variables on ordinal data existed. Statistical significance level used was 0.05 with a confidence interval of 95%.

**Measurement of availability and duration of stock-out**

Twenty key essential medicines to treat the common health problems in Sudan were surveyed to identify their physical availability and duration of stock-out. The availability percentage was measured by counting the number of medicines available out of the total sampled on the list at each facility level (in drug store, private and public pharmacies) divided by the number of medicines in the list and then multiplied by 100 to find the percentage of availability at the indicated facility. The national indicator for availability for example, at public facilities was calculated as the sum of percentages of medicines available for all public health facilities surveyed, divided by the number of health facilities sampled. The same rule of calculation was applied for medicine stores and private sector to identify the percentage of availability.

Stock-out duration was calculated by back revision for the stock cards that indicated which medicines have records covering at least 6 months within the previous 12 months. The total of medicines with records was added. The percentages of medicines with adequate records were calculated by dividing the number of medicines with records covering at least 6 months by total the number of medicines and multiplied by 100. A medicine was considered in stock if it was available in generic or branded form. The number of days out of stock and actually reviewed period for each medicine was indicated.

The equivalent number of stock-out days per year for each medicine was computed by multiplying the number of days out of stock by 365 and dividing by the number of days covered by the review. The total number of stock-out days per year was computed. The average number of stock-out days was finally calculated by dividing the total number of stock-out days by the number of key medicines reviewed.
Table 1: Comparison between public and private pharmacies in location, operating time and availability of medicines

Table 1 showed that 46.0% of the public pharmacies operated for 24 hours and more than 70.0% of the private pharmacies operated for 16 hours. However, 62.5% of the public pharmacies operated on Friday, only 7.0% of the private pharmacies were operated. The study found on average, availability of essential medicines at public pharmacies, medicines stores and private sectors was 80.6% (SD ± 15.4), 90.0% (SD ± 10.0) and 93.9% (SD ± 12.5) respectively. The study found more than 75.0-90.0 % of the selected essential medicines were available in 20 (83.4%) and 17 (71.0%) of the surveyed private and public pharmacies, respectively. Availability of essential medicines in the private and public sector's pharmacies as shown in table 2 and 3 was high and statistically no significant difference was found between the states in both sectors (p = 0.28 and p = 0.40, respectively). Low availability of essential medicines was shown in North Kordufan public sector (66.6%). The study identified that in the private sector there is no significant difference between the states in the daily working hours (p = 0.17) and the majority of the pharmacies were operated for 16 hours (70.8%). On the other hand, a significant difference was identified in the public sector’s pharmacies concerning daily operating hours (p = 0.01) and most of Khartoum state pharmacies were operated for 24 hours (83.3%). The findings show 62.5% of the public health facilities were operating on Fridays and no significant difference was found between the states (p = 0.34).
Availability of adequate record at health facility

In Sudan there is no data or records available at the pharmacy level in both private and public sector. The current study showed adequate records were found at all medicine stores. On the average, the survey found adequate records available for 92.5% (SD ± 11.9) of the studied medicines.

Stock-out duration of medicines in medicine stores

To calculate this indicator, it is necessary to verify by means of registers or other records the incidence and length of time of any stock-outs for at least 6 months prior to the study. This indicator expresses the proportion of days out of stock for the year. The study showed that good records were available at the medicine stores level with acceptable duration of stock-out of 26.5 days.

DISCUSSION

The objective of this study is to measure availability and duration of stock-out of essential medicines at public and private sectors. Although availability of essential medicines is one of the most important objectives of the national medicines' policies, the unavailability of essential medicines remains a major problem [12, 13]. The prolonged war in the South and the emergence of armed movements in Darfur has led to the collapse of health and pharmaceutical supply systems, difficulties in movement and lack of security. For these reason they are excluded from the sampling.

The findings show the median availability of medicines in the private sector, public pharmacies and medicines stores was 100.0%, 82.5% and 100.0%, respectively. These findings were consistent with a study conducted at health centers level in Sudan [6] and other studies conducted in Africa [14, 15]. Availability of essential medicines at medicine stores was high compared to some developing countries [16]. High availability of medicines in the country may be enhanced by Central Medicines Supplies (CMS) which is a governmental corporation; among its responsibilities is to ensure quality medicines and other medical supplies are available with affordable prices. CMS supply the public health facilities through implementation of good procurement practice, good storage practice and good distribution and transportation practices. To achieve this goal; the CMS assists the states' governments to create Revolving Drug Fund (RDF), to be responsible for drug supply management system at the state level. In spite of good availability of essential medicines at medicines stores, the study found low availability of medicines in North Kordufan public pharmacies compared with other states. Low availability may be due to absence of drug inventory cards, poor financial support for transportation and distribution of medicines to the pharmacies. Most of the public pharmacies were built inside the public hospitals; therefore the study found operating hours at the public pharmacies was longer compared with the private pharmacies. Due to equitable allocation for health services and implementation of policies the study found no significant difference concerning availability of medicines at the rural and urban areas. Although, no manual or computerized inventory systems are in place at pharmacy level, high percentage of availability of medicines was found. The survey found stock-out duration at the drug store was found to be 26.5 days which is consistent with findings of a neighbouring African country, which was found 25 days [15].

Limitation of the study

Darfur and Southern states of Sudan were excluded from the survey due to logistical constraints.

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