

Full Length Research Paper

Accessibility of medicines and primary health care: The impact of the revolving drug fund in Khartoum State

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This paper presents a comprehensive evaluation of a country where a revolving drug fund (RDF) has lasted for fifteen years and serves more than three million patients annually, with more than SDG 2.8 million (Sudanese Pound) (US\$11.1 million) annual turn over. Regardless of the fact that the supply of medicines and improvement in public health facilities utilization are among the main objectives of user fees policy, there is little information on the effect of RDF on accessibility of essential medicines and its impact on the utilization of public health services where RDF schemes have been introduced. We measured the percentage of prescribed medicines dispensed to patients in selected health facilities (both RDF and non-RDF), the availability of essential medicines in a twelve month period in order to determine whether the cost of the medicines is a barrier to utilization of public health services with RDF scheme in Khartoum State (KS). Structured interviews with users (186), personal observations, and archival as well as statistical records were used to capture data of interest relevant to the study objective. The average availability rate of key items was greater (93%) in the RDF facilities compared to 86% in non-RDF facilities. RDF records also showed that the availability of medicines in the RDF health facilities ranged from 95 to 100% in the twelve months period studied. Data from the household survey, demonstrated that over a third (36%) of respondents did not consult public health facilities when a member of a household was ill two weeks prior to the date of interview. Of note, only 9% of them said that this was because of unavailability of medicines. This study suggests that the RDF scheme adopted by KS made essential medicines available at its health facilities and increased health services utilization compared to those without RDF scheme. Therefore, sustained availability of low cost medicines near where people live that benefit previously disadvantaged poor population, particularly the vulnerable rural groups is achievable through RDF.

Key words: RDF, accessibility, availability, affordability.

INTRODUCTION

In 1992, the government of Sudan adopted a number of health policy reforms (for example, the implementation of a cost-sharing policy) as part of its programme of economic reforms. These reforms aimed to improve the performance of the health care sector by ensuring the availability of essential supplies, such as essential medicines and by extension the health status of the country's population, particularly the poor. The reform was based on evidence, which suggests that patients welcome the availability of medicines at health facilities and often interpret this as quality indicator of available health care services and this perception enhance utilization rates in health facilities (Gilson et al., 1993; Diop et al., 1995; Haddad and Fournier, 1995; Van der Geest et al., 2000;

Gilson et al., 2001; Meuwissen, 2002; Uzo-chukwu et al., 2002; Mariko, 2003). In this regard, there is some report (Graaff and Everard, 2003), which indicates that Khartoum State (KS) now has a high level of availability of essential medicines at affordable prices and this has been attributed to the RDF (Graaff and Everard, 2003). Unfortunately, the impact on utilization of health care facilities remains unclear.

The RDF of the Ministry of Health, Khartoum State was implemented with technical and financial support from Save the Children (United Kingdom), widely known as SC (UK), in an attempt to improve chronic shortages of medicines in public health centres. After the initial capital investment made by SC (UK), the RDF has been running

since 1989 using revenues so generated from pharmaceutical sales to procure more affordable medicines.

The primary aim of the RDF was and is still to improve the utilization of primary health care (PHC) services through the establishment of a reliable and self-financing supply of essential medicines of acceptable quality at low cost which the community can afford with full area coverage and total cost recovery within each PHC (Mohammed, 2000). Specifically, the RDF was initiated, according to the Khartoum Comprehensive Child Care Programme (1987), by its partners to improve the quality of health services by providing quality essential medicines to KS population at prices lower than prevailing prices at alternative sources, that patients are willing and able to pay for. It also aims to improve the utilization of PHC services. It was believed that the scheme will foster efficient use of public health facilities by reducing unnecessary referral to other levels of the health care system. This report concerns the evaluation of the performance of the RDF in Khartoum State against the objectives of its establishment.

Brief profile of Khartoum State- Sudan

Khartoum State comprises the national capital of Sudan with an area of 28,000 km². KS is administratively divided into seven localities. Khartoum State Ministry of Health (MOH) accounts for all public health centres (140) and 22 hospitals. In KS, there are also a number of public health facilities which are administered by the Federal Ministry of Health (FMOH) (15 hospitals), universities (2 hospitals), Ministry of National Defense (3 hospitals) and Ministry of Interior (1 hospital).

The population of KS is 5,144, 510 provided by the 1993 census with an annual growth rate of 4.04% per year (Ministry of Health, 2003). The KS population has a base of the pyramid indicating a large number of children thus, a high dependency rate that can potentially overburden social service sectors, e.g. health and education. Fortunately, majority (86%) of KS population live in urban areas (Ministry of Health, 2003) and this can reduce the cost of health services delivery and improve coverage with proper planning and implementation.

RDF: Historical background

Prior to the introduction of the RDF, medicines were financed solely by the government and distributed free to users of public health facilities. This became unsustainable and was associated with lengthy stockouts which forced many patients to fill their prescription at exorbitant prices in private pharmacies (Federal Ministry of Health, 1990). This led to a crisis of confidence; people frequently by-passed these less credible local PHC and often spend additional time and money in going to big hospitals or resort to high cost private clinics in cities'

centres or self-medication through private pharmacies (Revolving Drug Fund, 1998). The poor suffered most because they lacked protected access to free services at public health facilities (Revolving Drug Fund, 1998) and the situation also overburdened services at referral hospitals and increased cost.

This situation became untenable and unfavorable and with donation from the SC (UK), by way of a seed stock of essential medicines, basic medical equipment for targeted health centres (60 centres) and funds for training and logistic support, the RDF scheme was introduced in KS. Specifically, SC (UK) provided the capital seed stock of medicines (UK£ 1.8 million) for the RDF, in separate lots of drug consignments that were completed in 1992 (Mohammed, 2000). Since then, the RDF has used its own drug-sales revenues for the purchase of further medicine supplies and to pay for operating expenses.

RESEARCH METHOD

Three methods, which together comprise the research design, were used. They comprised: structured interviews with health facilities users; verification of archival and statistical records to capture data on availability of medicines, changes in utilization rates of public health facilities; RDF history and its operational procedures; and systematic observations using checklists to determine the availability of medicines during health facilities visits and to verify stock records in the twelve-month prior to data acquisition (August 2003 to July 2004).

Selection of health facilities

Stratified random sampling was used in selecting the RDF rural hospital and health centres, studied. 7 health facilities were sampled. Of these, 5 had RDF scheme in operation while 2 were without the RDF. The RDF health facilities comprised 1 teaching hospital (Ibrahim Malik Hospital), outpatient department, 1 rural hospital and 3 health centres distributed in rural, periurban and urban areas. The non-RDF health facilities included the biggest referral hospital in Sudan (that is, Khartoum Teaching Hospital) with 700 beds and 1 rural health centre (Alshiekh Altayeb health centre). The Khartoum Teaching Hospital was selected to represent a tertiary non-RDF hospital and Alshiekh Altayeb health centre was chosen to represent non-RDF health centres in the rural areas, since all urban and periurban health centres were enrolled in the RDF. Due to a complete lack of pre-RDF information, these 2 health facilities were used as control, in order to determine whether the changes in drug availability and utilization involved factors other than the introduction of the RDF. The sampled health facilities were located in 4 of the 7 localities in KS.

Selection and sample size of patients and households

The information necessary to conduct this evaluation was collected from 93 patients at the exit points of selected public health facilities. The average of the monthly attendances at a small health facility was about 400 patients (Revolving Drug Fund, 2002). The sample size of this group was 5 patients, which can increase as the average of monthly attendances increases. In 5 health facilities, all (5 to 10 patients per visit) patients attending outpatient clinics were interviewed (exit-interview) after visiting the pharmacy on the study day.

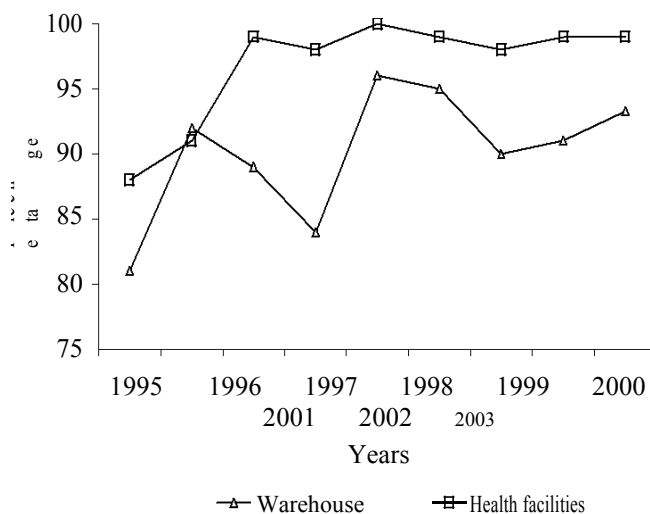


Figure 1. RDF medicine availability (1995-2003).

Although the Ministry of Health documents indicate that there is a health centre for every 15,000 inhabitants, there were no records to document this figure in each facility. Thus, it was impossible to determine the number of households covered in the catchment areas. Therefore, it was decided to use the number of health facility users per month as an indicator of households covered by each health facilities. The sampled households was selected within a 5 km radius of the health facility (after 5 km most probably enter a catchment area of another health facility) to include communities near to and far from health facilities. In the households' survey the sample was taken from urban, periurban and rural areas. The survey was carried out in the 7 selected health facilities' catchment areas. The households' survey sample was pre-determined. As we were interested in learning about the use and non-use of public health services by households, only those households where someone had experienced an illness in the preceding 2 weeks were interviewed. The first household was selected by the interviewers. If the head of the household was absent, refused to participate or had no member within the household who had fallen ill in the 2 weeks prior to the day of interview, the immediate right-hand side neighbour was tried, if not the left immediate one and so on, until the required number had been obtained. The total number of households was 93 (70 households from the hospitals' and 23 households from selected health centres' catchment areas). These numbers correspond to those of patients who were interviewed at the selected health facilities.

Ethical clearance

The study was approved by the Federal Ministry of Health (FMOH) research ethics committee. Thereafter, permission was sought from interviewees for their participation. Participants were also informed that there were opportunities to discuss issues of concern to them with interviewers and that all the data are for academic research purposes only. Volunteers were reassured that data processing would not be used to support decision making that could injure their interest.

Data analysis

Data collection involved 3 months of intensive field work from 26th June to 22nd September 2004. Acquired results were entered into a database using the Statistical Package for Social Sciences (SPSS) version 12.6 for Windows. Quantitative analysis consisted of simple

descriptive comparisons between two kinds of health facilities (that is, RDF and non-RDF health facilities) regarding accessibility issues.

RESULTS

Data from the household survey indicate that over a third (36%) of respondents did not consult public health facilities when a member of a household was ill 2 weeks prior to the study. Only 9% of them said that this was because of unavailability of medicines. Specifically, RDF records showed that the availability of medicines in RDF health facilities ranged from 95 to 100% as summarized in Figure 1.

The availability of a wide range of medicines is one of the most visible symbols that distinguish health facilities supplied by the RDF. For example, the list of RDF facilities contained 86 items (different dosage form and strength), whereas the list of non-RDF ones contained only 25 to 32 items at the time of the study. The average availability rate of key items that had been determined prior to the fieldwork as fast moving items in the government facilities was greater (93%) in the RDF facilities compared to 86% in non-RDF facilities. Of equal importance is the fact that the remainders of RDF listed medicines are also regularly available at RDF health care facilities. The verification of RDF facilities stock records revealed that all key items were highly available (97% on average) during the past 12 months (August 2003 to July 2004). All RDF health facilities had 84 out of 86 pharmaceutical products that they are authorized to sell during the field visits made to the selected health facilities. Similar information was not available at non-RDF health facilities (control group). The percentage of the availability of selected items in the RDF warehouse was 94%. The quantities of these medicines (18 key items) in the RDF warehouse were checked and expressed as the estimated duration for which the stock would be adequate to cover the expected average consumption (Table 1).

There was little difference between urban and rural RDF health facilities in the level of drug availability. The percentages of those who obtained their recommended medicines at RDF rural facilities and urban ones are 80 and 88% respectively. This difference is statistically insignificant (χ^2 , $p = 0.319$). In addition, most respondents mentioned at the end of their questionnaire that the supply of medicines had increased since the introduction of the RDF. Some typical responses were:

Before the RDF we had difficulties as public health centres were without medicines. Thanks to the RDF; the medicines are now available and affordable" (A patient at "Before the RDF we had difficulties as public health centres were without medicines. Thanks to the RDF; the medicines are now available and affordable" (A patient at RDF rural health centre). "People are no longer worried about medicines availability...even in this rural area, medicines are regularly available at our hospital" (A patient at RDF rural hospital).

Table 1. Stock of key items at the RDF warehouse at the end of June 2004.

Key items	Average/month	Stock	Stock units	Month worth
Amoxicillin 250mg capsules	428,389	6,317,000	Capsules	15
Amoxicillin 125mg suspension	11,007	220,000	Bottles	20
Chloroquine 200mg/5ml injection	122,209	638,491	Ampoules	5
Chloroquine 50mg syrup	10,802	94,033	Bottles	9
Chloroquine 150mg tablets	127,879	1,630,000	Tablets	13
Co-trimoxazole 240mg/5ml suspension	11,871	20,923	Bottles	2
Co-trimoxazole 480mg Tablets	117,286	119200	Tablets	1
Ferrous 200mg + Folic Acid 0.25mg Tablets *	161,473	1000	Tablets	0
Hyoscine butyl bromide 10mg Tablets	57,871	229,000	Tablets	4
Paracetamol 125mg Syrup	13,431	163,823	Bottles	12
Paracetamol 500mg Tablets	387,287	2,081,000	Tablets	5
Benzyl penicillin 1MU Injection	73,811	360,256	Vials	5
Procaine penicillin 1MU Injection	13,548	14,086	Vials	1
Promethazine 25mg/ml in 2ml Ampoule	3,560	11,248	Ampoules	3
Promethazine 25mg Tablets	19,803	208,000	Tablets	11
Dextrose 5% in Water, 500ml +giving set	11,513	154	Bottles	0
Dextrose 5% in NaCl 0.9%, 500ml + giving set	11,833	32,477	Bottles	3
Sodium Chloride 0.9%, 500ml + giving set	10,312	4,816	Bottles	0

*Out-of-stock for more than three months at the time of visit.

The RDF KS was designed to cover sixty health centres, including remote rural areas where population tends to be among the low income groups. From operating in 13 health centres in 1989, to 88 health facilities when the project was handed over to the government in early 1996 at the time of the study, the RDF supplied 104 health centres and 22 hospitals, with 48 health centres operating two shifts. The vast majority (96%) of respondents at the surveyed RDF health facilities walked (52%) to the nearest RDF health centre or sometimes took a bus (44%) to the hospitals.

The cost of a RDF prescription was perceived as affordable by users, while the quality improved compared to previously free medicines in the public health facilities. However, the costs of health services – e. g. major operations, medicines for chronic diseases, doctors' consultation fees - were considered as being very expensive. When patients were asked about reasons for not obtaining medicines prescribed to them, 4% reported that the medicines were too expensive in Khartoum Hospital. Only 67% of patients in non-RDF health facilities (control group) could afford the cost of their prescribed medicines and 8% of them said they abandoned their medicines for financial reasons. But no patient claimed such a problem in RDF health facilities.

Patients in non-RDF health facilities incurred greater expenditure than did patients in RDF ones. The average amount (SDG 24.71) paid to obtain the full prescription at non-RDF health facilities was found to be eight times higher than the average full prescription cost (SDG 3.01) paid by respondents at RDF health facilities. In both

cases, this cost included a transportation fee, but not consultation and diagnosis charges. Other costs, like waiting time, transport time and other opportunity costs, were excluded. The cost to obtain similar prescribed medicines at non-RDF facilities is significant in the context of the reported median monthly income of only SDG 269.50 (US\$104) at the time of the study. For example, in Khartoum Hospital, the prescription cost equals 18% of monthly income (6% of annual income calculated at 4 visits per year) of the respondents in the low income group. Conversely, the average cost of a prescription (SDG 3.01) at the RDF health facilities given by respondents who obtained their full prescription amounted to 1% of monthly (0.4% of annual income calculated at 4 visits per year) reported median income of the respondents and only 2% of the lowest monthly government salary which is SDG 125 at the time of the study. Generally, the expenditure of RDF patients comprises only 34% of their total expenditure on outpatient visit to a health centre. It should also be mentioned that for the 30% of the population covered by health insurance, only 25% of the prescription cost must be paid. There is considerable difference between households' expenditure on medicines in the rural catchment areas (where the health care services available either through RDF or non-RDF facilities in this study) of RDF and non-RDF health facilities. For instance, the selected household spent a total of SDG 3.25 to obtain their full prescription at the RDF rural health facilities catchment areas compared to SDG 3.93 in non-RDF ones. No comparison was made between households' expenditure on prescriptions in the

Table 2. Demographic characteristics of patients.

Demographic characteristics	RDF (n = 48)		Non-RDF (n = 45)		Total (n = 93)	
	n	%	n	%	n	%
Sex						
Male	20	42	22	49	42	45
Female	28	58	23	51	51	55
Age						
Under 5 years	17	35	5	11	22	24
5 to 15 years	7	15	1	2	8	9
16 to 34 years	15	31	20	45	35	38
35 to 44 years	8	17	8	18	16	17
45 to 54 years			6	13	6	6
55 years and older	1	2	5	11	6	6
Education*						
Not educated	9	19	5	11	14	15
Primary level	25	52	28	62	53	57
Secondary level	9	19	7	16	16	17
Higher education	5	10	5	11	10	11
Occupation						
Farmer	4	8	4	9	8	9
Self-employment	23	48	26	58	49	53
Labour job	10	21	7	16	17	18
Civil service employee	10	21	5	11	15	16
Private sector employee	-	-	2	4	2	2
Not employed	1	2	1	2	2	2
Income						
Low income group (less than SDG 200)	14	31	10	29	24	30
Middle income group (SDG 200 to 399.99)	23	51	13	37	36	45
High income group (SDG 400 or more)	8	18	12	34	20	25

*Applied to those with jobs or the head of households in case of children and dependents.

urban areas. It is difficult to know which type (RDF or non-RDF) of health facilities had been visited during the 2-week recall period, for households' respondents do not know which financing mechanism was applied.

Who are the users of public health facilities?

In this study, the users' surveys showed that all population categories (for example, males and females, adult and children, old and young, poor or rich people) with different ethnic and religious background were proportionally represented in the population using RDF and non-RDF health facilities. Half of the RDF patients were children less than 15 years compared to 13% of the non-RDF (Khartoum Hospital) patients in the same age group. Conversely, 76% of the Khartoum Hospital patients surveyed were in the 16 to 54 years age group compared to 48% of the RDF patients respondents. Two third of the patients sample consisted of individuals of less than 5 years of age (35%) and in the age group 16 to 34 (31%). Table 2 summarizes the demographic characteristic of users of public health facilities.

Changes in attendance rates at public health facilities

The impact of the Cost-Sharing Policy (which includes

payment for medicines as well as for other services) on the utilization of public health facilities has been assessed in this study by comparing attendance rates (number of visits per 100,000 population was used to avoid misleading increases in the number of patients as a result of population increase) before and after the imposition of user charges. Attendance in health facilities managed by KS MOH (including RDF and non-RDF facilities) were also compared with FMOH facilities (non-RDF facilities) using statistical reports available at FMOH and KS. Attendance rates at all public health facilities throughout the country fell sharply in 1992, following the introduction of the user charges policy (Figure 2). The annual attendance records were not available per facility from pre-RDF situations, thus making it difficult to compare changes in RDF facilities utilization before and after the programme. However, the overall utilization rates of public health facilities managed by MOH KS steadily increased from 1997, when most MOH KS facilities were enrolled in the RDF, but never returned to the pre-policy level. The absolute and proportional number of patients who fulfilled their prescription at the RDF facilities steadily increased from 683,069 (17,053 per 100,000 population) in 1996, (no figures were available before 1996), to 3,030,996 (61,406 per 100,000 population) in 2001. This striking increase of 260% in the utilization of public health

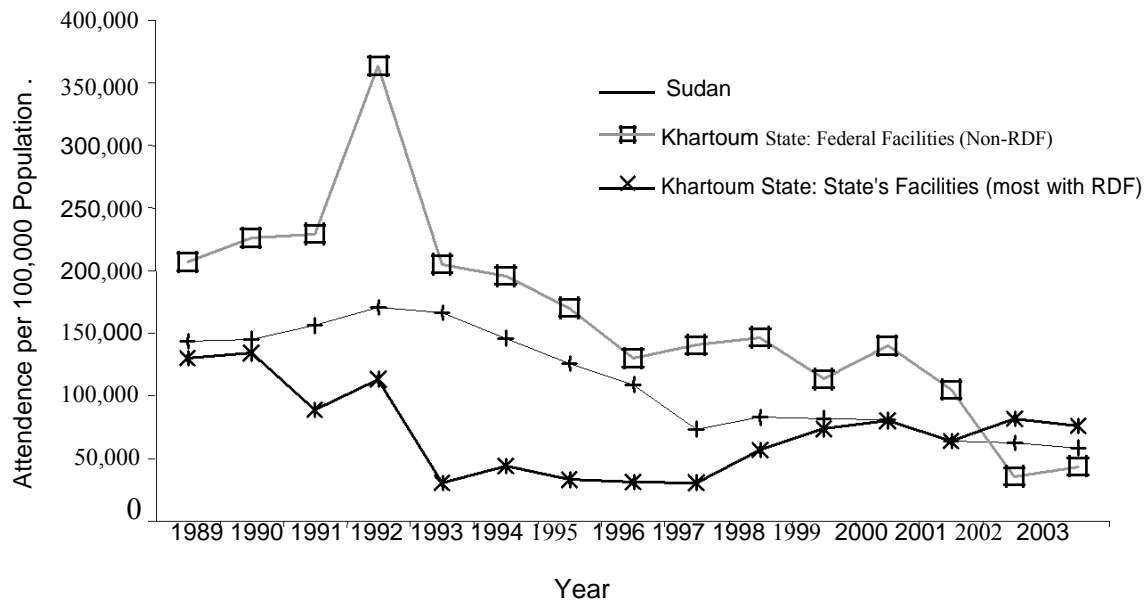


Figure 2. Changes in outpatients attendance rates at government health facilities. Source: Annual statistical reports, FMOH, [1990-2003].

facilities with RDF was observed. The increasing number of patients per facility is confirmed by figures of years 1997 to 2001 because the number of facilities has not changed during this period. In 2002 and 2003 when 14 health centres and 2 hospitals were added to the network, the RDF appeared to meet the medicine needs of 3,075,728 patients out of the 5,139,000 estimated population of Khartoum State (that is, two thirds of the population were served by RDF pharmacies), though with a small decrease in the proportional number (59,851 per 100,000 population) since 2002.

DISCUSSION

For service users, a major improvement in the quality of services could be attained, only if the availability of medicines is guaranteed. Our study reveals that in Khartoum State, the RDF has managed to maintain a steady supply of medicines in almost all public health facilities administered by the MOH KS. This was welcomed by participants. They believe that this outcome has outweighed the potential negative effects of the Cost-sharing Policy on the utilization of RDF health facilities by poor people. The availability of medicines, in fact, encouraged more people, including the poor, to seek health care at their local RDF health facilities, although many of them had not previously been able to easily obtain medicines for a considerable time; in fact since the mid 1980s, until the enrolment of their facilities in the RDF. The achievement of sustained availability of medicines resulted in other states in Sudan requesting to establish revolving drug funds too (Graaff and Everard, 2003).

The achievement of equitable access to medicines has

seemed to be difficult for many developing countries like Sudan, where 40% of the population are below the poverty line (CIA, 2006). Therefore availability of affordable medicines of good quality closer to residences of the population, particularly in remote areas, has often been a cause for concern for policy-makers, because it is one of the factors that make Primary Health Care facilities in these areas truly effective (Antezana, 1992).

In most low income countries, the largest proportion of health care expenditure is given over to medicines. They consume 60 to 90% of health expenses for poor households (World Health Organisation, 2005). According to the findings of this study, the expenditure of RDF users on medicines forms only 34% of the total cost of one outpatient visit to a health centre (transport and other opportunity costs are not included). This could be attributed to higher cost of other services (such as doctors' consultation and diagnostic fees) and/or lower cost of RDF medicines. The procurement of generic medicines from non-profit-making suppliers and their exemption from duties, and internal cross-subsidies within the RDF are the main reasons that make quality medicines regularly available at affordable prices.

The study showed that the impact of the price of medicines is extremely weak on the utilization of public health facilities and that among the sample of households not using health facilities, the percent of households who reported that costs of medicines were a barrier to service use was negligible (2%). But this should not be interpreted as supporting the ability of the patients to pay. Patients may sacrifice other things, for example, borrowing from relatives or friends, or selling their assets to meet their health need costs. Therefore the potential negative

impact of medicine costs on the health and economic status of the poor should not be overlooked. For any RDF programme to be successful, the negative impact of the drug price must be considered. Otherwise, the programme will force individuals, especially the poor, to pay a significant proportion of their available cash and assets and push many households into poverty.

Findings of this research indicate that the poor do not stop using RDF health centres. The RDF makes it easier for poor patients who previously (and still at non-RDF health facilities) spend money to consult a health facility doctor only to be told that medicines are out-of-stock. The findings from RDF health facilities, however, contradict studies of health care demand. For example, Gertler and Sanderson (1987), Mwabu and Wang'Ombe (1995) and Yazbeck and Leighton (1995) found that the poor respond to user fees by decreasing their consumption.

This discrepancy may be due to the fact that public health facilities in Khartoum State, particularly at health centres, were without medicines before the introduction of the RDF. As a consequence, the poor and others were directed to expensive private alternatives to get their prescribed medicines. But our findings are similar to the results of the study of Litvack and Bodart (1993) in Cameroon which revealed that the introduction of user fees associated with improvement in quality, benefits poorer people more than other groups, since availability of quality health services closer to the population represents an effective decrease in the overall cost of quality health care.

This study revealed that in RDF health facilities, availability of medicines has improved and the utilization of health facilities increased progressively. These findings are compatible with those reported in the facility-based utilization research (Murakami et al., 2001; Uzochukwu et al., 2002; Jitta et al., 2003). The results of this study are also similar to the findings of previous studies of user charges conducted in Sub-Saharan Africa (Litvack and Bodart, 1993; Lavy and Germain, 1994; Akin et al., 1995). The improvement in the utilization of PHC services associated with the introduction of cost-sharing was reported in Mauritania (Audibert and Mathonnat, 2000) and in Niger (Yazbeck and Leighton, 1995) where user fees provide financial resources to subsidize preventive services. Unlike the situation in Mauritania and Niger, the RDF KS does not free direct resources to subsidize PHC services. Instead it makes medicines regularly available and therefore, induces the utilization of both curative and preventive services.

Conclusion

The findings of this study are very encouraging. The most important of which is that the RDF KS model has been extremely effective in maintaining a regular, self-sustaining system of supply of safe and effective medicines of good quality and affordable prices to the KS population, regardless of their income and geographical location for

nearly two decades. The improved accessibility to medicines was clearly reflected in the steady increase in the utilization of the RDF health facilities by different socio-economic groups, particularly the poor population and other vulnerable groups (such as mothers and children) in both urban and rural areas in Khartoum State. Therefore, it does appear that the RDF has had a positive impact on the health status of Khartoum State population. The present observations should be of interest to policy-makers across developing countries and clearly show how RDF KS model could be a useful complement to publicly financed health care. Specifically, the model could be successfully replicated in the remaining non-RDF health facilities in Khartoum and other states of Sudan and low income countries. Finally, the results also demonstrate how international donors can help interested governments in developing countries to replicate the RDF KS model which has proved successful on a very large scale.

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