

Cross-sectional study on the availability of essential medicines at public health facilities in Jur River County, South Sudan

Dhal T. Ajingdit¹, Peter N. Karimi²,
Kashi B. Carasso³, and François
Niragire⁴

1. EAC Regional Center of Excellence for Vaccines, Immunization, and Health Supply Chain Management, College of Medicine and Health Sciences, University of Rwanda, Kigali, Rwanda.
2. Department of Pharmacy, Faculty of Health Sciences, University of Nairobi, Nairobi, Kenya.
3. EAC Regional Center of Excellence for Vaccines, Immunization, and Health Supply Chain Management, College of Medicine and Health Sciences, University of Rwanda, Kigali, Rwanda.
4. Department of Applied Statistics, College of Business and Economics, University of Rwanda, Kigali, Rwanda.

Correspondence:

Dhal T. Ajingdit

Email: dhalpharm04@gmail.com

Submitted: November 2022

Accepted: March 2023

Published: May 2023

Citation: Ajingdit et al., Cross-sectional study on the availability of essential medicines at public health facilities in Jur River County, South Sudan, *South Sudan Medical Journal*, 2023;16(2):45-49
© 2023 The Author(s) License: This is an open access article under [CC BY-NC](https://creativecommons.org/licenses/by-nc/4.0/) DOI: <https://dx.doi.org/10.4314/ssmj.v16i2.2>

ABSTRACT

Introduction: The availability of essential medicines in health facilities in Jur River County (JRC), South Sudan, is below expectations. This is despite the requirement that all citizens should be provided with adequate quality health care services. The objective of the study was to assess the availability of essential medicines and inventory management practices in JRC.

Method: This was a cross sectional study conducted in 31 of the 51 health facilities in JRC. These were 23 primary health care units (PHCUs) and eight primary health care centres (PHCCs). Data were collected using a structured questionnaire, logistics management information system (LMIS) data reports and checklist forms. All the completed checklists and questionnaires were analysed using IBM SPSS statistics version 20.0 and LMIS data was analysed using excel spreadsheet.

Results: The main findings were stockouts and overstocking of essential medicines, low skilled health workers (HWs) and ineffective rotation of medicines in the health facilities. From January – August 2021, the stockouts of essential medicines in PHCUs and PHCCs were 44% and 34% respectively, whereas the incidences of over stockings were 22% and 31% respectively. Almost all (97%) of the health facilities kept records of essential medicines, revealing stockouts of 90.3% on the day of the visit. Of the 31 HWs interviewed 23 (74.9%) were community health workers (CHWs), four (12.9%) nurses and four (12.9%) pharmacy technicians; most (87.1%) had attained secondary education.

Conclusion: The quantities of essential medicines were inadequate and able to cover only two months. The major reasons were inadequate supply of essential medicines; recruitment of CHWs and nurses, instead of pharmacy technicians in the management of supplies; ineffective rotation of medicines within and other health facilities. More research is needed on the factors affecting the availability of medicines at the health facilities in JRC.

Keywords: essential medicine, inventory management, stockout, overstock, South Sudan

INTRODUCTION

Access to medicines is a global problem due to rising prices. This affects the ability of health systems to provide full and affordable healthcare. With the persisting problems of shortages and stockouts of essential medicines for communicable and non-communicable diseases, there are increasing numbers of substandard and counterfeit medicinal products posing a serious risk to the public.^[1,2] These issues of substandard and counterfeit products and shortages of essential medicines are expensive for health systems to manage, with additional costs for the replacement of medicines and absorbing significant workers' time. Also, shortages of essential medicines have been reported in high, middle, and low-income countries.^[2]

Medicine shortages risk patients' health, as a result of non-treatment, under-treatment, and treatment errors from attempts to substitute missing medicines. The majority of essential medicines including common antibiotics, analgesics, antihypertensives, emergency medicines, and paediatric formulations are often out of stock at health facilities.^[3]

In African countries progress toward Universal Health Coverage (UHC) has been slow. The Abuja Declaration (2001)^[3] urged all state members to allocate 15% of the national budget to the healthcare system. In South Sudan, the national budget for healthcare services is less than 2%.^[1]

In South Sudan, health services are delivered through a five-tier system composed of PHCUs (boma level), PHCCs (payam level), a county hospital (county level), a state hospital (state level, and a referral hospital (national level). At the village level, care is provided by a set of community volunteers led by CHWs and community midwives (CMWs) through the Boma Health Initiative (BHI). There is no county hospital in JRC.

The leading health problems for all age groups across the states are communicable diseases such as malaria, typhoid, pneumonia, and diarrhoea.^[1,4] Information about healthcare services and disease prevention is mainly provided by CHWs and community leaders. Shortage of essential medicines as well as shortages in personnel and their inadequate skills were major challenges in health facilities in 2020.^[1]

According to the basic package of health and nutrition (BPHN) service in primary health care, a PHCU should be staffed by two CHWs, a vaccinator, and a community midwife who provide basic preventive and curative services. A PHCC offers a wider range of diagnostic and curative services, consists of laboratory diagnostic and an indoor observation ward, provides treatment of simple cases and basic emergency obstetric and neonatal care, and should be staffed with clinical officers, trained nurses, midwives, laboratory and pharmacy technicians, public health officers, vaccinators, and CHWs (See [Basic package of health and nutrition service in primary health care](#)) There are usually about four PHCUs for each PHCC.

This study assessed the availability of essential medicines and inventory management practices at PHCCs and PHCUs in JRC, one of the three administrative counties

in Western Bahr el Ghazal State, South Sudan.

METHOD

This descriptive cross-sectional study was conducted in 31 of the 51 health facilities in JRC. These were 23 PHCUs and eight PHCCs.

Data were collected in August 2021 from available records on the availability of essential medicines and use of LMIS tools at health facilities, and the socio-demographic characteristics of the HWs responsible for managing the medicines.

The study tools included a structured questionnaire, a checklist, and LMIS data reports. The questionnaire was used to collect data on inventory management practices from the participants such as the availability and use of LMIS tools; education level, skills, and job titles of participants; frequency of supply delivery; stockouts period of essential medicines, and cost-sharing from the patients in the health facilities.

A checklist form of twenty-four essential medicines based on the essential medicine list (EML) for the primary healthcare service was used to assess the availability of essential medicines. The same checklist was used for selecting essential medicines from the LMIS reports of January-August 2021. From the LMIS data, the average monthly consumption (AMC) of each essential medicine for individual PHCUs and PHCCs was calculated. Stock status at each health facility per month was analysed separately.

The AMC of each essential medicine per health facility of all PHCUs and PHCCs was combined to analyse the cumulative stock at hand per the report from January-August 2021. The stock min-max level (3-6 months) was determined and the months of stock (MoS) were calculated by dividing the stock at hand by the AMC to give the number of months the stock at hand would last in the health facility.

At a pre-arranged time, the researcher visited the health facilities, selected the health workers responsible for managing the medicines, and, following their consent, asked them the questions in the questionnaire. The stock levels of tracer medicines listed in the checklist form were then assessed. The LMIS monthly pharmacy reports were collected from the logistics management unit for analysis.

Table 1. Percentage of stockout for all PHCUs and PHCCs January-August, 2021

S/No	Months	Facility	Stockout %	Understock %	Overstock %	Normal %	Comments
1	January to August	PHCUs	44	17	22	17	Last 2 months C13, for period of C14 and first 2 months of C15
		PHCCs	34	16	31	19	

Table 2. Percentage stockouts per month from January-August 2021

S/No	Months	Facility	Stockout %	Understock %	Overstock %	Normal %	Comments
1	January	PHCU	37	35	13	15	Pre-Consignment (C14)
		PHCC	49	25	12	14	
2	February	PHCU	50	25	13	12	
		PHCC	56	18	10	16	
3	March	PHCU	15	27	27	31	Period of Consignment (C14)
		PHCC	14	30	24	31	
4	April	PHCU	30	35	18	17	
		PHCC	20	41	24	15	
5	May	PHCU	38	32	17	13	
		PHCC	22	37	21	20	
6	June	PHCU	50	28	13	9	
		PHCC	40	30	14	16	
7	July	PHCU	57	22	15	6	Post-Consignment (C14)
		PHCC	56	19	16	9	
8	August	PHCU	9	40	28	23	
		PHCC	4	35	29	32	

All completed checklists and questionnaires were analysed using SPSS version 20 and LMIS data was analysed using an excel spreadsheet.

RESULTS

Availability of essential medicines in the health facilities

Of the 31 HWs interviewed in the 31 HF, 23 (74.2%) were CHWs, four (12.9%) nurses, and four (12.9%) pharmacy technicians.

Assessment of the availability of essential medicines was based on three parameters: a checklist on the day of the visit, stock card records, and LMIS reports. On the day of the visit, all the essential medicines were available because the assessment was conducted one month after the delivery of supplies to the health facilities. In contrast, the stock card records in the facilities revealed the stockouts (90.3%) shown in Table 1.

In the LMIS reports, the AMC of the tracer medicines was computed for each category of health facility (PHCUs and PHCCs). The most consumed products were paracetamol, amoxicillin, ferrous sulphate, metronidazole, artesunate+ amodiaquine, and malaria RDT (rapid diagnostic test).

MoS of all PHCUs and PHCCs was calculated by dividing the stock at hand by the AMC. The MoS was classified into stockout (0/<1 month), understock (>1/<3 months), optimal/normal (3-6 months), and overstock (>6 months). The individual stockout of every essential

medicine in the health facilities per month in the period of January-August 2021 was calculated.

Most essential medicines were out of stock throughout January-August 2021. The commodities with higher stockouts included malaria RDTs, azithromycin 500 mg tablet, azithromycin 200 mg suspension, amoxicillin dry powder, ciprofloxacin 500 mg tablet, paracetamol 250 mg syrup, metronidazole 200 mg suspension, artesunate + amodiaquine 100/270 mg tablet (adult), diclofenac 25 mg tablet and vitamin A.

In general, health facilities experienced stockouts and/or under-stocked in most of the months per delivered consignment. In the period of January-August 2021, stockouts and under-stocks were higher in January, February, June, and July. In addition, there was overstocking of some medicines throughout the period as shown in Table 2.

January and February were the last two months of the consignment 13 (C13) delivery. March, April, May, and June were the full period of four months of consignment 14 (C14) whereas July and August were the first two months of consignment 15 (C15).

In the period January-August 2021, the stock levels in PHCUs included stockouts (44%), under stocks (17%), overstocking (22%) and normal (17%), whereas in PHCCs the scenario was stockouts (34%), under stocks (16%), overstock (31%) and normal (19%) Table 1.

Inventory management practices in health facilities

Table 3. Availability of essential tools in health facilities

Type of tools	n (%)
Essential Medicine List Form	1 (3.2)
Standard Treatment Guideline	28 (90.3)
Standard Prescription Forms	8 (25.7)
Drugs Dispensing Bags	2 (6.5)
Dispensing Equipment (tray, counter, spoon)	30 (96.8)

Table 4. Assessment of inventory and record keeping

Variables	n (%)
Health facility keeping records	30 (96.8)
Health facility keeping LMIS documents in secure location	30 (96.8)
Stock cards place next on products	29 (93.5)
Consignments received quarterly	31 (100.0)
Health facility received expected consignment	31 (100.0)
Number of stockout items before the last consignment known	28 (90.3)
Health workers attended on job training in the last three months	31 (100.0)

Assessment on the availability of essential tools in health facilities showed that the most common documents were standard treatment guidelines (90.3%) and standard prescription forms (25.7%) as shown in Table 3.

In addition, some of the records used included ordering and receiving forms, dispensing registers, correctly filled stock card, copies of waybills, copies of issued receipts, correctly filled vouchers, and copies of reporting and requisition forms.

An assessment for the inventory and recording was done (Table 4). Most (96.8%) of health facilities kept records. These included availability and use of LMIS documents (96.8%), stock cards (93.5%), consignment received quarterly (100%), expected consignment received (100%), number of stockouts of tracer medicines before the last consignment (90.3%). Table 4 also shows that all the participants had attended on job training in last three months.

DISCUSSION

The study showed that there were stockouts and overstocking of essential medicines and low skills of HWs in the management of medicines. Recruitment of CHWs and nurses with insufficient skills in PHCUs and PHCCs, based on the [BPHN for primary healthcare of South Sudan](#), has an effect on the management of medicines in the health facilities.

These situations compromise the right of people to receive adequate healthcare services.^[3,5,6] Stockouts of quinine, azithromycin, metronidazole, amoxicillin, and paracetamol in health facilities were troubling because the area has a high incidence of infectious diseases. A previous study reveals the high mortality from malaria, typhoid, respiratory infection and/or diarrhoea in JRC and across the states of South Sudan.^[1] These findings were contrary to the previous studies which suggest that the barrier to accessibility in primary healthcare is the transportation costs^[1,7] because in JRC, medicines and health supplies are distributed immediately once the supplies reached the county medical store through the last mile distribution (LMD) plan, introduced in South Sudan in 2019.

The major reason contributing to the shortage and overstocking of essential medicines in some health facilities may be the inadequate distribution of the supplies regardless of the population size and disease pattern in the health facilities.

Adequate human resources and professional skills are essential in promoting supply chain management and rational use of medicines in health facilities.^[1,2] Inadequate skills of the HWs managing medicines contributed to the problems detected in health facilities.

CONCLUSION

The quantities of essential medicines were inadequate and covered only the consumption of two months. There were stockouts and overstocking of essential medicines throughout the period of January -August 2021. The main reasons were inadequate supply of essential medicines, recruitment of HWs with inadequate skills in management of the supplies, and ineffective rotation of medicines in health facilities.

The MoH should review the allocated quantities of essential medicines, recruit more pharmacy technicians to manage the supplies, emphasise the rotation policy of the low moving medicines (overstocking) within/or to other health facilities, and improve capacity building of the HWs (storekeepers, dispensers and prescribers) on supply chain management and rational use of medicines. Finally, further research is needed into the factors challenging availability of medicines and inventory of the health facilities in JRC.

Ethical approval and consent for the participation:

Research approval letter was issued from of Research Ethical Review Committee, Directorate of Planning, Budgeting and Research, Ministry of Health, South Sudan. Data were collected after obtaining consent from the participants and preserved with confidentiality.

Availability of data and materials: All can be requested from the first author.

Competing interests: None

Funding of the study: The authors gratefully acknowledge the funding of the Master's of Health Supply Chain Management by the German Federal Ministry for Economic Cooperation and Development (BMZ) through KfW Development Bank and the East African Community Regional Center of Excellence for Vaccines, Immunization, and Health Supply Chain Management. This research would not have been possible without the assistance of the College of Medicine and Health Sciences, University of Rwanda.

Acknowledgements: The authors thank the data collectors and the healthcare staff and managers of the health facilities in JRC.

References

1. Access to Health Care in South Sudan : A Qualitative Analysis of Health Pooled Fund supported counties. December 2020. 2020;1–77. <https://www.kit.nl/wp-content/uploads/2021/09/HPF3-Access-to-healthcare-study-A-qualitative-analysis-report.pdf>
2. World Health Organization. Addressing the global shortage of, and access to, medicines and vaccines: Report by the Director-General [Internet]. Exec. Board. 2018. https://apps.who.int/gb/ebwha/pdf_files/EB142/B142_13-en.pdf
3. Kefale AT, Shebo HH. Availability of essential medicines and pharmaceutical inventory management practice at health centers of Adama town, Ethiopia. *BMC Health Serv Res. BMC Health Services Research*; 2019;19:254. <https://bmchealthservres.biomedcentral.com/articles/10.1186/s12913-019-4087-0>
4. Johnson A, Peter K, Shital M. Inventory Management Practices and Supply Chain Performance of Antiretroviral Medicines in Public Hospitals in Nyamira County, Kenya. *Rwanda J Med Heal Sci.* 2021;4:257–68. <https://www.ajol.info/index.php/rjmhs/article/view/214245>
5. Marks SP, Benedict AL. Access to Medical Products, Vaccines and Medical Technologies. 2013;1–28. https://cdn1.sph.harvard.edu/wp-content/uploads/sites/580/2015/06/Marks-Benedict-accessstomedicines_final_rev2.pdf
6. Fentie M, Fenta A, Moges F, Oumer H, Belay S, Sebhat Y. Availability of Essential Medicines and Inventory Management Practice in Primary Public Health Facilities of Gondar Town, North West Ethiopia. *J PharmaSciTech.* 2015;2–4 <https://bmchealthservres.biomedcentral.com/articles/10.1186/s12913-019-4087-0>
7. Prinja S, Bahuguna P, Tripathy JP, Kumar R. Availability of medicines in public sector health facilities of two North Indian States. *BMC Pharmacol Toxicol [Internet]. BMC Pharmacology and Toxicology*; 2015;16:1–11. <http://dx.doi.org/10.1186/s40360-015-0043-8>