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ASSESSMENT OF AVAILABILITY, EXPIRY AND STORAGE CONDITION FOR KEY TRACER ESSENTIAL MEDICINES IN PUBLIC HEALTH FACILITIES IN RUWENG STATE, SOUTH SUDAN

Dissertation submitted to the University of Rwanda, in partial fulfillment of the requirements for the degree of Masters in Health Supply Chain Management (MSc HSCM)

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Academic year 2018/2019

DECLARATION

The work in this dissertation is my own work and has not been subjected or presented for award of degree in another University

Moses Akuak *27/9/2019*

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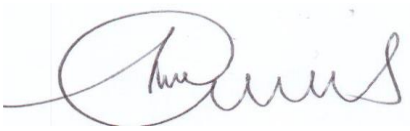
Moses Akuak Date

We had review this dissertation has been approved by us as University supervisors



27/9/2019

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Mulatedzi Makhado Date

27/9/2019

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Kashi B. Carasso Date

DEDICATION

This paper is dedicated to my uncle who tirelessly had been encouraging me to continue with studies and my mother for her advice and care for the entire family

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I will wish to extend my sincere gratitude to you my supervisor Dr Mulatedzi Makhado , your effort in this work encourage me to achieved and attained the final version of this dissertation. I most sincerely thank and appreciate my co supervisor Kashi Carasso for her great contribution to the success of this paper.

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ABSTRACT:

ASSESSMENT OF AVAILABILITY, EXPIRY AND STORAGE CONDITION FOR KEY ESSENTIAL TRACER MEDICINES IN RUWENG STATE, SOUTHSUDAN PUBLIC HEALTHCARE FACI;ITIES

South Sudan stock out of essential tracer medicines was a major problem in health facilities run by government, this is due to civil war that is ongoing and lack of adequate funding for healthcare financing, many of government healthcare facilities lack essential tracer medicines however availability and access are compromised to a great extent. The objectives of this research stood to assess the availability, expiry, and storage condition for key tracer medicines in government for Ruweng state of South Sudan public healthcare facilities. Quantitative descriptive survey method was used and health facilities were selected purposively with fifteen essential medicines selected based on their inclusion in South Sudan essential medicines list and in South Sudan treatment guideline. Survey forms were adapted from world health organization operation package for the assessment of country pharmaceuticals situation. Essential tracer medicines availability in Ruweng state was 83%, with the highest score registered by Yida PHCC(93%), and the rest of the facilities scored 80% each .Expired medicines were also investigated and it was found that none of the facilities were keeping and holding expired medicines on store shelves. The mean stock out in days of essential medicines was not bad with very few medicines that were out of stock for very long time in some health facilities, meanwhile the assessment of the storage conditions in the state healthcare facilities was found to be satisfactory, the availability of essential medicines is very good, maximum used of good storage practices, improvement of emergency request and more research to be done that cover many indicators and including all the state of South Sudan. The availability of essential tracer medicines will remain a major challenge in South Sudan as long as funding mechanisms or insufficient funds are allocated for procurement of medicines and no proper training is conducted for personnel on medicine supply management practices.

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LIST OF ACRONYMS

AAHI	Africa action helps international
AHA	Africa humanitarian action
BPHNS/SS	Basic Package for Health and Nutrition Services
CAIPA	Crown agent for international procurement agency
CMS:	Central medical store
DFID:	Department for international development
EMF	Emergency medicines fund
GFTAM	Global Funds to Fight AIDS and Malaria
GOSS/ MDTF	Government of Southern Sudan Multi Donor Trust Fund
HIV/AIDS	Human immune deficiency virus/ Acquired immune deficiency syndrome
HPF	Health pooled fund
ICCM	Integrated community case management
ICT	Information communication technology
IRC	International Rescue Committee
LMU	logistic management unit
MCH	Mother and Child Health
MDG	Millennium Development Goals
MTDF	Multidonor Trust Funds
MOH:	Ministry of Health
MSH/SIAPS	Management science health/System for Improves Access to Pharmaceutical Services
NGO	Nongovernmental organization
PHCC	Primary Health Care Centre
PHCU	Primary Health Care Unit
PTWG	Pharmaceutical technical working group
SBPHNS	South Sudan Basic Package for Health and Nutrition services
SSEML	South Sudan Essential Medicines List
TB	Tuberculosis
UNFPA	United Nation Population Funds
UNHCR	United Nation high commissioner for refugees

UNICEF United Nation for Children Education Funds

WHO World health organization

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CHAPTER ONE: INTRODUCTION

1.1 BACKGROUND TO THE STUDY

Budgets in developing countries are often tight for medicines however proper management of supply cycle is needed to prevent all types of wastages such misuse, theft and expiry. High wastage reduces medicines availability to patients and therefore the quality of services they received from the healthcare. Companies manufacturing pharmaceuticals recommended storage conditions or storage in normal conditions apply that is storing at room temperature, store medicines in a well-lit out direct sunlight and in dry place, these practices can prevent deterioration and product contamination. If medicines are store inappropriately may lose their potency and become ineffective. Good storage practice ensured that medicines conserved and safe for their used with no adverse reactions. South Sudan Ministry of Health (MOH) has developed guidelines to empower health workers at all level to redistribute medicines that are not needed or are about to expire(1).

The primary key essential function of health care system is to ensure availability of health care services which can meet standard minimum and securing accessibility and affordability of essential tracer medicines. Access to medicines is an essential component of millennium Development Goal (MDGs) under point number 8. (2), this was reassured in sustainable development under goal 3 where health and wellbeing for all are to be ensured and promoted(3). The Alma Ata announcement through the international discussion on primary healthcare in 1987 reaffirmed that health is a ultimate human right then the attainments of the maximum possible level of health is a furthermost important universal societal goals, this declarations outline eight (8) essential components of primary health and delivery of essential medicines. Medicines are central part of healthcare and the modern health care arrangement is impossible without the availability of necessary essential medicines. They not only protect the life and support health but inhibit epidemics and diseases. The medications are unquestionably one of the weapons of mankind to combat diseases and ailment (4)(5) .

According to world health organization (WHO) essential tracer medicines are those that satisfied the priorities of health care desires of the community, carefully chosen with regards to prevailing disease pattern, proven evident of clinical usefulness, safety and reasonable cost

effectiveness, they are planned to be existing at all times within the working health care systems in dosage form that are appropriate and with assured quality and at price that the community can be able to pay for, essential medicines concept is a globally applied by all countries through their managing institutions(6).

Expired and poor quality medicines affect the lives of patients and nation. Patients who use these medicines do not heal faster and therefore add to the cost for treatment which can lead to customer's loss of confident in getting services from public health facilities and capacity to give services and therefore can seek services at private health facilities. Medicines quality depends on how distribution and storage have been done starting from the manufacturing site to the end user site. Lack of infrastructure for testing medicines quality is generally a challenge in most of the countries and a simply quality assurance measure is often employed to guarantee the quality of medicines, quality was measured by absent of expired medicines on the medical store shelf and adequacy of storage condition .(7)

1.2 SITUATION IN SOUTH SUDAN

South Sudan history is dominated by civil wars and political crisis which are the major setback and has made the country not to rest ever since her creation in 2011, and as a result many South Sudanese are living in displacement camp or abroad as refugees in foreign countries, with the current crisis and political turmoil the government been focusing on war meanwhile development in the entire country is compromised, bulk of the money obtained from oil money were used to purchased military equipment thereby leaving critical departments like education and health with nothing to run the projects. The negligence and war brought destruction of the little infrastructures in South Sudan, however human resources and social services suffer badly, South Sudan has developed her policy on health and obtained a strategy called basic package for South Sudan health services (BPHSS) with an objective to improved delivering of sustainable, cost effective, accessible, and affordable and acceptable nutritional and mother and child health (MCH) projects(8).

South Sudan has relied significantly on development partners for the procurement and distribution of essential medicines. These partners have been providing support from the time when the signing in 2015 of inclusive peace agreement after gaining independence in the country; the same partners still continued their support to the country after independence in 2011

and up until the present date. The situation has not changed much as bulks of the medicines are still provided for by development funding instead of it being funded by government.

Procurement and distribution of essential medicines were supported by the Multi Donor Trust Fund (MDTF) for period 2005 to 2012; the Emergency Medicines Fund (EMF) from 2013 to 2015 and since 2016 by the Crown Agents International Procurement Agency and International Partners (CAIPA). The primary health care program Health Pooled Fund and World Bank through Rapid Results Health Project has also been doing distribution and procurement of essential medicines from 2017 and this project will run till 2023. Crown agent international procurement agency and international procurement partners procure and distribute essential medicines to government institutions through a kit system in accordance with the level of care namely: Primary health Care Centre (PHCC), Primary Health Care Unit (PHCU), County Hospital, State hospitals and teaching / referral hospitals. Kits are distributed throughout the whole country. Pharmaceutical kits contain selected medicines and medical supplies in predefined quantities that are used for primary pharmaceutical supply, supplementary supply or emergency supply. Emergency health kits are well standardizes and broadly used by main international relief agencies, and they can stop many common complications associated with pharmaceutical donations (9). The ordering method is either a push system where suppliers will predict and determine order quantities for facilities or used pull system which is an inventory replenishment arrangement by which a facility manages and monitors its own stock of medicines and place orders according to its requirement.

Emergency medicines kits are procured and distributed through humanitarian funding mechanisms managed by WHO and united nation children education funds (UNICEF) and united nation population funds (UNFPA). These include kits such as the inter agency emergency health kits, diarrheal kits, reproductive health kits and others. The long term vision is for the government to overtake distribution, storage, procurement and financing of essential medicines in the country. In view of this goal, the government intends to formally establish the Central Medical Stores (CMS) as an autonomous agency to procure and distribute medicines and health products. The legislation describing the mandate, roles and responsibilities of the CMS is currently under revision by the legal department of the Ministry of Health (MOH). The CMS currently operates through a CAIPA program that distributes essential medicines kits, while

emergency medicines kit requirements are managed separately in another area within the health cluster. The procurement, storage and distribution of TB, HIV/AIDS and malaria are funded by global funds to fight malaria tuberculosis and AIDS (GFTAM) and the department for international development (DFID) and managed in yet another parallel system. There is limited coordination between procurement and delivery of essential medicines and emergency kits/humanitarian supplies. The opportunity cost of the redundant efforts is a risk to the long term sustainability of procurement and supply chain management investments.

Information systems for pharmaceuticals, distribution and consumption are managed separately by each partner and program. Different inventory management systems are used and reporting requirements vary across the programs for virtually all levels in the health system. The Pharmaceutical Technical Working Group (PTWG) encourages partners to share data; however, due to the chronic fragmentation across systems, the government has not been able to effectively consolidate towards a full picture of the country pharmaceutical situations. This is a risk to effective quantification, forecasting and decision-making which resulted in rampant shortages of essential medicines and health supplies as well as medicines expiry occurring more regularly

The impact of essential medicines shortage and expiry directly affect the patient. Expired medicines have a high likelihood of being recirculated into the market. Expired medicines are not only ineffective but can result in the emergent of resistance strain of antimicrobial agents toxicity in humans and animals. Expired medicines pose risks to food chains and water sources if not properly disposed of. In addition, expired medicines constrain storage capacity at the health facilities.

Poor health indicators are as a result of conflicts which couple with lack of resources. Development plans for health for the year 2012/2016 indicated and stated that of the 35% under 5 patients who suffer from malaria and fever 12% where treated rationally with antimalarial medicines(9). Access to free essential medicines is one of the component of universal health coverage, though overall access to sustained quality health care is unfortunately poor with very few communities living within the reach of most basic health services.(8)

1.2 PROBLEM STATEMENT

Stock out of essential tracer medicines in South Sudan was a major public health problem in healthcare facilities because of the war and inadequate financial resources to support the healthcare sector, many of government healthcare facilities lack essential tracer medicines these lead to inaccessibility and unavailability with great compromised on the services.

The shortage of medicines in health care facilities had diverted patients seeking free services leaving client with no hope rather than resorting to look for local herb which have not been proven scientifically to treat the claim disease. The unavailability of essential medicines will remain a major challenge in South Sudan as long as funding mechanisms or insufficient funds are allocated for procurement of medicines and no proper training is conducted for personnel on medicine supply management practices.

1.3 PURPOSE OF THE STUDY

The aim of this research was to assess the availability, expiry of medicines & adequacy of storage condition in South Sudan public healthcare facilities in Ruweng state

1.4 OBJECTIVES OF THE STUDY

1.4.1 GENERAL OBJECTIVE

To assessed availability, expiry, and the storage conditions for key tracer medicines in South Sudan public healthcare facilities in Ruweng state.

1.4.2 SPECIFIC OBJECTIVES

- To measure availability of key tracer medicines in healthcare facilities
- To determine presence of the expiry medicines in state public healthcare facilities
- To check adequacy of store conditions of the medicines storeroom of healthcare facilities
- To determine average period of stock out days of medicines in selected public healthcare facilities

1.5 SIGNIFICANCE OF THE STUDY

Several internal reports have revealed that rendering of proper pharmaceutical services in South Sudan is hindered by low availability of medicines, expiry of medicines on pharmacy storerooms and the poor storage conditions across the country. The study will therefore seek factors that contribute to low service delivery as well as advising on strategies to improve the current situation.

The results of this study will provide a good overview of challenges experienced in maintaining medicines availability, management and prevention of expired medicines as well as how

medicines are stored. This may assist management to develop strategies to improve on these activities. The study findings will help identify gaps in storing of medicines, training needs, policies and management of expiring medicines that can help improve medicines management which government can prioritize depending on availability of funding. Lessons learnt from facilities that are performing better could be used as a benchmark for other facilities or contribute towards planning for quality improvement.

1.6 STUDY LIMITATION

This study was limited in scope to the public healthcare facilities located in Ruweng State, a rural state of the remote location in Northwest of South Sudan. The number of health facilities assessed was 4 out of 11 functional health facilities and this sample cannot be generalized to the whole country nor to the state, due to insecurity and in accessibility of the roads to peripheral healthcare facilities hinder their involvement in this study. Lack of resources was another factor as this research was self-sponsored.

CHAPTER TWO: LITERATURE REVIEW

2.1. INTRODUCTION

The review on this section introduced literatures proceeding medicines availability, expiry and storage conditions in the region and across the globe.

2.2 ACCESS TO ESSENTIAL MEDICINES

Access to essential medicines is a fundamental basic human right , however essential medicines are well-defined as those that satisfied health care need of the inhabitants with priorities on the diseases that are most prevailing in that area, their selection is guided by relevance of the diseases, evident on efficacy and safety and comparative cost effectiveness, they are planned to be available within the working healthcare system all the time and in adequate quantities, with appropriate dosage forms with quality secure at fee individual and community can pay for. The application of idea of essential medicines was intended to be adjustable and adaptable to many diverse circumstances, exactly the medicines viewed as essential remains a national duty and can vary from country to country(10).

2.3 MEDICINE MANAGEMENT CYCLE

Proper medicines management supply chain cycle was organized and plan around four primary functional activities which are selection, quantification & procurement, storage & distribution and inventory management the last not the least was used. The cycle is circular and at the central part are systems that support the management which is comprised of information management system, organization arrangements, financing and sustainability, quality assurance and human resource and at a logistic system for medicines management cycle environment are adaptability and policy. The successful cycle management of medicines depend on the capacity and ability to consistently and reliably supply the quality standard medicines at very reasonable cost that the community can afford(11).Supply chain for pharmaceutical globally are very different due to big and long extended pipelines requiring a very high levels of coordination for product availability to guarantee putting in mind uncertainty of demand and supply, a need for intervention in order to sustain and expand the services is required , however supply chain design should be responsive and flexible be better management through more grand allocation of money to successively achieve and implement optimization of the supply chain. Many low income countries don’t

periodically monitor supply chain system and the performance and progress is not reported to high authorities to take action. This alone was significant sign of suboptimal performance, monitoring that usually occurred is often based on routine surveys data for a limited number of indicators. A supply chain assessment performance was limited by number of factors such as lack data and present other factors that can impact and affect greatly medicines availability particularly finance(12).

Proper environmental controls storage requirements such as humidity, temperature, ventilation, light, ventilation must be recorded and maintained whenever storage of medicines and supplies are done. An effective and efficient medical warehouse fitted with appropriate and suitable racking system to maximized used of space and avoid wastage spaces with floor pallet and handling equipment for the medicines is important, storage locations must be secure from water penetration, fire safety equipment should be deployed in their appropriate places, and Storage chamber for control medicines be constructed in a manner that put top security for the medicines and minimized accessed to the area, with only in charge to be responsible for its keys. Flammable and poison have very much safety concerned and should be store in safe location (13).

World health organization stated that availability of essential medicines is a priority and need to be at the facility in adequate quantities all the time and that 80% availability should be maintained at all-time at the facilities however study conducted revealed that availability of essential medicines had been poor particularly in public healthcare facilities(14). The WHO study on Impact policy of Essential Medicines on Inappropriate Use of Antibiotics reveled that average availability of generic medicines selected in middle low income countries was 42% in healthcare facilities (15). A study conducted in two Indian state of Punjab and Haryana showed availability of essential medicines to be 45.2% and 51% respectively (16)

With wide spread use of information communication technology (ICT) most of functions can be done with help of information technology as shown by the study conducted in Kenya Kisi county. The results of the study in Kisi indicated 49.1% of changed in availability of essential medicines were attributed to the ICT followed by staff qualification, however poor staffing is seen in most African countries which is evident in unmatched skills placement as well as the existing knowledge needed to do the work(17). In Tanzania studies found out that in the public

healthcare facilities visited only one had lower than 30% availablility meanwhile 10 facilities had availability ranging from 30%-80%(18) .

A research conducted on affordability and availability for chronic diseases selected essential medicines in six low middle income countries found that, key medicines availability used for the treatment of chronic disease in many countries assessed was poor, benzathine availability in Bangladiesh and Nepal was very poor with less than ≤7.5% of 32 medicines assessed were as the slightly high availability was witness in public health facilities in Brazil 30% ,and Sri Lanka availability at 28%(19), 2% lamivudine availability was obtained in the study conducted in Uganda, the overall result was 29% in drug store shops and a near minimum availability of rifampicin and oxytocin (20). In Bur era which is a district northern of Rwanda, no relationship between medicines stock out and distance of the health facilities from the supplying centers, visits for supervision and delayed in medicines deliveries, in the same study mebendazole was available always and quinine had 10.5 months stock out average in 10 healthcare facilities (21)

Supply chain assessment done in South Sudan indicated some facilities having been stock out at some time and 35% of public health facilities and stores maintained minimal acceptable storage condition. There were some common things among assessed facilities and stores which included lack of acceptable storage conditions, insufficient space, lack of temperature controls and personnel training gaps. Sixty-five percent (65%) of PHCC and PHCU assessed had infrastructural condition that hampered medicines management and pose storage constrains(22). Some African countries which has strong regulatory bodies and having commitment to 15% budget allocation to health have good results on availability of essential medicines in public health facilities as seen in the study conducted in Sudan which showed excellent median availability of medicines in private and public sector showing 100% and 82.5% respectively. The high availability is enhanced by the existence of a central medicines store which is a governmental corporation responsible for ensuring that quality medicines are available at affordable prices through, amongst other strategies, the creation of dedicated funding for medicines, and the implementation of good procurement, storage, transportation and distribution practices. However some areas showed lower medicines availability attributed to factors such absence of inventory cards, poor financial support for distribution and transportation to the facilities(23).

CHAPTER THREE: METHODOLOY

3.1 STUDY AREA

The survey was conducted in Ruweng state, South Sudan using structured questionnaires and the WHO operational package for assessing and monitoring the country pharmaceutical situation (2007) version (37), the package contained tools necessary for the survey (24) , health facilities were selected purposively excluding areas where study location was insecure, swampy and lack of roads that can connect to the facilities.

Names and types of public health facilities that were accessed are presented in Table 1

Table (1) list of four health facilities assessed

Name of the health facilities	Type of the facility
Hakima Yakoub PHCC	PHCC
Panriang hospital	State hospital
Jamjang PHCC	PHCC
Yida PHCC	PHCC

3.2 STUDY DESIGN

Descriptive cross sectional design was used to conduct the study. Data collection tools/ survey forms were used to assess the prevailing pharmaceutical situation in Ruweng state public health facilities

3.3 STUDY PERIOD

The study was conducted for a period of one month starting from August 2019 to September 2019

3.4 STUDY POPULATION

This study used case study approach to assess availability level assess the level of tracer essential medicines, assessment of expiry of medicines and the conditions at which medicines were stored

in public healthcare facilities in Ruweng state. Medicines were drawn from national essential medicines list of South Sudan latest version 2017 and were selected based on their inclusion in treatment guidelines for the level of health care being assessed (25)(26). Both pharmacy/store in charge were contacted to allow the researcher to collect the data using the questionnaire. For pharmacy/store availability of selected essential medicines to treat common disease was confirmed, expiry medicines were checked and a checklist for storage condition was filled in the store.

3.5 DATA COLLECTION TOOL AND PROCEDURES

All the selected public health facilities and stores were approached on the day of the visit. Each health facility was allocated one day of visit to complete all the study assessments. The survey form 1 (Annex I) was used to collect data on the availability of key tracer essential medicines derived from the South Sudan essential medicines list 2017.This form was used to provide information on the availability of key medicines. These medicines are the one that treat most common diseases in the area and are to be used at the level of primary health care center. List of selected essential medicines to be used for this study is shown in Table 2

Table 2A list of 15 selected key medicines from national essential medicines list of South Sudan(SSEML) was prepared.(25)

S/no	Key essential medicines
1.	Paracetamol 500mg tablet
2.	Ferrous sulphate 200mg tablet
3.	Albendazole 400mg tablet
4.	Amoxicillin 250mg capsules
5.	Amoxicillin 125mg suspension
6.	Ciprofloxacin 500mg tablet
7.	Metronidazole 200mg tablet

8.	Sulfamethoxazole+Trimethoprim =Cotrimoxazole 400mg +80mg tablet
9.	Benzoic acid/ Salicylic acid ointment (Whitefield)
10.	Artesunate 50mg /Amodiaquine156mg tablet
11.	Artesunate 25mg/Amodiaquine 67mg tablet
12.	Oral Rehydratation Salt (ORS) WHO formulation
13.	Zinc sulphate 20mg tablet
14.	Doxycycline 100mg tablet
15.	Carbamazepine 200mg tablet

The outpatient pharmacy/dispensing units were asked about their availability and whether or not there are medicines that have expired. The essential medicines that had proper records were checked for stock-out days and analyzed. Data were recorded accordingly in the survey forms and calculations were made to obtain the percentage of available medicines on the day of visit.

The survey form 2 (Annex II) gave data about the expired essential medicines being kept on the store shelves.

The survey form 3 (Annex III) gave data on stock out days of the medicines selected for the health facilities visited

The survey form 4 (Annex IV) gave insight on the storage conditions of medicines at the public pharmacy dispensing unit and main stores which consisted of ten (10) questions where a score was given based on the observed conditions. Adequate conditions for storing and handling checklist was another tool that was used to assess factors affecting the quality and efficacy of medicines stored in facility medicines store. Referring to the WHO indicators, nine (9) questions were adopted in the checklist, and the average score was calculated from each column. (i.e. from facility medical store).

3.6 DATA MANAGEMENT AND ANALYSIS

All data collected were checked on daily basis, were counter checked for their clarity and validity, entered in excel sheet and imported in SPSS software for analysis. In the data analysis

descriptive statistic were computed and findings presented in graphs and tabulations using excel and SPSS.

3.6.1 CALCULATION OF AVERAGE PERCENTAGE AVAILABILITY

Percentages calculated by dividing the counts of medicines in the facility on visiting day of the survey by total counts of medicines kept at the facility and on the survey form multiply by 100. The overall availability of key medicines is reported and calculated as the percentage stock availability of the medicines in the facility on data collection day.

3.6.2 CALCUALTION OF AVERAGE PERCENTAGE EXPIRY

Percentage calculated as total number of expired medicines divided by the number of medicines found in stock multiplying by 100.

3.6.3 CALCULATION FOR STOCK-OUT EVALUATION

Stock out duration was calculated by revision of the ledgers that indicated which medicines had records covering six months within the twelve months period. The equivalent number of stock-out days per year for each medicine was computed by multiplying the number by 365 and dividing it by the period that was review. The total number of stock out days per year was computed for each medicine. The average number of stock-out days was finally calculated by dividing the total number of stock-out days by the number of medicines reviewed.

3.6.4 CALCULATION FOR STORAGE CONDITION SCORES

For each facility the score for the storeroom was calculated by taking the most occurring ranking as the level of the health facility

3.7 STUDY VARIABLES

The variables of the study were as follows:

- Availability of key medicines in the given dosage form and strength: Each survey medicine with the specific dosage form and strength.
- Storage conditions for medicines in the selected health facilities.
- Expired medicines in the public health facilities.
- Days of stock out of essential tracer medicines.

3.8. DATA COLLECTION INSTRUMENT

Tool for monitoring and evaluation developed by (WHO) was adopted and modify and used to conduct this assessments(24)

3.9. ETHICAL CONSIDERATION

Ethical clearance was obtained from Ministry of Health in Ruweng State, South Sudan. Study purpose was communicated to participants, they were asked if they were willing to participate and signed the written consent form. Anonymity was used for confidentiality and freedom of participants

CHAPTER FOUR: RESULTS

This chapter gives result of the assessment done on medicines availability, expiry of medicines stock out days and storage conditions for the health facilities in one of the rural state of South Sudan

4.1 KEY ESSENTIAL MEDICINES AVAILABILITY IN RUWENG STATE, SOUTH SUDAN PUBLIC HEALTH FACILITIES

Of all the four (4) South Sudan Ruweng state health facilities assessed, Yida score 93% which happened to the highest scoring facility in the state, the rest of the facilities score 80% each.

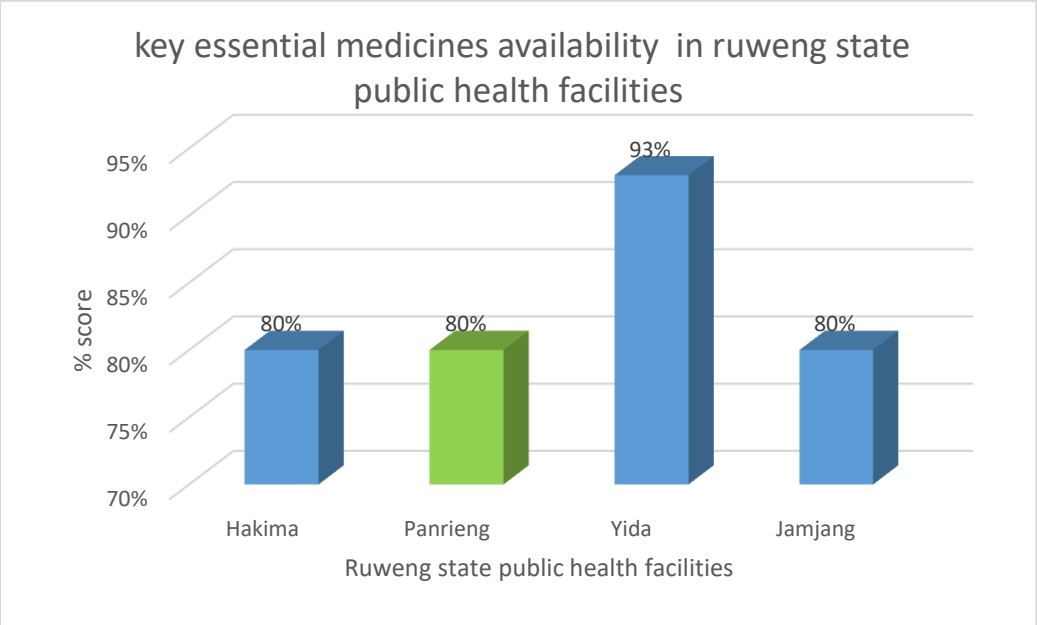

Figure 1: availability of key essential medicines in public health facilities in Ruweng state

4.1.1 AVAILABILITY OF INDIVIDUAL MEDICINES ACROSS RUWENG STATE PUBLIC HEALTH CARE FACILITIES

The availability of individual medicines across Ruweng state public health facilities is good with very few medicines with low availability. Six of the products' availability score was below the 80% WHO target. The most unavailable medicines in state was zinc sulphate 20mg tablet with 25% availability, zinc sulphate was found to be available in one health facility in the state, followed by carbamazepine 200mg tablet and Benzoic acid + salicylic acid each with availability

of 50% then ferrous sulphate 200mg tablet, ciprofloxacin and sulfamethoxazole +Trimethoprim (cotrimoxazole480mg) tablet was each 80% available .The percentage availability for individual medicines is presented in figure 2

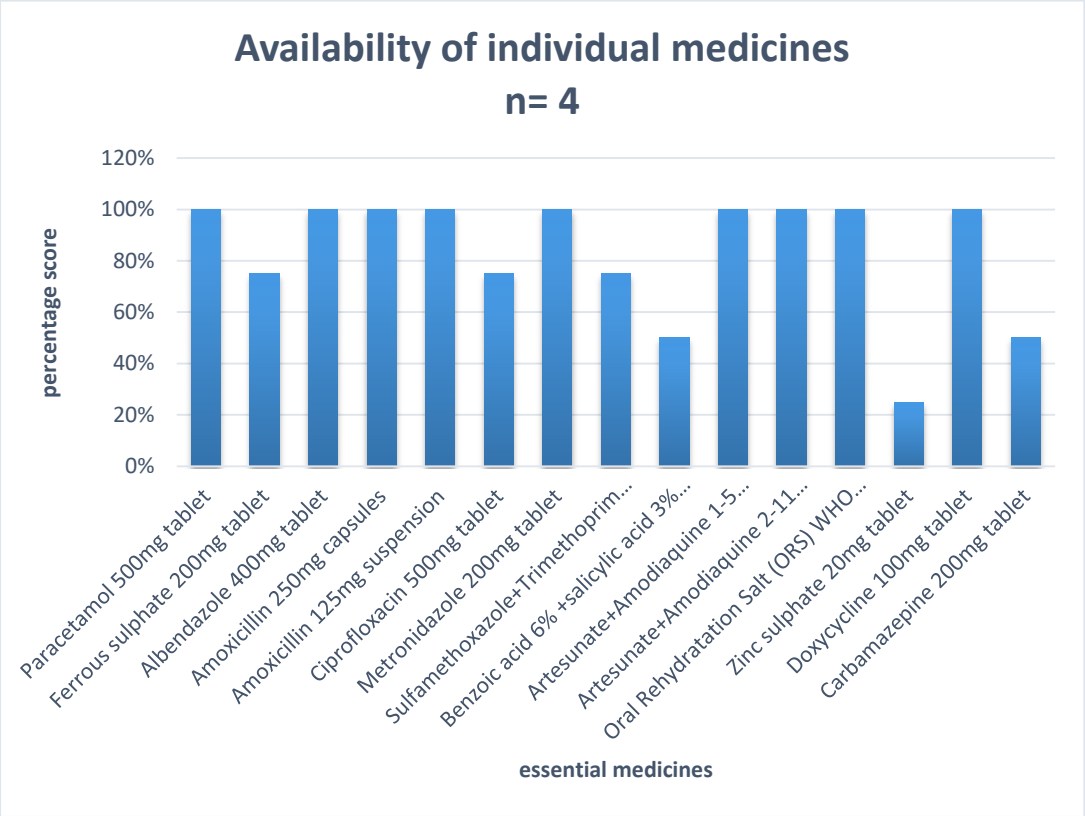

Figure 2: % Availability of individual medicines in Ruweng state

4.2 PERCENTAGE OF EXPIRED MEDICINES IN RUWENG PUBLIC HEALTH FACILITIES

The percentage of expired medicines in public health facilities in Ruweng state was 0% meaning that there were no facilities found to be holding expired medicines on their dispensing shelves or cupboards.

4.3 MEAN STOCK OUT OF ESSENTIAL MEDICINES IN RUWENG STATE PUBLIC HEALTH FACILITIES

Mean stock out for all the health facilities in Ruweng state was 21.2 and the most stock out facility was Panriang with mean stock out of 36, the highest mean stock out registered was due to the fact that the facility had been out of stock of carbamazepine for equivalent of 360 day in a year and then Benzoic acid was also found to be out of stock for 120 days, Jamjang follows with stock out for mean of 29, among the public health facilities assessed, Panriang was having the highest average stock out days followed by Jamjang, Yida and finally Hakima

Figure 3 depicts the average stock out days of the assessed product

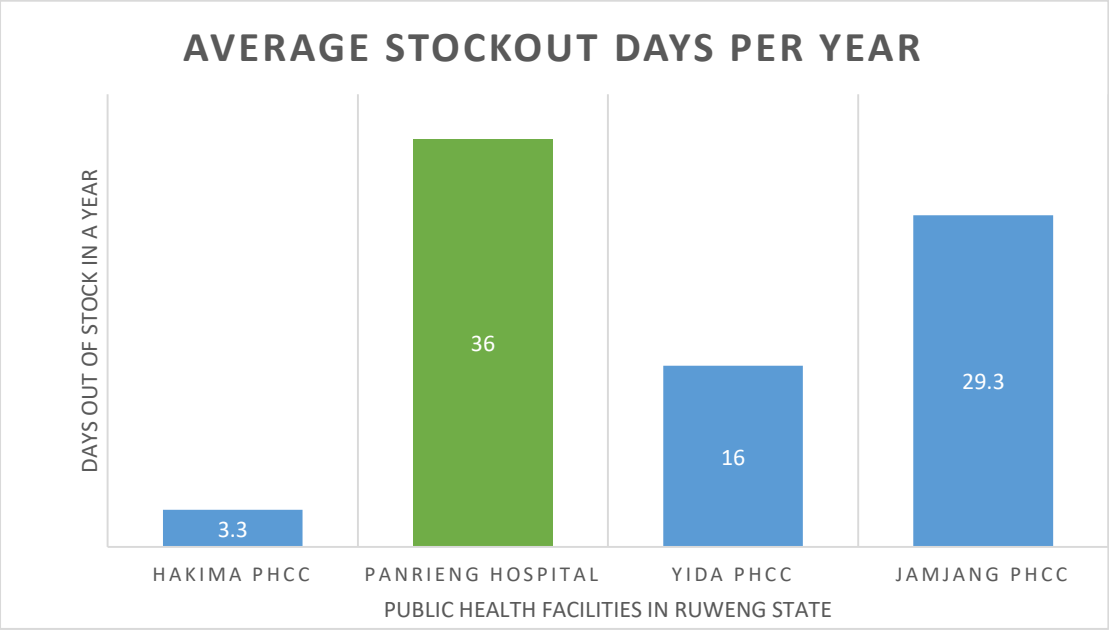

Figure 3: Average stock out days in a year across public health facilities assessed

4.4 STORAGE CONDITIONS IN THE PUBLIC HEALTH FACILITIES MEDICAL STORES

Most of the health facilities stores assessed was found to be satisfactory and only minor improvement is needed to get the level of very satisfactory as there were very few storage areas that were not in line to recommended practice.

Among the facilities assessed Hakima and Yida score high in maintaining and managing store well, meanwhile Panrieng hospital and Jamjang PHCC were found to be keeping medicines directly on the flour and the medicines were not kept in systematic way of arrangements

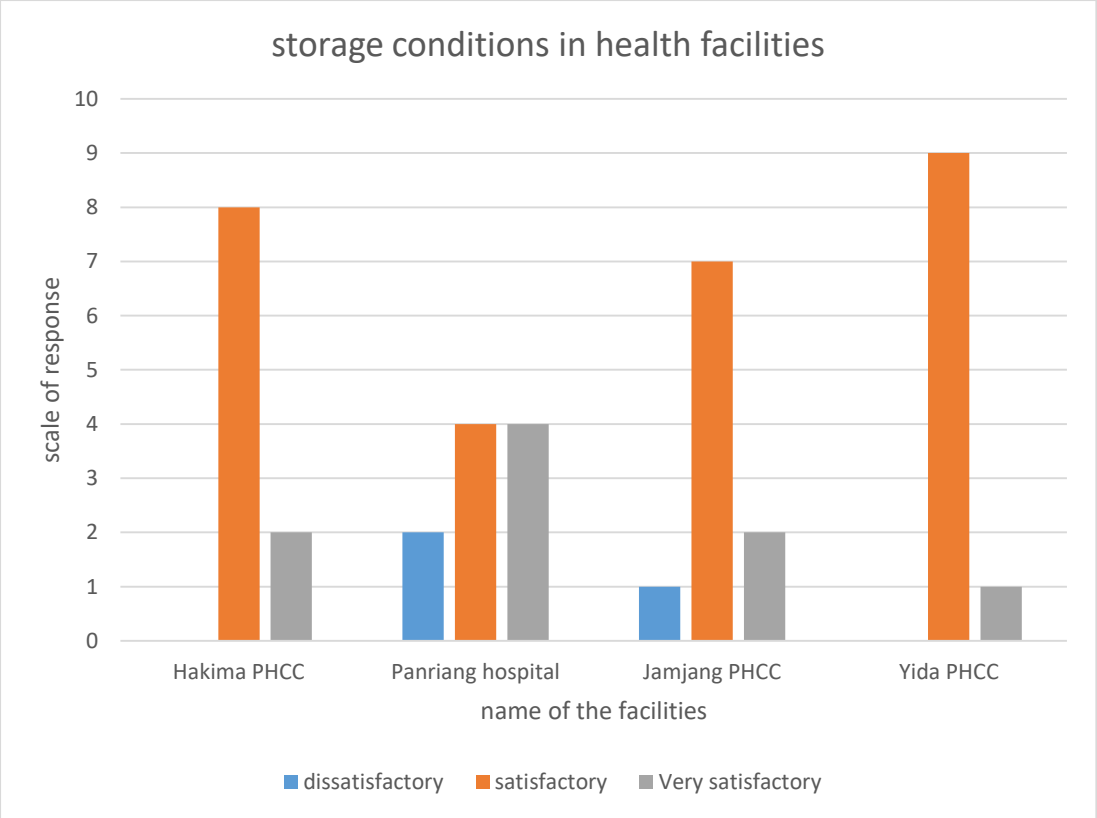

Figure 4: shows scores of storage conditions of state of Ruweng health facilities

CHAPTER FIVE: DISCUSSION AND RECOMMENDATION

5.1 DISCUSSION

The tracer essential medicines availability in Ruweng state health facilities according to the results of this assessments was 83.3% which concurs with the statement by WHO which stated that essential medicines should be at least 80% available in the public health facilities at all time and in the quantities that individuals and communities can use(14), the literature on availability of essential medicines in South Sudan showed less than <50% however the high availability results of this assessment is because of bilateral donors supplying the facilities assessed in Ruweng state. The donors that help supply essential medicines to these facilities are UNHCR and HPF and hence the reasons why there is high availability in Ruweng state compared to low availability in the entire country.

The state had parallel programs that work at the community level through integrated community case management (ICCM), these program is implemented at the community site and it covers three main diseases namely malaria, diarrhea and pneumonia all for under five children, the low availability of medicines especially zinc sulphate was due these special programs that are implemented where patients numbers are low in some of the facilities. Low patient's number will translate into ordering little stock of some of the products like zinc sulpahate and carbamazepine. Although the average percentage was above WHO target of 80%, zinc Sulphate was not available in all facilities but one. The low level availability of zinc sulphate in this facility is due to a fact that health facility is managing integrated community case management where the product is brought in through parallel procurements. Another unavailable medicines was carbamazepine which happen to be stock out in two (2) facilities, this medicines were stock out in both facilities for the whole year, the reason was that most of the health facilities that were assessed do not have mental health department that deals with such cases except in Hakima PHCC where there was a department with its own staff that response to mental health cases. In comparison to the studies done in Bangladesh in 2014, similar results were achieved where availability of some individual essential medicines was 80% (27) and another studies done in Sudan in 2009 indicated that 92% of health facilities were having medicines(28)

The availability of essential medicines in Ruweng cannot be generalized to the whole country nor to the whole state where some main health facilities where assessed due to the following reasons

- The facilities assessed do not represent statistical sample, they were selected purposively and therefore cannot be generalized to the whole state.
- The high availability was due to other donors supplying the same products to the same facilities as supported for the burden of refugees that are in the state
- Some health facilities are having some parallel program, like Hakima PHCC is managing another program of ICCM and mental health this made to have zinc and carbamazepine in their health facility
- The assessment was done at the beginning of quarter of which supplies where just received from the suppliers

The percentage of expired medicines on shelves was 0% in all public healthcare facilities, this shows that most of the products when expired are immediately removed from the shelves and packed in cartons then put in separate areas waiting disposal. This percentage is for those medicines which were found on stock, there were some expired which were kept separate from the usable medicines. The fact that no expired medicines were found on shelves doesn't mean no expiry in facility. However as compared to the assessment made in 2019 in South Sudan, there is much improvement as far as this assessment is concerned. The findings of the previous assessment showed high percentage (29%) of expired medicines being kept on the dispensing shelves together with livestock, this shows low level of managements (22)another study done in Uganda in 2007 showed 2% of one or two of the expired medicines being kept on shelves , this show low level of the quality of medicines being given to the patient(29)

Stock out days of medicines in the year was also determined by calculating mean stock out days per year for those medicines that were determined to be out of stock in the survey form annex one. The one with the highest mean stock out days was carbamazepine which was out of stock for an equivalent of 360days, followed by zinc sulphate. As far as facilities are concerned Panrieng scored the highest mean stock out days with mean of 39%, followed by Jamjang , Yida and the Hakima score the least mean stock out days due to it short stock out days.

Storage condition for health facility medical store was found to be satisfactory, this is due to most resent renovation being done across the state and some of the health facilities are brand new, with only one health facility having one of the storage conditions being dissatisfactory

5.2 CONCLUSION

Essential tracer medicines availability in Ruweng state health facilities was very good with very few medicines were not available in some facilities that were assessed, the management of essential medicines was also very good as there were no expired medicines kept on shelved mixed with live medicines, however the storage conditions were also good with very few conditions on the checklist for the some facilities need improvement.

5.3 RECOMMENDATION

The findings of this assessment were very good in all the indicators assessed, however there are some few recommendations:

- There should be improvement in supplying emergency request as need arise at the facility level, it has been that some facilities stayed for long without being supplied
- To improve on the good storage practices, some of the facilities scores dissatisfactory on the storage conditions this was due to some facilities having been able to keep supplies directly on the grounds
- To harmonize the stocking record forms, requisition and report forms and dispensing registers in all the health facilities.

This research had focus on one state and on few indicators, there for I would like other researchers to explore and expend their research to cover areas that were not assessed by this assessment.

- Rational use of medicines in South Sudan
- Assessment of the storage capacities in South Sudan
- Factors influencing stock out of essential medicines in South Sudan
- Effect of current push distribution in the availability of essential medicines

- Assessment of the capacity of human resource managing health supplies in South Sudan

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Questionnaire

THE PUBLIC HEALTH FACILITIES DATA COLLECTION TOOLS

ANNEX I

Survey for 1: public health facilities/medical stores

Facility: ---------- Date: ----------

Indicator: Availability of key essential medicines

Check the availability of essential medicines in stock and circle ‘‘Yes’’ if available or ‘‘No’’ if unavailable.	
Paracetamol 500mg tab	1.Yes 2.No
Ferrous sulphate 200mg tab	1.Yes 2.No
Albendazole 400mg tab	1.Yes 2.No
Amoxicillin 250mg capsules	1.Yes 2.No
Amoxicillin 125mg suspension	1.Yes 2.No
Ciprofloxacin 500mg tab	1.Yes 2.No
Metronidazole 200mg tab	1.Yes 2.No
sulfamethoxazole+Trimethoprim =Cotrimoxazole 400mg +80mg tablet	1.Yes 2.No
Benzoic acid/ salicylic acid ointment (whitefield)	1.Yes 2.No
Artesunate+Amodiaquine 1-5 years(50mg +135mg 3 tablets)	1.Yes

	2.No
Artesunate+Amodiaquine 2-11 months(25mg +67.5mg 3 tablets)	1.Yes 2.No
Oral Rehydratation Salt (ORS) WHO formulation	1.Yes 2.No
Zinc sulphate 20mg tablet	1.Yes 2.No
Doxycycline 100mg tablet	1.Yes 2.No
Carbamazepine 200mg tablet	1.Yes 2.No

ANNEX II

Survey for 2: public health facilities/medical stores

Indicator: Medicines expired

Check the expired essential medicines among the medicines available in stock and circle ‘‘No’’ if not expired , ‘‘yes’’ if expired or ‘‘N/A’’ if the medicine is not in stock	
Paracetamol 500mg tab	1.Yes 2.No 3. N/A
Ferrous sulphate 200mg tab	1.Yes 2.No 3. N/A

Albendazole 400mg tab	1.Yes 2.No 3. N/A
Amoxicillin 250mg capsules	1.Yes 2.No 3. N/A
Amoxicillin 125mg suspension	1.Yes 2.No 3. N/A
Ciprofloxacin 500mg tab	1.Yes 2.No 3. N/A
Metronidazole 200mg tab	1.Yes 2.No 3. N/A
Sulfamethoxazole+Trimethoprim =Cotrimoxazole 400mg +80mg tablet	1.Yes 2.No 3. N/A
Benzoic acid/ salicylic acid ointment (whitefield)	1.Yes 2.No 3. N/A
Artesunate+Amodiaquine 1-5 years(50mg +135mg 3 tablets)	1.Yes 2.No
Artesunate+Amodiaquine 2-11 months(25mg +67.5mg 3 tablets)	1.Yes 2.No 3. N/A
Oral Rehydratation Salt (ORS) WHO formulation	1.Yes 2.No 3. N/A
Zinc sulphate 20mg tablet	1.Yes

	2.No 3. N/A
Doxycycline 100mg tablet	1.Yes 2.No 3. N/A
Carbamazepine 200mg tablet	1.Yes 2.No 3. N/A

ANNEX III

Survey for 3: public health facilities/medical stores

Indicator: Average stock out days

What is the duration of stock out in terms of days for the below essential medicines, within the period of 6 month (April to July	Number of stock out

2019)?	days
Paracetamol 500mg tab	
Ferrous sulphate 200mg tab	
Albendazole 400mg tab	
Amoxicillin 250mg capsules	
Amoxicillin 125mg suspension	
Ciprofloxacin 500mg tab	
Metronidazole 200mg tab	
Sulfamethoxazole+Trimethoprim =Cotrimoxazole 400mg +80mg tablet	
Benzoic acid/ salicylic acid ointment (whitefield)	
Artesunate+Amodiaquine 1-5 years(50mg +135mg 3 tablets)	
Artesunate+Amodiaquine 2-11 months(25mg +67.5mg 3 tablets)	
Oral Rehydratation Salt (ORS) WHO formulation	
Zinc sulphate 20mg tablet	
Doxycycline 100mg tablet	
Carbamazepine 200mg tablet	

Notes:

Go through the card covering the review period. Add the number of days that each of the key essential drugs is not available. A drug is considered in stock if it is the records showed balances. The review should a 6 months period. If it is not possible then indicate the number of days then calculate the number of stock out days for each medicine as follows:

Number of stock out day x 360 days/ period cover by review = equivalent number of stock out days in a year per each medicines

ANNEX IV

Survey for 4: public health facilities/medical stores

Indicator: Adequacy of storage conditions and handling of medicines in facility storerooms

Rate the storage conditions in the facilities as outline below by selecting appropriate answer from the third column.	
There is a method in place to control temperature ie roof and ceiling with space between them in hot climates, air conditioners, fans, etc	1. Very satisfactory 2. Satisfactory 3. Dissatisfactory
There are windows that can be opened or there are air vents.	1. Very satisfactory 2. Satisfactory 3. Dissatisfactory
Direct sunlight cannot enter the area (e.g window panes are painted or there are curtains/blinds to protect against the sun.	1. Very satisfactory 2. Satisfactory 3. Dissatisfactory
Area is free from moisture (e.g. leaking ceiling, roof, drains, taps, etc)	1. Very satisfactory 2. Satisfactory

	3. Dissatisfactory
There is a cold storage in the facility such as refrigerator or fridge.	1. Very satisfactory 2. Satisfactory 3. Dissatisfactory
There is a regular filled temperature chart for the cold storage.	1. Very satisfactory 2. Satisfactory 3. Dissatisfactory
Medicines are store directly on the floor.	1. Very satisfactory 2. Satisfactory 3. Dissatisfactory
Medicines are stored in a systematic way (e.g. alphabetical, pharmacological)	1. Very satisfactory 2. Satisfactory 3. Dissatisfactory
Medicines are stored first- expiry-first out (FEFO).	1. Very satisfactory 2. Satisfactory 3. Dissatisfactory
There is no evidence of pests in the area (e.g. rats droplets, spider wabs)	1. Very satisfactory 2. Satisfactory 3. Dissatisfactory

ANNEX V

INFORMED CONSENT FORM

ID-NO 281014662

Iam Moses Akuak a master student at the University of Rwanda College of medicines and health science. Iam doing survey on assessment of availability, expiry storage conditions of selected medicines in the health facilities. The purpose of this survey is to assess the effectiveness of current distribution and recommend changing to appropriate distribution model that can best address the situation. No information from your response will be available to any other person, all information collected will be coded and identified by the assigned code, no harm shall be happen from this study to you, if you wish to take part in this study please kindly complete this consent, this is a voluntary work you can withdraw any time without giving reasons, even if you have already given consent. If you have any other questions regarding this study, feel free to contact me, the researcher,

Moses Akuak, contact: 0915111680, email: mosesakuak@gmail.com

Do you agree to participate? (Tick the response) YES …….NO……

I have read the consent form and my questions have been answered and I agree to participate in this study.

Signature of Participant……..

Signature of Investigator……

Date of signing consent……

Date 2/8/2019

Ajuongthok

To: Director General state ministry of health

Subjection: Request for ethical approval.

Dear Sir;

As per the above mention subject I would like to request from your office the ethical approval that is required before the beginning of a research involving humans, am student pursuing masters in health supply chain management in Rwanda University School of public health, regional center of excellence for vaccines, immunization and health supply chain management . The title of the research is assessment of availability, expiry and storage conditions of public health facilities in Ruweng state.

Objectives of the research: To assess the availability, expiry, and storage condition for key tracer medicine in public health facilities in Ruweng state, South Sudan. The results of this study will be used as baseline information to assist management to develop strategies to improve on these activities. The study findings will help identify gaps in storing of medicines, training needs, policies and management of expiring medicines that can help improve medicines management which government can prioritize depending on availability of funding

Research is one of the requirements for the awards of the master programs however I will be doing the research in four purposively selected health facilities in Ruweng State and therefore your assistance as the local authority in this area is paramount.

Regards

Moses Akuak Maciek