Sudan Medical Specialization Board
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Assessment of Emergency Free Medicines Project: Experience of the Blue Nile State – Sudan

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Dedication

- *To my mother and father, who are the main cause of my Success through out my life.*

- *To my family, for their inspiration and motivation.*

Acknowledgement

At moments of winning and success, individual always feels with ebullient emotions to those who encouraged and supported him to realize his goals.

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Abbreviations:

AACN	American Association Of Critical-Care Nurses
B.N.S	Blue Nile State
BAEM	British Association for Emergency Medicine.
CMSPO	Central Medical Supplies Public Organization
DMIS	Drug Management Information System
DOCM	Directorate of Curative Medicine
EDL	Essential Drugs List
EPI	Expanded Programme For Immunisation
FML	Free Medicines List
F.M.o.H	Federal Ministry of Health
GDP	Growth Domestic Product
HAMT	Health Area Management Team
M.o.H	Ministry Of Health
NMP	National Malaria Programme
NTP	National Tuberculosis Programme
PHC	Primary Health Care
RDF	Revolving Drug Fund
SNAP	Sudanese National Aids Programme
STG	Standard Treatment Guidelines
WHO	World Health Organization

Abstract

Background:

The free medicines project was implemented in Sudan in 1996, and was aimed to provide free medical care for those who need emergency treatment in hospital casualty departments.

Study design:

It was a cross sectional study of the free medicines project.

Setting:

The study was performed in the central store of medicines, and five selected hospitals in Blue Nile state during the year 2007.

Objectives:

To assess accessibility, rational use of free medicines, and the efficiency of dispensing limitations for the first twenty-four hours practices.

Methods:

The study was carried using Level I and Level II indicators of the WHO for monitoring and assessment the pharmaceutical sector.

Results:

The study showed sustainable provision of free medical care in urban hospitals while interrupted in rural ones.

In the central store and urban pharmacies, on average, 92% of the fifty-one free medicines monitored were available, with good storage quality, and all drugs prescribed by the physician were dispensed by the urban pharmacy, while the stock-out duration was around one month on average in the central store.

The average number of drugs per prescription was high (3.5). Prescription of injectable antibiotics was very high in urban pharmacies (78%) on average.

In rural hospitals, availability of free medicines was less than fifty percent (39%) on average without stock records and poor storage quality.

The percentage of medicines prescribed out the Free Medicines List was acceptable (10%) on average.

The percentage of patients receiving medicines after the first twenty- four hours was 53% in Elroseris pharmacy while no patients received medicines after the first twenty- four hours in Eldmazin pharmacy; no records were available in rural hospitals.

No activities were carried for training and development in emergency project, and the availability of the basic managerial and regulatory manuals were poor.

The recording, reporting and information systems were weak at all levels.

Conclusion:

Separate emergency departments with specified personnel need to be established.

Availability of free medicines is good in urban hospitals but poor in rural one. The rational use of drugs needs to be emphasized, restrictions strategies needs to be reviewed.

Chapter 1

1.1. Introduction:

The types of medical services needed, vary depending on the locale, the available local medical resources, and the types of medical risks.

There are two basic types of medical care production: non-emergency medical care, and emergency medical services (Mccann, 1988).

Non-Emergency Medical Care involves large numbers of people, and minor problems and diseases. Family or medical care practitioners can treat these types of medical problems.

Medical emergencies are potential problems that range from minor up to major problems like heart attacks. These are hazardous stunts and should be treated by Emergency Physicians who are specifically trained to handle such types of medical problems.

First aid is not medical care. It is an emergency supportive treatment. It intends to keep the person alive until he can get definitive medical treatment.

Emergency is defined as a condition where the patient is, or is believed to be, suffering from an illness or injury requiring early assessment and or management, to save life or limb, to relieve pain and/or suffering, or to prevent further deterioration in a treatable condition in order to reduce morbidity and mortality (BAEM, 2005).

The emergency or casualty department is either a hospital or a primary care department that provides initial treatment to patients. It is the dedicated area in a hospital that is organized and administered to

provide a high standard of emergency care to those in the community who are in need of acute or urgent care.

Critically ill patients are defined as those patients who are at high risk for actual or potential life-threatening health problems. The more critically ill the patient is, the more likely he is to be highly vulnerable, unstable and complex, thereby requiring intense and vigilant nursing care (AACN, 2006).

The purpose of emergency medical care is to stabilize patients who have life-threatening problems.

Emergency medical care has three core components; care in the Community, care during transportation, and care on arrival at the receiving health facility.

The three fundamental functions of a health system are to improve the health of the population, respond to people's expectations, and provide financial protection against the costs of ill health. Emergency medical care can contribute positively to these functions (Razzak and Kellermann, 2002).

1.2. Emergency services in developing countries:

The development of emergency departments results from an increased need for rapid management of critical illnesses. In some developing countries, emergency departments have become important entry points for those without other means of access to medical care.

Health care in developing countries is usually non-existent or highly limited and under resourced. The outbreak and spread of infectious diseases has crippled many populations and sent life expectancies. The provision of timely treatment during life-threatening emergencies is not a

priority for many health systems in developing countries. The level of emergency medical care might be well below international standards.

(Razzak and Kellermann, 2002).

1.3. Sudan:

1.3.1. Country Profile:

Sudan is the largest country in Africa. Its size is about 2.5 million square kilometers in the Northeastern side of Africa. Between longitudes 21.75^0 and 38.50^0 East, its width from North to South is about 2100 kms, and its breadth is 1800 kms from West to East at the broadest parts. It borders the Red Sea and neighbors nine countries, namely Egypt, Libya, Chad, Central Africa, Congo, Uganda, Kenya, Ethiopia and Eritrea.

Sudan is a multicultural and multi-ethnic country. The country is a federal state, divided administratively into 26 states. The climate is arid in the north and tropical in the south, where the rainy season lasts from April to October (WHO, 2004).

Table 1.1: Sudan Demographic indicators

Total population = 33 million; 27 million is in the north. 1999)
Life expectancy at birth is 56 years old.
Annual growth rate is 2.6% with total fertility rate of 5.9 births per woman. (1999)
(WHO/EMRO Annual Report of the Regional Director, 2003)

Sudan map

Figure: 1.1

Source: (UN, Sudan .2004)

1.3.2. The health system in Sudan:

Sudan is still high burden of tropical diseases, which is a consequence of Sudan's geography, ecology, the limited programs and interventions. Such common diseases affect mainly the poor, in particular, the people living in rural areas(Ahmed, 2006).

The Sudan federal system governs the health system, but most of the responsibilities of management and financing are decentralized.

The Federal Government Act of 1993(WHO, 2003) establishes three levels of management:

(i) The Federal Ministry of Health (FMoH), which is responsible for formulating national sector policies, supervision, evaluation, development and management of human resources, international relations and allocation of central funds to the states.

(ii) The State Ministry of Health (MoH), which is in charge of planning, administration and financing within the framework of national policies.

(iii) The Health Area System, with a Health Area Management Team (HAMT) responsible for planning and implementing health programmes at the locality level.

However, an administrative division hampers the HAMT. The lower level health facilities (Primary Health Care "PHC" units, dressing stations and dispensaries) are administratively under the responsibility of the local council, and technically under the State MoH, including some of the HAMT members, while the more sophisticated facilities, such as the health centres and rural hospitals, are exclusively under the management responsibility of the State MoH(WHO, 2003).

The health delivery system is organized into three tiers(WHO,2003): the first level consists of PHC units staffed by a community health worker (providing essential PHC services), dressing stations (delivering curative care for common diseases), dispensers (managing more serious cases) and Health Centres (which should include laboratory and X-ray unit, but without inpatient wards) (WHO, 2003).

The first referral level is represented by rural hospitals, while specialized and teaching hospitals in the state capitals, offering more developed services, represent the second level of referral. Primary level health facilities represent 95% of the total network and higher levels contribute to the remaining 5% .There is some overlap between the functions and services at different levels (WHO, 2003).

The decentralized system introduced with responsibility for the management and financing of most of the health system devolved to the country's states. Unfortunately, adequate revenues were not correspondingly channeled to the states to enable them to carry out this responsibility effectively and equitably. Alongside this decentralization, other reforms were implemented, including establishing a national health-insurance scheme, introducing user fees for services and treatment, and actively promoting private-sector provision.

Government spending on health remains one of the lowest in the world: below one percent of growth domestic product (GDP) or $4 per capita. Yet overall spending on health is considerably higher, indicating substantial out-of-pocket expenses are being incurred.

Health-insurance schemes cover approximately eight per cent of the population – largely government employees – and are significantly biased towards urban populations. The insurance schemes cover both primary and secondary healthcare provision. In addition to their

membership fees, patients are required to pay only 25 per cent of the drug fees at point of service (Save the Children, 2005).

Some exemptions in healthcare provision exist. The first 24 hours of emergency treatment are meant to be free, with the government providing essential drugs to primary healthcare facilities and hospitals for this purpose (Save the Children, 2005).

However, the quantities of essential drugs are often inadequate and, once the monthly stocks are exhausted, patients are required to buy additional essential drugs from alternative sources, such as private pharmacies (Save the Children, 2005).

The main actors of the pharmaceutical supply system in Sudan categorized into two main groups (Ahmed, 2006):

The public sector, which includes;

- The central medical supplies public organization (CMSPO), which is the national centre for selection, procurement, storage and distribution of medical supplies.
- The Revolving Drug Fund (RDF), which works in the regional level of the states of Sudan.

The private sectors; which includes:

- For- profit business organizations: (local manufacturing companies and importers).
- Non- Governmental Organizations: which work in different parts of the country with refugees and relief as well?

Below are some of health indicators in Sudan

Table 1.2: Sudan health indicators

• FMOH expenditure in relation to the GDP is 0.8%.
• Health expenditure per capita is US$ 17.5, corresponds to 4.5% of the GDP
• Public expenditure on drugs is estimated at US$ 2 per capita.
• Funding through CAP to the health sector reached US$ 4,700,000 (22% of the total revised requirements of US$ 21,345,744) in 2003 by the end of September.
(WHO/EMRO Annual Report of the Regional Director, 2003)

1.4. Pharmaceutical Supply Management:

The drug management cycle is a systematic approach that used to ensure that all drugs are available and appropriately used according to an effective treatment strategy and time line. It emphasizes connections among four drug management activities (Quick, et al, 1997).

1.4.1. Selection of essential drugs:

The process of establishing and using a limited list of essential drugs involves reviewing prevalent health problems, identifying the best clinical treatments, choosing individual drugs, dosages, and dosage forms, and deciding which drugs will be available at each level of health care.

1.4.2. Procurement of selected drugs:

Procurement is the process of acquiring drugs through purchase, donation, or manufacture. Procurement includes quantifying drug requirements, selecting procurement methods, managing tenders, establishing contract terms, assuring drug quality, and ensuring adherence to contract terms.

1.4.3. Distribution of procured drugs:

Distribution is the process by which an organization receives, transports, and stores drugs. The distribution process includes clearing drugs through customs, transporting drugs from a central point to depots and health facilities where they are dispensed, controlling stocks, and managing stores.

1.4.4. Use of distributed drugs:

The process of diagnosing, prescribing, labeling, repackaging, and dispensing drugs, and of securing patients' adherence to drug treatment. Achieving rational drug use requires effective interventions, such as active use of standard treatment guidelines, training linked to improved drug supply, and guided discussions among patients and providers (Quick, et al, 1997).

1.4.5. Pharmaceutical Supply System Assessment:

Pharmaceutical Supply System Assessments are useful to predict problems, plan major projects and interventions, monitor progress, and compare the performance of one system with another.

The two most common approaches to pharmaceutical system assessment are comprehensive structured assessment, which gathers information from all levels of the system and limited assessment that relay primarily on interviews, and documents review. With limited field visits and little primary data from records (Quick, et al, 1997).

Three major categories of issues should be addressed.

(i) The functionality of the public-sector system;

(ii) The capacity and interest of the private sector;

(iii) Political mapping to understand the important actors, their attitudes, and the feasibility of successful implementing changes in the pharmaceutical system.

Specific information objectives should be set in advance, incorporating quantitative as well as qualitative data, performance indicators, and special-purpose analysis.

The assessment' results must be used in developing new policies and procedures for the pharmaceutical system (Quick, et al, 1997).

1.5. Emergency Medical Services in Sudan:

The Sudanese enjoyed free medical care services during the favourable economic condition of the 1960s. In the late 1970s and 1980s, the Sudanese economy was hard hit by a series of crises due to drought and political instability (Federal Ministry of Finance and Bank of Sudan, 1987). The economic recession and the limited success of the primary health care philosophy had led to failure of the national health system.

In 1992, the economic medical care project (a user fee system for services) was introduced as a part of Health Salvation Programs (Federal Ministry of Health, 1992).

In its efforts to contain the problems of those who cannot pay for their medicines, in 1996, the government announced a project of free treatment at hospital emergency units. The Emergency Free Medicines project was intended to increase access for those who need emergency treatment in hospital casualty departments, regardless of their ability to pay. According to this project, all patients in emergency units are entitled to receive free services including medicines, during the first twenty-four hours of admission. The free emergency medicines' list is developed by an expert committee and revised on a regular basis. The list includes a

very limited number of medicines, such as fluids and certain injections. The project also offers relevant investigations (lab tests and x-rays) and surgical operations. After the first twenty-four hours of admission, the patient has to pay for every service provided to him.

The Central Medical Supplies Public Organization (CMSPO) receives a special budget from the ministry of finance for the free distribution of the emergency drugs at hospitals' emergency departments. The medicines are distributed on monthly basis after their value has been deposited in the CMSPO account. The budget allocated for this was SDD3.0 billion (around US$ 11.6 million) in 2005(Mohamed 2006).

The emergency medicines for each state are delivered monthly by the CMSPO; they are received in a regular quota according to the specific program designed by the Federal Ministry of Health.

1.6. The Free Treatment Project of Sudan:

The proposal of the project (M.O.H, 2007) defined emergency case as a disease incident, which occurs suddenly, and represents a direct risk and life threatening to the patient, who needs admission to the emergency department.

The emergency free services include Patient examination, Laboratory investigations, surgery, and free medicines for treatment according to the Standard Treatment Guidelines for the first twenty-four hours after patient admission.

The emergency casualty department is a hospital department that provides initial treatment to patients with acute illnesses, some of which may be life-threatening and requiring immediate attention. Upon arrival in the unit, patients undergo a brief sorting, to determine the nature and severity of their illness. Those with serious illnesses referred to the doctor

first. After initial assessment and treatment, patients are either admitted to the ward or stabilized and transferred to another hospital for various reasons, or discharged.

Emergency department units are the clinic, lab-tests, pharmacy, x-rays, theature, intensive care unit and short stay ward.

In addition to the hospital' causally departments there are other centres, which provide free services for some patients. These are:

- Kidney Disease and Transplantation National Centre at Khartoum and Gezera.
- Nuclear Medicine and Radiotherapy National Centre, at Khartoum and Gezera.
- The National Department of Blood banks, the directorate of curative medicine (M.O.H, 2007).

1.6.1. Essential Elements of Emergency Project:

The elements of the project that constitute the free services are:

- The emergency system staff "focal point"
- Emergency units at the states, which provide the services.
- The hospital medical departments.
- The Standard treatment guidelines for emergency treatment.
- Drugs and other consumable products supply system.

1.6.2. Objectives of the emergency project:

The general objective of the project is to maintain systemic, continuous, effective, safe, and appropriate free medical services at the appropriate time (M.O.H, 2007).

The specific objectives of the project:

First objective of the project: to ensure systemic and sufficient supply of essential medicines and other consumable products that comply with the international standards required for effectiveness, safety and quality (M.O.H, 2007).

The policy in this field includes:

- The Central Medical Supplies Public Organization (CMSPO) supply all the essential medicines included in the list of emergency free medicines designed by the Directorate of Curative Medicine "Ministry of Health".
- The Ministry of Health, in coordination with the CMSPO encodes all the items included in the emergency free medicines list to distinguish them from other pharmaceutical products.
- The Directorate of Curative Medicine (DOCM) represented by the department of hospitals and emergency separate the free medical services from other medical services packages.

Second objective is to provide free medical services according to the requirements of health facilities. The policy designed to include:

- Development of the standard specifications required for emergency medical departments in coordination with the relevant departments and institutes.
- Establishment of the appropriate safety measures at the hospital emergency departments and effective control and supervision.
- Dissemination of the concept of emergency free treatment among the patients to avoid problems and difficulties encountered during the practices.

Third objective is to improve the quality of health care, through rational use of medicines, by implementation of standard treatment protocols. The policy is formulated to include:

- Development of the standard treatment guidelines (STG), printing and distribution of manuals containing the protocols for emergency treatment.
- Modernization of the Free Medicines List (FML) based on the standard treatment guidelines of the specific specialty in coordination with the medical consultant boards and the relevant departments.
- Promotion for the emergency treatment protocols among the medical professionals and assistants, and implementation of these protocols through the hospital medical committees in coordination with the quality control department.

Last objective to Develop, train and qualify the administrative staff "focal points" in addition; the medical services providers at the different departments. The policies in this field include:

- Creation of appropriate organizational structures at the national and state levels.
- Development of job description for the managerial and medical staff.
- Preparation of training courses and workshops for emergency treatment system.
- Coordination with the relevant organizations to recruit and retain emergency services providers.

- Coordinate the medical treatment activities between the different departments, to ensure and maintain delivery of services at the appropriate time and the required quality.
- Motivate the medical care providers for research and development in the field of emergency medicines (M.O.H, 2007).

1.7. The Current Situation in Sudan:

According to the documents of the Directorate of Curative Medicine (DOCM), the budget allocated for free medicines project was SDD 12.9 billions (around US$ 64.5 million) in 2007(M.O.H, 2007).

The budget is distributed as follow:

SDD 4.15 billion for free medicines, blood transfusion services and surgery at federal and states hospitals.

SDD 2.00 billion for National Radiotherapy Centre and Gezera centre.

SDD 3.00 billion for kidney diseases and transplantation national centre.

SDD 3.30 billion for primary care services, pediatric, and caesarian surgery.

SDD o.45 billion for the treatment of blood related diseases.

The free medicines budget was confined to the northern states only; such budget distribution was based on the population's percentages of Sudan states.

The table bellow shows the budget distribution in SDD for2006 and 2007.

Table1.3: Budget distribution for free medicines project SSD in million

States	Population No.	Population (%)	Budget 2006	Budget 2007
Khartoum	5761000	19.3	26	37.5
Gezera	3905000	13.0	22	25
Sinar	1334000	4.5	10	10
Blue Nile	738000	2.5	7	10
Gadarif	1666000	5.7	12	12
Kasala	1728000	5.8	12	12
Red Sea	737000	2.5	10	10
Northern State	634000	2.1	10	10
River Nile	990000	3.3	10	10
White Nile	1676000	5.6	12	12
Northern Kordofan	2212000	5.7	15	15
Southern Kordofan	1801000	6.0	12	12
Northern Darfour	1709000	5.7	10.4	11
Southern Darfour	3282000	10.6	15.2	20.56
Western Darfour	1776000	6.0	10.4	11.6
Sum /month	29949000	100	194	218.66
Sum/year			2.328	2623.92

Source: M.O.H- Sudan- 2007

1.8. Apparent problems of the project:

- The free treatment services dominated in the northern states only.
- There is no clear definition for the free medical treatment packages.
- There are no separate stores at the federal hospitals and the states for the storage of free medicines.
- There is no reporting system nor feedback from the hospitals and the states for estimation of the gaps in the needs
- The concept of free treatment is absent in the medical field.
- There is no separate department at the CMSPO, to facilitate the administrative procedures.

1.9. Blue Nile State –Sudan:

1.9.1. Brief Profile:

The Blue Nile State (B.N.S), located on the central eastern part of Sudan where it borders Ethiopia and neighbors Sinar State at the north and Upper Nile State at the west. Its area is about 3700 square kilometers, which extends between longitude 39^0 at west and 12.3^0 at east, and from latitude 33.5^0 at north to 33.3^0 at south. The state falls in the Savanna belt that characterized is by its tropical climate, dense forests and mountains series, where the rainy season lasts for six months.

According to annual growth rate estimates the total population of the state was estimated at 810633 in 2006, represent 2.5% of the total population of Sudan.

The state is divided into five administrative localities (M.O.H, 2006).

The table below shows details about these localities.

Table1.4: The administrative localities of B.N.S

Locality	Population	% Population	Location in the State
Eldmazin	326211	40.3	Centre
Elroseris	206786	25.5	East
Gaisan	78194	9.6	South east
Bowo	111418	13.7	Mid south
Elkurmok	88024	10.9	South
Total	810633	100	

Source: Blue Nile M.O.H annual report 2006

During the two past decades, the Blue Nile state was involved in the civil war, and most of the infrastructures were destroyed, particularly the health sector was the most affected area. The following health indicators reflected the situation of the state.

Table 1.5: Infrastructure indicators of B.N.S

Public Sector		**Private Sector**	
Indicator	**Number**	**Indicator**	**Number**
Hospitals	15	Private pharmacy	16
Beds	668	House drug store	55
Health centres	16	Labs	21
Dispensary	40	Dentists clinic	1
Dressing station	130	G.prationers clinic	14
PHCU	0	Specialists clinic	12

Source: (M.O.H, 2006)

Table 1.6: Human resources indicators of B.N.S

Indicator	Number	Doctors per 100.000 pop
Specialist	12	1.5
Total doctors	78	9.6
Dentists	2	0.2
Pharmacists	12	1.5

Source: (M.O.H, 2006)

Table1.7: Health providers per 100.000 populations in B.N.S

Indicator	Provider per 100.000 population
Lab technians	35
x-ray technians	6
Sisters	8
Medical assistants	61
Lab assistants	22
Pharmacy assistants	11
Nurses	357

Source: (M.O.H, 2006)

Based on the resources available in the states, the federal government proposed two classes for the organizational structure of the ministry of health of the states, class- A&B.

The Blue Nile state adopted class-A model that consists of five essential directorates, namely; the directorate of administrative and financial affairs, health planning, preventive medicine, curative medicine and the directorate of pharmacy (M.O.H, 2006).

The main actors involved in direct provision of medical care were the directorate of curative medicine represented by the department of

hospitals and the directorate of pharmacy represented by the department of hospital pharmacy.

In addition to the revolving drug, fund which is responsible for the distribution of medicines to the public facilities.

Other partners involved in the provision of medical services were the national health insurance fund, the military hospital, police hospital and private sector.

Beside the free treatment project, a number of other exemption systems were in place. for example expanded programme for immunisation (EPI), antenatal care, national tuberculosis programme (NTP), national malaria programme (NMP) and Sudanese national aids programme (SNAP).in addition; a number of solidarity schemes exist, chief among them the Zakat, an official Muslim institution aimed at channelling assistance to the needy, it provide support either as direct funds to the hospitals or as individual assistance.

1.9.2. Emergency Medical Services in Blue Nile State:

The defined quota for Blue Nile state is about SDD 10 million. Thus, the assessment of the medicine needs is within this limit (M.O.H, 2007).

In the state medicines are distributed from the central store to the central and peripheral hospitals according to specific defined percentages.

The directorate of pharmacy and the curative medicine departments keep all documents and records regarding distributing and dispensing of these medicines.

The emergency medicines list includes limited items. The dispensing of such items is restricted to the first twenty-four hours only.

1.10. Justification:

Since it was adopted in 1996, the emergency free medicines project of Sudan has not been evaluated.

During the past decade, Sudan faced new economic, institutional and social challenges.

Evaluation of the system will provide evidence-based information for the decision makers to enhance their efforts to develop and strengthen national drug policies and programmes to meet these challenges.

This study will, therefore, make an important contribution by providing updated information about constraints that prevent regular availability and coverage of the emergency medicines.

1.11. Aim and objectives:

General Objective:

To evaluate the degree of attainment of the strategic objectives of the free medicines project.

The Specific Objectives Are:

- To measure accessibility of the free medicines.
- To assess the rational use of free medicines
- To evaluate the efficiency of dispensing limitations for the first twenty-four hours practices.

Chapter 2

2.1. Introduction to the Study:

The study was carried out using Level I and Level II indicators for monitoring the pharmaceutical sector (WHO, 2003). Level I indicators which assess the existing infrastructure and key processes of the pharmaceutical sector were collected before the field study, using a structured interviews (annex 1). Level II indicators which focus on the degree of access and rational use of quality drugs was the object of this survey (annex 2).

2.2. Study Design and Duration:

This was a cross sectional study of the free medicines project in the Blue Nile state. Data were collected during the year 2007 from January to June, assembled during one weak of field study.

2.3. Study indicators:

2.3.1. Level I indicators:

The indicators measured are as follows

2.3.1.1. Availability of basic information indicators:

- Percentage adequate records
- Availability of standard treatment guidelines (STG)
- Availability of essential drugs list (EDL)
- Availability of Free medicines list (FML)
- Availability of Free treatment regulations manuals

2.3.2. Level II indicators

The indicators measured are as follows

2.3.2.1. Access indicators

- Percentage availability of key drugs
- Average stock-out duration

2.3.2.2. Rational Use indicators

- Average number of drugs prescribed
- Percentage of Medicines prescribed that are dispensed
- Percentage of patients received injectable antibiotics
- Percentage of prescribed drugs not included in the FML
- Medicines dispensed after 24 hrs

2.3.2.3. Quality indicators

- Adequacy of storage
- Percentage of expired drugs

2.4. Scope and limitations:

The study was not intended to give a detailed analysis of the free treatment project, but provide a picture about the situation in the state to help in policy analysis and in the design of appropriate interventions.

2.5. Sampling procedure:

Blue Nile state has five administrative localities, these are:

- Eldmazin locality occupies the northern and western part and constitutes 40% of the population of the state.
- Elroseris that lies at eastern part with 26% of the population.

- Gaisan, Bowo, and Elkurmok are located at the Southern region with population percentages 9.6%, 13.7%, and 10.9% respectively.

From twelve public hospitals in the state, only two are urban while the rest are rural hospitals.

The selection of samples was based on the geographical location, and the population's distribution. The hospitals chosen were five, Eldmazin at the centre, Elroseris at the east, and Elsiraew at the north, Roro at the west and Bawo at the south.

The five selected hospitals are located at three localities; all collectively constitute eighty percent of the state populations.

The other two localities are located far at the southern region; both collectively represent approximately twenty percent of the population, with vast area and unstable situation, because the region was affected by the last civil war, and most of the infrastructures were destroyed.

Eldmazin, central store where the free medicines are stored and distributed was selected for study.

2.6. Selecting basket of key medicines:

The basket of key medicines was selected systematically according to the principles by referring to official morbidity data for adults and children.

The following criteria were followed:

- A list of **51** key medicines used to treat common health problems was selected.
- The selected key medicines were basic requirements in all levels of health care.

- The chosen medicines were found to meet the essential principles below:

– They are included on the national essential medicines list.

– They are included in the free medicines list established by the department of curative medicine.

– Medicines should be available at all primary health care facilities at all times (WHO, 2003).

2.7. Data collection:

This research has been designed in the form of a limited assessment, which relied primarily on:

I-Literature and documents' review: this has been carried out to identify the issues related to emergency free medicines project.

2- Interviewing:

Structured interviews with a limited number of stakeholders; one person from each of the following: the directorate of pharmacy, the curative medicine department, doctors and pharmacists.

3- Model contains World Health Organization (WHO) survey forms for monitoring level II indicators:

The WHO process on pharmaceutical monitoring and assessment, uses a hierarchical approach with three groups of indicators: Level I, Level II and Level III.

This provides a standard methodology to follow progress over time and to compare situations in different facilities, districts and countries.

Primary; the selected subjects had been interviewed. So, the information about the infrastructure and processes was obtained.

Secondly, the actual evaluation was performed using structured survey forms to gather data through site visits from records and prospective observation.

Measurement of current availability and storage quality of key free medicines in the central store and the hospital pharmacies was carried out by direct survey through shelves. Medicines available in stock at the time of the visit were counted, and presence of expired medicines was evaluated.

Using stock cards in the central store number of days each key medicine is not available was determined, the review period covered was six months.

During the survey, adequacy of conservation conditions and handling of medicines in the central store and selected pharmacies was measured by using standards related to storage quality.

Assessment of the rational use of free medicines was checked at urban hospitals, Sample of thirty outpatient encounters and available records was reviewed in each hospital.

The related variables measured were; average number per prescription, ability of the pharmacy to dispense free medicines, prescription of medicines not included in the free medicines list and dispensing of free medicines after the first twenty-four hours.

Availability of standard treatment guidelines, essential medicines list, free medicines list and protocol manuals at hospitals were assessed by direct interviews.

2.8. Data analysis:

(i) Data gathered from structured interviews has been analyzed manually to understand the performance of the free medicines project.

(ii) Data collected in the field using Level II indicators was entered into summary forms, and analyzed using excel program.

2.9. Ethical Considerations:

Interviewees have clearly informed about the academic purpose, consequences and anticipated disclosure of the data. They have been also informed that the data will be fairly processed and used only for the purpose of this study. Data processing will not cause any substantial damage or distress. They have been informed also about the anonymity of the interviews.

Chapter 3

3.1. Results:

The data was presented using descriptive statistics (means, values, percentages).

3.2. Infrastructure and processes:

The structures and processes in the emergency project of the Blue Nile state were assessed using structured interviews with a number of key informants (Table 3.1). This table summarized the qualitative data obtained with detailed variables. It showed that, there were no separate stores, pharmacies, clinics and wards concerned the emergency project in all the state, except Eldmazin emergency unit and Elroseris free pharmacy. Moreover, there was no transport vehicle for the distribution of medicines; and it shared the existing public infrastructures and assets of the ministry of health.

There were no specific focal personnel for the emergency project and the administrative expenditures incurred by the directorate of pharmacy in coordination with the revolving drug fund (Table 3.1).

The directorate of pharmacy of the Blue Nile State adopted computerized delivery program for medicines, while the department of curative medicine used a manual recording and reporting system for the free treatment practices (Table 3.1).

The availability of basic information was assessed, both the national treatment guidelines and the essential medicines list were unavailable, but the free medicines list and the free treatment regulations manuals were available (Table 3.1), the practices supervised and controlled by the drug committee No activities carried for training and development in the emergency project (Table 3.1).

The provision of the free treatment at rural hospitals depends on the presence of the doctor, who is the only responsible person at the department of curative medicine (Table 3.1).

The medicines distributed according to the patients frequency at different hospitals, the assessment of the needs based on the past consumption (Table 3.1).

The table bellow illustrates the facts obtained from the interviewees.

Table 3.1: Qualitative Data of Level I Indicators

Variables	Indicator	Qualitative Data	Interviewee No.
Availability of infrastructure	Central store for free medicines	Not Available	1
	Hospital stores for free medicines	Not Available	1
	Free pharmacy	Available only at Eldmazin and Elroseris	1&2
	Transport tool for free medicines	Not Available	1
	Separate Clinics for emergency	Available only at Eldmazin	2
	Separate Wards for emergency	Available only at Eldmazin	2
Managerial Systems	Storage and distribution system	Available(computerized program)	1
	Recording system	Available but inadequate	1&2
	Reporting system	Available but inadequate	1&2
	Supervision and control system	Available but inadequate	1&2
	Storage quality control system	Available(FEFO)	1
Regulatory systems (Availability of Basic information)	EML	Not Available	1
	FML	Available	1,2&3
	Dispensing manual regulations	Available	1,2 &3
	STG	Not Available	2
	Protocols	Available for vertical programs	2
Administrative Systems	Drug therapeutic committee	Available Drug Committee only	1&2
	Distribution of medicines	according to the patients frequency at different hospitals	1
	Separate Focal Personnel	Not Available	2
	Method for Drug Needs Estimation	Use past consumption method	2
	Training courses in Emergency	Not Available	2
	Dissemination Of Basic Information	Not Available	2
	Provision of free care	Depends on the presence of doctors	2
Prescribing and dispensing indicators	Adherence to dispense drugs for the first 24hrs only	Adhere only in Eldmazin hospital, complete non adherence in the other selected hospitals	3&4
	Adherence to dispense drugs included in the FML	Adhere only in urban hospital. Some times, get over.	3&4

Note:

Interviewee No. 1: Pharmacist represents the directorate of pharmacy.

Interviewee No. 2: Specialist represents the directorate of curative of medicine.

Interviewee No. 3: Two doctors represent the hospitals

Interviewee No. 4: Two pharmacists represent the pharmacies

3.3. Accessibility of drugs:

Table 3.2 shows the results of the accessibility indicators. 92% of the 51 items monitored were available in the central store, with adequate stock records 98% and the stock-out duration (i.e. the annual number of days during which a drug from the list was unavailable in the store) was 29 days.

The storage indicators showed approximately 4% expired drugs on shelves and the quality of storage was 87% (Table 3.2).

Table 3.3 showed the results of the five selected hospitals. The availability of the selected drugs indicators in the two urban hospitals were 92.5% and 84.3%. There were no stock records in both hospitals. The storage indicators showed approximately 4% expired drugs, and the quality of storage in both hospitals was 78%.All items prescribed at the urban hospital were dispensed by the pharmacy.

Two of the three rural hospitals showed 45.1% and 33.3% actual availability, unfortunately without stock records. the storage indicators showed that no items expired , but the medicines were stored in a separate closed metallic cupboard (0^{a}), no prescribing or dispensing records were found (0^{*}). The cupboard contain the free medicines was closed at the time of visit to Bawo, the third rural hospital (Table-3.3).

Table3.2: Accessibility indicators in the central store Eldmazin

Indicator	%
Percentage availability of key medicines	**92.16**
Percentage adequate records	**98.04**
Average number of stock out days	**29.76**
Percentage medicines expired	**4.29**
Percentage adequate conservation conditions and handling of medicines	**87.5**

Table3.3: Accessibility Indicators in the selected hospitals (B.N.S)

Indicator(%)	Eldmazn	Elroseris	Elsiraw	Roro	Bawo
% availability of key medicines	92.16	84.31	45.1	33.3	-
% adequate records	0	0	0	0	0
% medicines expired	4.26	4.65	0	0	-
% adequate storage conditions of medicines	77.8	77.8	0^a	0^a	0^a
% Medicines prescribed that are dispensed (ability)	100	100	*	*	*
Type of hospital	urban	urban	rural	rural	rural

Note:

0^a = medicines were stored in cupboard, * = no records available, - = not accessed.

3.4. Prescribing practices:

Table 3.4 showed that the average number of drugs per prescription was 3.5, ranging from 3.3 in Elroseris hospital to 3.6 in Eldmazin . The number of prescriptions containing injectable antibiotic was 78% on average (76% in Elroseris and 80% in Eldmazin). The number of prescriptions containing medicines not included in the free medicines list was 10% on average. No records were available in the rural hospitals.

Some items not included in the free medicines list prescribed in certain cases, like pediatric syrups, anti asthmatic inhaler and tablets (Table 3.1).

3.5. Pharmacy dispensing practices for free medicines:

The dispensing practice measured using one indicator, showed that percentage of patients receiving medicines after 24 hrs was 53% in Elroseris pharmacy while in Eldmazin pharmacy was zero (Table-3.5).

Table3.4: Prescribing indicators in two urban hospitals in B.N.S

Indicator	Eldmazin	Elroseris	Average
Average number of medicines per prescription	3.6	3.3	3.5
% patients receiving inj antibiotics	76.7%	80%	78.4%
% of medicines prescribed out Free Medicines List	10.2%	10%	10.1%

Table3.5: Dispensing indicators in two urban hospitals in B.N.S

Dispensing indicators in two urban hospitals		
Indicator	**Eldmazin**	**Elroseris**
Medicines dispensed after 24 hrs	0	53.3%

Chapter 4

4.1. Discussion:

The government announced the project of free treatment at hospital emergency units in 1996. This was implemented as pilot project on the existing infrastructure of the Ministry of Health, and was aimed to provide free medical care for those who need emergency treatment in hospital casualty departments.

The objectives of the project were the provision of free medical care with continuous supply of free medicines, rationalize their use through implementation of protocols, train and qualify the health care providers. Achievement of such objectives can permit the development of the project either as vertical program or as a separate department of the ministry of health.

The qualitative information obtained by the study about the emergency project was gathered from a number of key informants. The samples chosen were indicative rather than representative. Six key informants had been chosen to represent the main stakeholders.

Below are some details about the interviewees that provide rationale for their selection:

Interviewee No. 1: Pharmacist has five years experience; he had been involved in management of all activities concerned the free medicines supply system of Blue Nile state, and represent the directorate of pharmacy.

Interviewee No. 2: Specialist has nineteen years experience; he had been involved in management and provision of the free treatment services for long period in the Blue Nile state, and represent the department of curative medicine.

Interviewees No.3: Two medical officers have experience range between three to five years, one represent the urban hospital and the other represent the rural one, both involved in the provision of free treatment services in the state.

Interviewees No.4: Two pharmacists have experience range between three to five years, they are the only two pharmacists involved in direct contact with patients in the dispensing of the free medicines in the state.

The time taken by the interviews varied between the six subjects, but it took half an hour on average

After eleven years the study showed that, there were no separate emergency departments with specific focal personnel in the Blue Nile state, except Eldmazin emergency hospital and Elroseris pharmacy (Table 3.1).It might be that the budgets specified by the federal government for the foundations of emergency units was confined to the main hospital only in each state, in addition to inadequate local financial resources.
The funding of government is crucial for the establishment of the causal departments at the national and state levels; create appropriate organizational structures and job description for its focal personnel and health care providers. Moreover, the policies of the project stated, emphasized the importance of separation of the free medical services packages from other hospital services in addition, the distinction of items included in the free medicines list(M.O.H, 2007).

This study revealed that, no activities for training and development in emergency field in place (Table 3.1). It may be due to absence of federal funds, limited budgets available, lack of planning and awareness.

The presences of specific responsible focal personnel can initiate and activate training courses and workshops by mobilizing the required resources.

This study showed that, the directorate of pharmacy has proper system for distribution and storage of medicines (Table 3.1). Possible explanation was the existence of computerized program facilitated the management of drugs supply at the directorate of pharmacy.

The planning process for the project should include a drug management information system (DMIS). The DMIS is an organized system for collecting, processing, reporting, and using information for decision- making.

This study showed inadequate recording and reporting system of the free project at the Blue Nile State (Table 3.1).Manual recording and reporting system used at the directorate of curative medicine, this may lead to weakness of the system.

Record- keeping documents, data reporting forms and feedback reports need to be in place with computerized programs. Introduction of electronic network system will improve the information system and the performance of the free treatment project.

Direct observation during the study showed sustainable provision of medical services at urban hospitals with adequate medical records and prescription forms, and interrupted in rural hospitals where free medicines were actually dispensed directly by the prescriber.

The reason might be that, there were integrated medical activities and procedures at the urban hospitals, while at rural hospitals, it was a personal responsibility of the doctor, and depends on his attendance and awareness.

More health care providers should be involved in the provision of the free treatment at rural hospitals.

The WHO level II indicators enable the evaluation of several aspects of the pharmaceutical sector such as patients' access to drugs of good quality, rational prescribing and dispensing, availability of reference information in the primary care settings as well as the quality of drug stores and public pharmacies.

The availability of free medicines in the central store of the Blue Nile state was good and on average 92% of drugs on the list was available at the store with adequate stock records 98%. Stocks of free medicines were unsatisfactory; drugs on the list were unavailable for approximately one month on average (Table 3.2).

Drug availability varies between developing countries; it ranges from 38% to 90 % (WHO, 1993), and significant stock-outs exceeded 2.5 months (Ghana, 2002). However, the ideal standard for the inventory is 90%. In addition, for average stock out duration is 10 days (Quick et al, 1997).

The presence of essential drugs at all times in health facilities is an important factor in provision of quality health care. The historical availability of key drugs shows an adequate logistic system that ensures essential drugs remain in stock at all times.

The current situation in the state central store of 29 days stock out duration gives an indication that this stock out duration has been influenced by late supply of some items to the health facilities. It might be due to delays in medicines supply from the Central Medical Supplies Public Organization. Stock levels need be properly determined to avoid

stock out of free medicines. Moreover, the situation may be critical in cases of emergency with stock out of duration more than 10 days.

This can be minimized by introducing a reporting system in all hospitals to supervise these activities, and training in drug supply management.

The low quantity of expired drugs (4% approximately) confirms the efficiency of the methods of quantification for procurement of medicines. The expiry percentages often range from 3% to 5% of drug inventory (Quick et al, 1997).

The good quality of drug storage (87%) confirms the quality of the pharmaceutical storage system. The standard for adequacy of storage was 68% (Ghana, 2002).

Presence of dusts, protection against direct sunlight, drugs stored on floor, provision of temperature monitoring charts and facilities to monitor room temperature are common problems encountered in the stores and pharmacies. Proper storage of drugs is an important factor in ensuring that the quality of drugs is maintained either in stores or in the public pharmacies.

The availability of free medicines in the five selected hospitals was good only in the two urban hospitals (Table 3.3), which showed relatively high availability, about 88% in average without stock cards. The findings that all drugs prescribed by the physician were dispensed confirm the ability of the urban hospital pharmacy to avail such items (Table 3.3).

The low quantity of expired drugs (4% approximately) confirms that estimation of the needs was proper, and the acceptable quality of their storage (78%) confirm the quality of the storage system in their pharmacies (Ghana, 2002).

Two of the three other rural hospitals showed availability less than fifty percent about 39% in average without stock cards(Table 3.3), the storage indicators were contradictory, showed that no items expired with regard to expiry date, but they are stored in a separate closed metallic cupboard 0^{a} (Table 3.3), this may not insure proper quality of the storage system.

The availability of medicines in a health facility depends on the level of services provided, and the attendance of the health care providers. The level was a primary care level in rural hospitals; the items used were limited in this level. This justifies the difference in the percentage of availability of medicines from the urban hospitals, which was secondary or tertiary care level; some items although they are included in the FML and available in the central store, but the doctors did not request them. No doubt, the presence of the doctors and pharmacists in a hospital is an essential factor for stability of drugs availability.

No prescribing or dispensing records were found at rural hospitals 0^{*} (Table 3.3), the availability of records is important for the needs assessment of drugs. There was weak adherence to the recording and reporting system particularly at rural hospitals, and the directorate of curative medicine does not insist to receive feedback from these health facilities.

The department of information and statistics of the Ministry of Health needs be encouraged and resourced to perform its responsibilities.

The cupboard, in which free medicines were stored, was locked at the time of visit to Bawo, the third rural hospital due to absence of the doctor. A system of responsibility and accountability needs to be in place, in addition to performance evaluation for the personnel in the hospital.

Physicians' prescribing habits showed that the average number of drugs prescribed per prescription was 3.5 in the urban hospitals (Table 3.4). In the majority, the number of drugs per prescription was high; the standard average number per prescription in Sudan was 1.4(WHO, 1993).

The reason might be that, trauma and surgery were included in emergency cases, or it may be due to irrational prescribing.

Lack of therapeutic training or appropriate diagnostic equipments may contribute to high polypharmacy.

As only injectable antibiotics are included in the FML, the study combined the two indicators in one (injectable antibiotic).

In developing countries, the ideal figure was estimated to be 17.2% for injectables, and 29% for antibiotics. In Sudan, they were 36% and 63% respectively (WHO, 1993).

The high number of prescriptions for injectable antibiotics showed in Table.3.4 (78% on average), may be because first, only injectable items are included in the free medicines list. Second, apparently, patients and/or physicians still consider that injections are more effective than oral drugs. Finally, possible explanation was that the majority of items might be included in surgery.

Further investigation is needed to understand the causes of high percentage of injectable antibiotic prescribing among the different facilities.

The percentage of medicines prescribed out the Free Medicines List was 10%, on average (Table 3.4), which was low and confirm that the availability of essential free medicines in the state was satisfactory, and give confidence that the criteria for their selection was proper. Also, indicate the importance of some items to be included in the free

medicines list, such items like pediatric syrups and anti-asthmatic inhaler may be considered as urgent medicines in certain situation.

The free medicines list needs to be reviewed periodically, for additions and/or deletions.

No patients received medicines after the first twenty- four hours in Eldmazin pharmacy (Table 3.5). Possible explanation is that the emergency system of Eldmazin hospital is an independent department with integrated sequences, where more restriction for prescribing and dispensing exist. While at Elroseris hospital, only the free pharmacy involved within the hospital, and 53% of the patients received medicines after the first twenty- four hours, such patients are either, do not have health insurance or un-able to pay for their medicines, particularly at the inpatient ward , no commitment to the rules at rural hospitals (Table 3.1).

"Prescribing restrictions and dispensing limitations are imposed to cut down inappropriate use of medicines. Regulatory strategies are essential to improve rational use of medicines (Quick et al, 1997)".

The presence of the free medicines list restrictions rules participate in the improvement of the practices, but the burden may fall on poor people, health insurance coverage for such sectors must be a strategic policy.

The absence of basic information was another issue, despite the adherence of physicians and pharmacists to standard treatment guidelines or national essential list. Sudan national treatment guidelines and national drugs list were missing at all health levels of the Blue Nile state.

"Managerial strategies include approaches to prescribing and dispensing like standard treatment guidelines, and national essential medicines lists,

are important to address the problem of irrational use (Quick et al, 1997)".

4.2. Conclusions:

The survey confirmed the good availability of free medicines in the central store and urban pharmacies. The management of drugs in these facilities was good, storage quality was up-to-standard, and levels of expired drugs were low. The system of centralized drug procurement and distribution contributed to these achievements. But the stock-out duration in the central store was unacceptable, and need to be reduced.

The drug information service concerning the safe and rational use of drugs was relatively better in the independent emergency department.

The effective pharmacy management, due to the presence of pharmacists in urban hospitals, the availability of some printed and electronic drug information resources, and the system of integrated emergency department units contributed to these improvements.

Drug availability and their storage conditions in rural hospitals of the state were poor; these hospitals need to upgrade their level in order to improve the quality of health care.

The recording procedures for diagnosis and treatment of patients were inefficient and do not allow a good follow-up of the prescribing patterns of the doctors.

Managerial efforts are needed to fill the gap in drug information by dissemination of drug information books, EMLs and STGs to all health facilities. There was neither printing nor dissemination of regulatory manuals, including FML and standard protocols.

The reporting and recording systems were weak at all levels of different health departments in Blue Nile state.

4.3. Recommendations:

- Separate, independent emergency departments, should be created in all hospitals, including the rural hospitals.
- Specific focal personnel for the emergency project should be recruited, trained and developed.
- Clinical and administrative regulatory manuals must be printed, disseminated and distributed to all health facilities.
- Appropriate administrative and educational strategies should be developed and implemented to improve prescribing habits.
- The ministry of health should activate the recording and reporting systems, and implement modern computerized programs at all levels.
- Introduction of information network is essential.
- Further studies are necessary to understand horizontal coverage and vertical coverage, i.e. the population coverage by the quantities of free medicines and the coverage of the diseases by free medicines list.

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Annex 1

Questionnaire on structures and processes of country pharmaceutical situation

Department----------Date ---------- **Name of respondent(s)---------- Position(s)----------**	
1- Are there separate infrastructures for the free medicines?	
Central stores	Yes/No/Don't Know
Hospital stores	Yes/No/Don't Know
Free pharmacy	Yes/No/Don't Know
Clinics and wards	Yes/No/Don't Know
2- Are there separate transport tools for the free medicines?	Yes/No/Don't Know
3- Is there a system for the storage and distribution of the free medicines?	Yes/No/Don't Know
4- Is there a system for control and supervision?	Yes/No/Don't Know
5- Is there a system for control the quality of storage?	Yes/No/Don't Know
6- Is there a system for recording and reporting?	Yes/No/Don't Know
7- are the following regulatory manuals available?	
EML	Yes/No/Don't Know
FML	Yes/No/Don't Know
Dispensing manual regulations	Yes/No/Don't Know
STG	Yes/No/Don't Know
Protocols	Yes/No/Don't Know
8- Are there separate focal personnel for the free medicines project?	Yes/No/Don't Know
9- Is there a drug therapeutic committee at the ministry of health?	Yes/No/Don't Know
10- How the free medicines are distributed to the hospitals?	Answer
11- Is there a method for estimation drug needs?	Yes/No/Don't Know
12- are there any courses training for development in Emergency?	Yes/No/Don't Know
13- are there any activities for dissemination of basic information?	Yes/No/Don't Know
14- how the free care is provided in the hospitals?	Answer
15- are doctors and pharmacists adhere to the following restrictions?	
to dispense drugs for the first 24hrs only	Yes/No/Don't Know
to dispense drugs included in the FML	Yes/No/Don't Know

Annex2

Survey form 1: Central Store, health facility pharmacy

Indicator: Availability of key medicines

% medicines expired

Facility ---------- Date ----------

Region ---------- Investigator ----------

Key medicines to treat common condition [A]	**In stock** **Yes=1, No=0** [B]	**Expired medicines on shelves** **Yes=1, No=0** [C]
Sum of A = 51	**[B_1] = Sum of B =**	**[C_1] = Sum of C =**
	[B_2] = % in stock = B1 ÷ 51 x 100 =	**[C_2] = % expired = C_1 ÷ B_1 x 100 =**

Survey form 2: hospital and pharmacy

Average number of medicines per prescription, % medicines dispensed or administered

Facility ---------- Date ----------

Region ---------- Investigator ----------

NO	**Cases (Patient s)** [A]	**Number of medicines Prescribed** [B]	**Number of medicines dispensed or administered** [C]
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			
16.			
17.			
18.			
19.			
20.			
21.			
22.			
23.			
24.			
25.			
26.			
27.			
28.			
29.			
30.			
[A1] = Sum cases =		**[B_1] = Sum of B =**	**[C_1] = Sum of C =**
		[B_2] = Average number of medicines = $B_1 \div A_1$ =	**[C_2] = % dispensed = $C_1 \div B_1 \times 100$ =**

Survey form 3: Central store/ hospital/ pharmacy

Indicator: Average stock out duration

Adequate record keeping

Facility ---------- Date ----------

Region ---------- Investigator ----------

key free medicines [A]	**Records cover at least 6 months within the past 12 months Yes=1, No=0** [B]	**Only collect data for medicines with records covering at least 6 months within the past 12 months**		
		Number of days out of stock [C]	**Number of days covered by the review (6 months)** [D]	**Equivalent number of days/year [E] = C x 365 ÷ D** [E]
Sum of A= 51	**[B_1] = Sum of B =**			**[E_1] = Sum of E =**
	[B_2] = % adequate records = B_1 ÷ 51 x 100 =			
[F] = Average number of stock out days = E1 ÷ B1 =				

Survey form 4: stores/hospitals/ pharmacy

Indicator: Adequate conservation conditions and handling of medicines

Facility ---------- Date ----------

Region ---------- Investigator ----------

Checklist	**Store room True=1, False=0**[A]	**Dispensing Area/Room True=1, False=0**[B]
1. There is a method in place to control temperature (e.g. roof and ceiling with space between them in hot climates).		
2. There are windows that can be opened or there are air vents.		
3. No direct sunlight can enter the area (e.g. windowpanes are painted or there are curtains/blinds to protect against the sun).		
4. Area is free from moisture (e.g. leaking ceiling, roof, drains, taps, etc.).		
5. Medicines are not stored directly on the floor.		
6. In the facility there is a cold storage with temperature chart.*		
7. Medicines are stored in a systematic way (e.g.alphabetical, pharmacological or first expiry first out).		
8. There is no evidence of pests in the area.		
9. Tablets/capsules are not manipulated by naked hand.		
	[A_1] = Sum of A =	**[B_1] = Sum of B =**
	[A_2] = Score = A_1 ÷ 8 x 100 =	**[B_2] = Score = B_1 ÷ 8 x 100 =**

Survey form 5: **Public health facility**

Indicator: Average No. prescribed/ % patients prescribed inject able antibiotics/ prescribed medicines out the free medicines list/ % of patients prescribed medicines after twenty-four hours

Facility ---------- Date ----------

Region---------- Investigator ----------

Type R/P [A]	**Number of medicines Prescribed** [B]	**Antibiotic Inj prescribed Yes=1, No=0** [C]	**Number of medicines prescribed out FML** [D]	**Medicines dispensed after 24 hrs Yes=1,No=0** [E]
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				
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18.				
19.				
20.				
21.				
22.				
23.				
24.				
25.				
26.				
27.				
28.				
29.				
30.				
[A1] = Sum cases = 30	**[B_1] = Sum of B =**	**[C_1] = Sum of C =**	**[D1] = sum of D =**	**E1= Sum of E**
	[B_2] = Average number of medicines = $B_1 \div A_1$ =	**C_2] = % receiving inj antibiotics = $C_1 \div A_1$ x 100 =**	**[D2] = % Medicines out = D1÷ B1 × 100 =**	**E2=% receiving medicines after 24 hrs = E1 ÷ A1 × 100 =**