

**ASSESSING THE RATIONAL USE OF ESSENTIAL MEDICINES IN
PUBLIC HEALTH FACILITIES MONTSERRADO COUNTY,
LIBERIA**

By

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Degree of Master of Science (Pharmaceutical Management) of
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Muhimbili University of Health and Allied Sciences

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CERTIFICATION

The below undersigned certify that they have read and hereby recommend for acceptance by Muhimbili University of Health and Allied Sciences of thesis/ dissertation entitled **“Assessing the Rational Use of Essential Medicines in public health facilities in Montserrado County”**, in partial fulfilment of the requirements for the degree of Master of Science in Pharmaceutical Management of Muhimbili University of Health and Allied Sciences.

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DEDICATIONS

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ABBREVIATIONS

| | |
|----------|---|
| ACT | Artemisininbased Combination Therapy |
| BPHS | Basic Package for Health Services |
| CIA | Central Intelligence Agency |
| CMO | Chief Medical Officer |
| CHAI | Clinton Health Assess Initiative |
| CME | Continuing In-service Medical Education |
| DD | Drug Depot |
| DHS | Demographic Health Survey |
| DAP | Drug Action Program |
| EML | Essential Medicine List |
| EM | Essential Medicines |
| EDM | Essential Drugs Management |
| FBOs | Faith-based Organizations |
| GDP | Gross Domestic Product |
| GOL | Government of Liberia |
| GFATM | Global Fund to Fight Aids, TB and Malaria |
| HP | Healthcare Provider |
| HIV/AIDS | Human Immune Virus/Acquired Immune Deficiency Syndrome |
| IDPs | Internally Displaced Persons |
| IDA | International Dispensary Association |
| IMF | International Monetary Fund |
| INRUD | International Network for Rational Use of Drugs |
| INN | International nonproprietary names |
| ICESC | International Conference on Economic Social and Cultural rights |
| ICIUM | International Conference for Improving the Use of Medicines |
| JFK | John F. Kennedy |
| LDHS | Liberia Demographic Health Survey |

| | |
|--------|---|
| LISGIS | Liberia Institute of Statistics and Geo-Information Service |
| LMHRA | Liberia Medicines and Health products Regulatory Authority |
| LMIS | Logistics Management Information System |
| MA | Medical Assistant |
| MDG | Millennium Development Goal |
| MTC | Medicines Therapeutic Committee |
| MIS | Medicines Information Systems |
| MoHSW | Ministry of Health and Social Welfare |
| MDS | Managing Drugs Supplies |
| MUHAS | Muhimbili University of Health and Allied Sciences |
| MUE | Medicines Use Evaluation |
| NDS | National Drug Service |
| NHP | National Health Policy |
| NMP | National Malaria Program |
| NGO | Nongovernmental Organization |
| PA | Physician Assistant |
| PBL | Pharmacy Board of Liberia |
| PSA | Pharmaceutical Systems Africa |
| PVOs | Private Volunteer organizations |
| RUM | Rational Use of Medicines |
| SCMU | Supply Chain Management Unit |
| SPS | Strengthening Pharmaceutical Systems |
| SOPs | Standard Operation Procedures |
| TB | Tuberculosis |
| TEM | Tracer Essential Medicines |
| TRIPS | Trade Related aspects of Intellectual Property Rights |
| WCC | World Council of Churches |
| WTO | World Trade Organization |
| WHO | World Health Organization |

ABSTRACT

Back ground

The Republic of Liberia has had a fourteen year civil war which has a devastating effect on the lives of people and healthcare infrastructures. Among the many health challenges, irrational use of essential medicines is of high priority. The determinants of the irrational use of essential medicines in the country are unknown. In order to obtain the magnitude at which medicines are used and advance possible recommendations for remedy, a descriptive cross-sectional was conducted in 30 public health facilities in Montserrado County, Liberia administrative center.

Objective: To assess the rational use of essential medicines in public health facilities in Montserrado County, Liberia.

Methodology: A descriptive cross sectional study was conducted according to the (WHO) guidelines for monitoring and assessing country pharmaceutical situation. The study was conducted from March to June, 2012. About 30 TEMs using the WHO model list of 15 medicines (that is a standard set by WHO /DAP for sampling and study of medicines) and an additional 15 medicines of interest were assessed in the targeted healthcare facilities.

Results: A total of 486 essential medicines were dispensed in 121 prescriptions. An average of 4 medicines per prescription was encountered. About 42 (67%) TEMs were prescribed by generic names. The availability of the TEMs in the hospitals ranged from 43.3% to 96.7% with St.Joseph Catholic Hospital (97%) ranking the first. In the healthcare centers, about 43% of TEMs were readily available with a range of (33% to 43%) while in clinics these ranged from between (13% to 90%). By therapeutic groups, the comparative availability of TEMs showed 93% for analgesics, 90% for antimalarial medicines, 83% for anti-infective agents, 27% for antihelminthics, 37% for vitamins, 43% for antacids, 37% for anti-hypertensive and 87% for other medicines. In this study, the majority 25 (70%) of the dispensers interviewed were nurse aides and minority being Pharmacists (3%). The pharmacists were mainly deployed in the referral hospitals. Of the 144 out-patients interviewed, 91 (63.3%) of them knew how to take medicines as per indications and 121 (84%) were satisfied with the healthcare services they received.

CONCLUSION

There were no problems of medicines availability in the County. Significant variabilities of essential medicines availability, prescription and dispensing patterns of essential medicines were observed. Unequal medicines distribution patterns were observed between health facilities. Healthcare providers demonstrated the lack of basic skills and knowledge in pharmaceutical management. Irrational use of medicines: unnecessary prescription of injectables and use of brand names of medicines were evident.

Rational use of medicines requires that patients receive medications appropriate to their clinical needs, in doses that meet their own individual requirements, for an adequate period of time, and at the lowest cost to them and their community. Irrational use of medicines on the other hand is the overuse, underuse or misuses of medicines which results in wastage of scarce resources and widespread health hazards. Example, the use of too many medicines per patient (polypharmacy), inappropriate use of antimicrobial agents, over-use of injections when oral formulations would be more appropriate; failure to prescribe in accordance with clinical guidelines; inappropriate self-medications; and non-adherence to dosing regimens.¹

In the prescription practice (lawful medical order by health provider of medicines for use by a patient), the use of brand (trade) names of medicines was observed. Skills in dispensing medicines and poor (inadequate) communication with patients are the main shortfalls encountered among health care providers. STGs were only available and used for malaria, TB and AIDS/HIV.

CHAPTER ONE

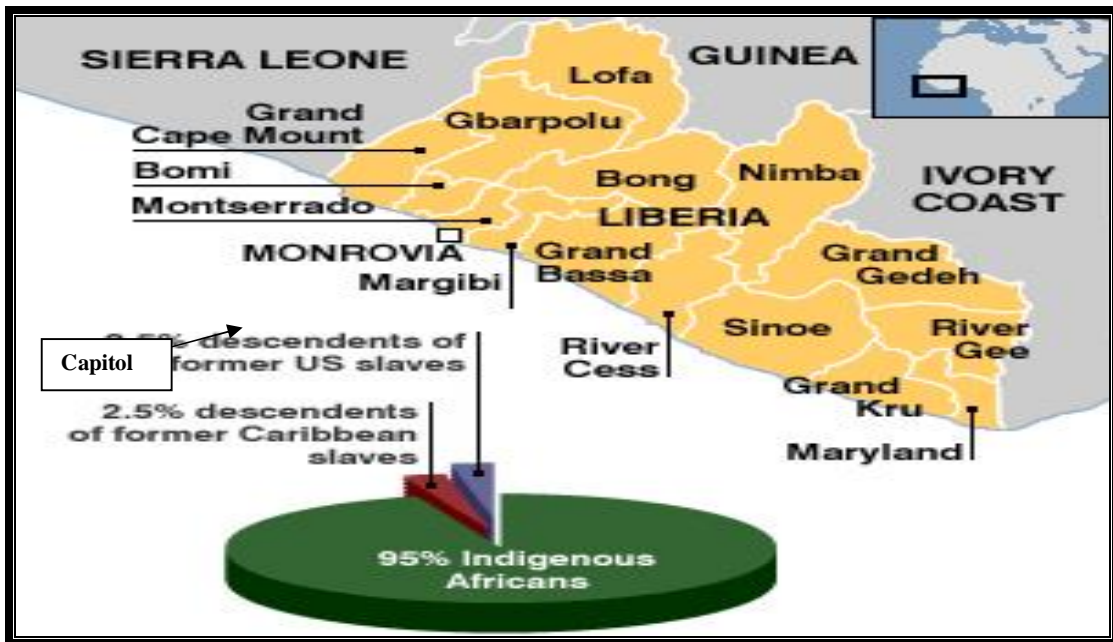
1. INTRODUCTION AND LITERATURE REVIEW

1.1. BACKGROUND INFORMATION

The Republic of Liberia is a small country located West Coast of Africa bordered on the North by Guinea, East by Ivory Coast, West by Sierra Leone and South by the Atlantic Ocean². It was founded in 1847 making it the oldest Republic in Africa. It has a total land area of 111,370km², (43,000sq.miles) and coastline of 579km. It is divided into 15 administrative counties.³ Montserrado County is the largest by population size and the most accessible of the fifteen counties. The County has a total of 279 health facilities consisting 47 public health facilities, 33 none profit private health facilities, 150 profit making private health facilities and 49 “ghost” (nonexistence) health facilities. There are about 550 health facilities in the entire country.

The climate of Liberia is tropical, with significant rainfall during the months of May to October season and harsh Harmattan winds for the remainder of the year. The 2008 Population and Housing Census preliminary results estimated the population of Liberia at 3.88766 million inhabitants.³ According to (2011) World Bank report, Liberia population now stands at 4,128,572. In terms of sex ratio, women account for 51% of the population and men 49%. The country has a very young population (below 18 years) 63.8% aged 15 plus, 16.2% aged 5-14 years and 15.0% aged 0-4 years. The fertility rate is currently 5.2, indicating a substantial reduction since 1986 from 6.2 in 1999-2000 and 6.6 in 1986.²

The figure 1 below shows the map of Liberia.⁴



Source: [WHO-2012]

The situation of medicines use and management in Montserrado County is complicated in that many stakeholders are involved. The system is also infested with insincere and none committed health providers. Many of the health providers lacked basic skill and knowledge in pharmaceutical management. Pharmaceutical management entails the timely availability and appropriate use of safe, effective quality medicines and related products and services in any health care setting. In order to improve the county pharmaceutical management system, health providers must possess the professional competences and be committed to the effective distribution, rational use and management of commodities.

The majority of the health care delivery system of this county and the entire Liberia are privately owned or provided by INGOs. Health care services are provided free of charge in public health facilities and extended to the private health facilities through the malaria, TB and HIV/AIDS programs. Despite the provision of free medicines and services to facilities, effective commodity use and management has always been a problem. This is much more pronounced in the public health facilities as compared to the private health facilities. The public health facilities are adequately funded by government. The quality of care provided is low and staffers are stretched to their limits and suffer from low morale. Medical equipment and health infrastructures are in deteriorating stages. Medicines and medical

devices are often short supply as a result essential medicines and medical supplies are frequently lacking especially in the urban and rural health facilities.⁵

Funding from the central MoHSW to the (NDS) for the procurement and distribution of health commodities is also unpredictable (not regular) and insufficient. The NDS is the central medical store of Liberia responsible for the procurement, storage and distribution of health commodities to facilities. It is often faced with logistical problems for the distribution of health care services, equipment, and medication in a timely manner. The delays in the distribution of commodities contribute to the stock-outs of basic health commodities especially in hard to reach areas of the country. High level of irrational use of medicines also contributes to the stock-out situation and patient harm. Irrational use of medicines implies the overuse, underuse or misuses of medicines which results in wastage of scarce resources and widespread health hazards. Example, the use of too many medicines per patient (polypharmacy), inappropriate use of antimicrobial agents, over-use of injections when oral formulations would be more appropriate; failure to prescribe in accordance with clinical guidelines; inappropriate self-medications; non-adherence to dosing regimens.⁶ In the Liberia public health supply system ,there have always been controversies over effective distribution, rational use, and management of basic health commodities with mechanism in place to investigate the reasons behind all of these problems.

In 2003, Liberia suspended the fee-for-service system and introduced the free service after the war.⁷ Fee-for-service (FFS) is a payment model where services are unbundled and paid for separately. In health care system, FFS gives an incentive for health providers to provide more treatments (including unnecessary ones) because payment is dependent on the quantity of care, rather than quality of care. Similarly, when patients are shielded from paying (cost-sharing) by health insurance coverage, they are incentivized to welcome any medical service that might do some good.⁷ The fee-for-service is believed to have positive impact on the rational use and commodity management because services are paid for and health providers paid justly. In return, the health providers ensure the commodities are properly secured, rationally used and managed. Before 2003, health services were paid for by health care seekers and the problem of commodity mismanagement was not as pronounced as it now. From the inception of the free medical services in Liberia, there have always been problems with commodity use and management. In order to encourage rational use and commodity management in health facilities, there is a need to adequately

compensate health providers, provide the proper working tools and create the enabling working environment with continuous assessment of the system to identify and address issues.

This study was designed to assess the current medicines use situation in Montserrado County in order to identify the bottlenecks and provide appropriate recommendations for interventions in addressing these challenges. The results of the study could help policy makers in making supply chain decisions concerning available, prescribing, dispensing, or patient use and to monitor the quality of care within each health facility. The results are also useful resource material for students and all other wishing to improve the medicines use situation in Liberia.

1.2. Liberia in post-conflict situation

The Republic of Liberia has had a fourteen year 14 year civil war which has devastating effects on the lives of the people and health infrastructures among others.³ The cessation of the war in 2003 led to the conduct of democratic elections in 2005 that brought to power the first female president in Africa.² Though the country is in a state of transition, there are still persistent humanitarian needs to be addressed before real development progress can be attained.² Since 2006, the country has made significant progress in consolidating peace, including the establishment of a Truth and Reconciliation Commission (TRC), the reintegration of over 103,000 ex-combatants and resettlement of over 200,000 Internally Displaced Persons (IDPs) and refugees, the expansion of community-based reintegration and recovery programmes and restructuring of the security sector.²

Despite the progress made, formidable reconstruction and development challenges still remain.² The fourteen years of protracted war, coupled with a long history of economic mismanagement, have taken a serious toll on the country and its economy. When the war finally ended in 2003, the economy had been ruined, with over 80% of the population displaced and traumatized, and the country's infrastructure destroyed.² During the conflict period, the economy, heavily reliant on agricultural produce and natural resource exports, collapsed. The GDP dropped by almost 90% between 1987 and 1995. Per capita GDP in 2006 was US\$ 195, down from US\$ 1,269 in 1980.² The country had a huge external and domestic debt burden of US\$ 3.7 billion as of mid- 2005, representing 80% of GDP and 3000% of export value .⁴ With the inauguration of a democratically-elected government

in 2006, there has been marked progress. The Economic growth for 2007 was estimated at 9%, and domestic and external direct investment has improved. Notwithstanding, the remaining challenges are enormous, and the country will take years to fully recover.²

1.3. The Economy of Liberia

Economically and academically, Liberia was once noted for its academic institutions, iron ore-mining, and rubber. The political upheavals beginning in the 1980s and a 14-year civil war (1989-2003) largely destroyed the economy and brought a steep decline in living standards of Liberian. The economy, which was ravaged by the war, has since 2006 began to recover, with an estimated GDP reaching US\$ 725 million in Fiscal Year 2006/2007. The economy is steadily expanding; with growth rate averaging over 9.5% in 2007.⁸ The growth of the economy is attributed to a number of stringent economic policy reforms introduced by the Government to reverse the downward trend. The economic growth reached an estimated 5.3% in 2005, an estimated 7.8% in 2006, and a further increase to an estimated 9.5% in 2007.⁸

Table 1: LIBERIA-SOCIO-ECONOMIC INDICATORS, 2008 -2009.⁹

| Indicators | 2008 | 2009 |
|--|---------|---------|
| Economic Indicators | | |
| Real GDP growth rate (%) | 7.1 | 4.6 |
| Real GDP est. (US million) | 507.1 | 530.4 |
| Public sector workforce (active duty civil servant 2007) | 47,681 | 34,000 |
| Informal sector employment | 487,000 | 569,790 |
| Imports (US\$ million) | 813.5 | 565.2 |
| Exports(US\$ million) | 242.4 | 148.0 |
| Socio-Demographic Indicators | | |
| Population size (in millions) | 3.48 | 3.48 |
| Population growth rate (%) | 2.1 | 2.1 |
| % of population with access to education | 31.46 | 31.46 |
| Infant mortality rate (per 1000 live births) | 72 | 72 |
| Under five mortality rate | 111 | 111 |
| Maternal mortality rate (per 100,000 live births) | 578 | 578 |
| Proportion of births attended by health | 46 | 46 |

Source: UNDP/08/09

The lifting of the economic embargos on Liberia has spurred an increase in foreign investment. Government revenues, estimated at US\$ 200 million in 2007/2008 are expected to increase. To address the current pervasive poverty situation in the country, the Government, with support from partners, buttressed by an inclusive participatory approach, has developed and launched its Poverty Reduction Strategy (PRS) document covering the period 2008-2011.² Moreover, the introduction of stringent economic reforms has led to the waiver of a sizable portion of the Government's external debt stock, which stood at US\$ 3.5 billion in 2004. Efforts are underway to complete the heavily indebted poor countries (HIPC) debt relief process during the PRS period, thus paving the way for the cancellation of the majority of the country's external debt stock.¹⁰

1.4. Liberia current health profile

The healthcare delivery system of Liberia has been operating in partnership with various concession holders (mining and logging companies), missions, churches and NGOs. Decentralization started in the early 1970s and led to the establishment of county health teams (CHTs) that are now responsible for operational planning, implementation and supervision of health activities and services at the county level. The one and half decades of civil conflict led to massive and severe disruption of social services, including health care. This impacted negatively on the health status of the population, especially women and children. However, the concerted efforts deployed since 2006 have led to a minimum increase in access and coverage of health care services. It is estimated that 41% of Liberians currently have access to health care.⁸

Liberia's health indicators, though improving, remain unsatisfactory. According to the 2007 LDS, childhood mortality has decreased substantially. Infant mortality has declined from 139 per 1000 live births to 71 per 1000 live births; under-five mortality has also declined from 219 to 110 per 1000 live birth, representing 50% reduction of the 1992-1996 infant and under-five mortality rates. Nevertheless, maternal mortality rate in 2007 was 994 deaths per 100,000 live births, representing one of the highest in the world. Life expectancy at birth substantially decreased from 55 years in 1980 to 47.7 years in 2006.⁸

The country's health sector is experiencing a transition from an emergency phase to a development phase. The MoHSW has developed a comprehensive national health policy and a national strategic health plan, as well as a two-year emergency transition plan to

prevent a potential crisis that was evolving as a result of the untimely departure of a number of INGOs that provided the greatest share of health services during the conflict period. The National Strategic Health Plan sets out the priorities of the health sector for the five year period to include; the basic package for health services (BPHS), human resources for health (HRH), Infrastructure, and Support Systems. However, while the BPHS and HRH are core for reviving the sector, cost implications and financing are major challenges for implementing the plan. The implementation of the plan in 2007 was estimated to cost US\$ 283,000,000. Between 2007 and 2008, only 30% of the estimated cost was realized.¹¹

1.5. Health care delivery system and human resources of Liberia

1.5.1. Health care delivery system

The Health care delivery system of Liberia is fragmented and uneven, heavily dependent on donor-funded vertical programs and NGOs.¹² Disease prevention and control programs exist for malaria, leprosy, tuberculosis, STDs, HIV/AIDS, and onchocerciasis. Humanitarian relief agencies concentrated their interventions in the most war-affected areas and where refugees and IDPs were resettling. Many health care providers including CHWs were funded by emergency programs, which have begun to withdraw as the country stabilizes. The gap created by the reduction in funding for emergency assistance, before development aid starts flowing, has the potential to disrupt health care provision, as witnessed in other post-conflict settings.¹¹ Sixty percent of the INGOs that provided the greatest share of health services have either left the country or reduced their operations and the rest have informed the government of their intention to leave. As a result, a number of existing arrangements have been concluded between the MoHSW and NGOs to ensure continuity of services after their departure.

1.5.2. Human Resources for Health

There has been a scarcity of (HRH) in Liberia since the war. The country's overall HRH situation is highly precarious. In terms of distribution, the workforce continues to be skewed towards the urban centers. The country's ratios of physicians, nurses, and midwives are extremely low at 0.03, 0.18 and 0.12 per 1000 people.² The health workforce is plagued by major problems of inadequate skills, uneven geographical distribution, ghost (nonexistence) health facilities and workers, and the scarcity of high-level cadres.¹³ Many training institutions that are critical for the development of human

resources for health are in a declining state, exacerbated by the events of the war. The medium-term HRH plan is yet to be fully implemented. However, the MoHSW is currently exploring a number of options to address the shortage of qualified health personnel in the country. One of these is a bilateral agreement with the Cuban Government intended to contract the services of 50 Cuban medical professionals.¹³ Moreover, the Ministry has suspended payment of tuition fees in all public sector HRH training institutions, and, with support from partners, offered scholarships to specialized clinical and managerial health workers, contracted over 1,000 health workers through incentive payment, transferred over 300 workers on government contract (despite the freeze on employment), and was expected to recruit, train, and deploy over 2,000 community health volunteers.¹³

In 2009, a national HRH census recorded 8,553 health and social welfare workers. Of those who reported their cadres, 62% (5,346) were clinical and 38% (3,207) were non-clinical (including security guards, registrars and cleaners).¹³ However, only 48 % (2,568) of the clinical workers were skilled providers (e.g. physicians, pharmacists, physician assistants, nurses, midwives, lab technicians) and almost 70% of the total workforce was either non-clinical or unskilled. Progress has been made in expanding the number and quality of pre-service training institutions in order to increase their capacity to produce more skilled workers. While male HWs are in the majority in most clinical cadres, female HWs outweigh male HWs in certain cadres. The proportion of male x-ray technicians (95.5%), physician assistants (84.6%), physicians (84.4%), lab technicians/assistants (84.3%), and pharmacists (78.3%) far outweighs the proportion of female. On the other hand, the majority of certified midwives (98.3%) and nurses (57.4%) are females.¹³

Table 2: The Analytical summary of Liberia Human Resource Census, 2009.¹³

| County | MDs | PA | Nurses | CMs | Pharmacists | Lab Tech | Other HWs | Total |
|-------------|-----|----|--------|-----|-------------|----------|-----------|-------|
| Bomi | 1 | 7 | 53 | 23 | 2 | 12 | 209 | 307 |
| Bong | 5 | 10 | 124 | 43 | 5 | 22 | 408 | 617 |
| Gbarpolu | 1 | 4 | 27 | 10 | 1 | 6 | 117 | 166 |
| Grand Bassa | 5 | 10 | 89 | 18 | 2 | 18 | 309 | 451 |
| G. Cape Mt | 1 | 9 | 49 | 14 | 2 | 8 | 206 | 289 |
| G. Gedeh | 2 | 10 | 40 | 9 | 2 | 13 | 209 | 285 |

| County | MDs | PA | Nurses | CMs | Pharmacists | Lab Tech | Other HWs | Total |
|--------------|-----|-----|--------|-----|-------------|----------|-----------|-------|
| Grand Kru | 1 | 4 | 12 | 7 | 0 | 7 | 193 | 224 |
| Lofa | 9 | 20 | 120 | 37 | 5 | 33 | 633 | 857 |
| Margibi | 4 | 11 | 90 | 36 | 3 | 31 | 336 | 511 |
| Maryland | 6 | 17 | 48 | 11 | 0 | 10 | 270 | 362 |
| Montserrado | 48 | 126 | 512 | 153 | 20 | 125 | 1864 | 2848 |
| Nimba | 5 | 33 | 121 | 26 | 2 | 65 | 589 | 841 |
| Rivercess | 1 | 8 | 39 | 8 | 0 | 2 | 148 | 206 |
| River Gee | 0 | 11 | 26 | 9 | 0 | 8 | 144 | 198 |
| Sinoe | 1 | 6 | 43 | 8 | 2 | 16 | 315 | 391 |
| Total | 90 | 286 | 1,393 | 412 | 46 | 376 | 5,950 | 8,553 |

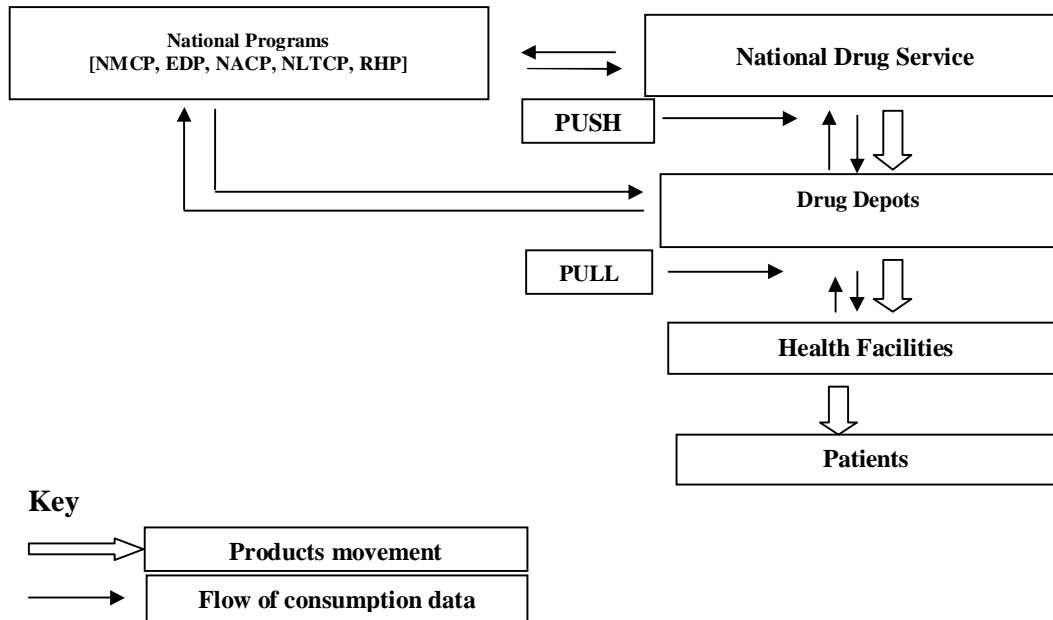
Source: MoHSW/Liberia HR Census-2009

MD = Medical Doctors, PA = Physician Assistant, CM = Certified midwife, Lab tech=Laboratory Technician, HW = Health workers

1.6. The National Health Programs of Liberia

The revised NHP of Liberia has again adopted decentralization as a core strategy, and is currently being used to strengthen the various support systems. County Health Teams have been reactivated in the fifteen Counties.² Under the revised policy, the Liberia MoHSW currently runs seven national healthcare programs. Each of these programs previously conducted its own forecasting, quantification, procurement, and determined distribution plans, including resupply quantities for healthcare commodities to the health facilities, closely monitored the program supply chain and took the necessary actions to avoid supply chain shocks. Additionally, the programs provided supportive supervisions to healthcare facilities and health workers throughout the system. But with the development of the public health supply chain master plan, the programs are now restricted to policy development and forecasting of program specific commodity needs.¹⁴

Figure 2: Liberia commodity movement pipeline.¹⁴



Source: JSI/DELIVER PROJECT-LIBERIA

1.6.1. Health Facilities

In 1990, there were 30 Hospitals, 50 Health Centers and 330 Clinics functional. In 2006, 18 hospitals, 50 health centers and close to 286 health clinics were considered to be functional. Many of these facilities struggled to attain acceptable performance levels, and are in need of robust infrastructural interventions to become truly functional. Presently, there are 550 health facilities throughout the country. Of this total amount, 279 health facilities are in Montserrado County. The hospital component of the health sector is under-sized with its technical capacity grossly inadequate. Large investments are already under way to restore the functionality of some of the hospitals.¹⁵

1.7. The Pharmaceutical sector of Liberia

Pharmaceuticals are mostly synthetic products made from chemicals meant to improve health and well-being of patients by helping to prevent and treat diseases, reduce pain and suffering, and extend and save lives. Pharmaceutical products (medicines or drugs) – are a fundamental component of both modern and traditional medicine. The framework to manage and coordinate the pharmaceutical sector of Liberia is contained in the 2001 NHP and NMP.¹⁵ The framework provides the conceptual basis for a systematic approach to

assessment, comparison, planning, implementation, monitoring, management, and research in complex situations. The overall goal for the pharmaceutical subsector of Liberia is to use the available resources to develop pharmaceutical services to meet Liberia's requirements in the prevention, diagnosis, and treatment of diseases by increasing access to efficacious, high-quality, safe, and affordable essential medicines for the people.¹⁵ However, much remains to be done in terms of medicines regulation, registration, quality control, capacity building, training, prescribing, dispensing, and rational use. Since pharmaceutical products are important and resources so limited, it is essential that these products are safe, effective, and of good quality, and are carefully managed and used to minimize costs and patient harm.

1.7.1. The Public Pharmaceutical Sector of Liberia

The public pharmaceutical sector of Liberia is comprised of the Pharmacy Division, the Supply Chain Management Unit (SCMU), the Pharmacy Board of Liberia (PBL), the Liberian Medicines and Health Regulatory Authority (LMHRA) and the National Drug Service (NDS).¹⁵ This subsector is regulated by a board, the PBL, which has the oversight of most pharmaceutical parameters including registration of personnel, and retail medicine shops. The Pharmacy Division within the MoHSW is responsible for harmonizing policy, placement and supervision of pharmacists on duties and coordinating the overall pharmaceutical sector. It also functions as the essential medicines program.¹⁵ The SCMU, a newly established unit in the MoHSW which is now considered a component of the pharmacy division, is charged with the responsibility of spearheading the full implementation of the ten year Liberian public health supply chain master plan. The SCMU responsibilities include increasing the visibility of data up and down the system through SOPs, facilitating greater coordination between stakeholders and ensuring alignment of demands with supply via data-based quantifications, the development of unified procurement plans, LMIS and monitoring and coordinating the movement of commodities including the performance of the NDS.¹⁵

1.7.2. Pharmaceutical Regulatory System ¹⁶

The medicines regulatory authorities (MRAs) are responsible for the regulation and control of medical products such as medicines, vaccines, blood products and medical devices in a country. The MRAs ensure the commitment to implementing and enforcing pharmaceutical laws.

The MRAs contribute to promoting and protecting public health by ensuring that:

- ✓ medicines are of the required quality, safety and efficacy;
- ✓ health professionals and patients have the necessary information to enable them to use medicines rationally;
- ✓ medicines are appropriately manufactured, registered, stored, distributed and dispensed, illegal manufacturing and trade are detected and adequately sanctioned,
- ✓ promotion and advertising is fair, balanced and aimed at rational drug use,
- ✓ access to medicines is not hindered by unjustified regulatory work.

The LMHRA, which was established in September 2010, is charged with the responsibility of ensuring the quality of medicines and health products on the Liberian market including the registration of products and monitoring wholesale shops.¹⁷

1.7.3. The private pharmaceutical sector of Liberia

The private pharmaceutical sector is made up of registered retail and wholesale pharmacies including medicine shops.¹⁴ This sector supplies medicines and medical devices to a significant number of the population, particularly in towns and cities at a cost. The majority of the pharmaceutical outlets of Liberia are located in Montserrado County.¹⁴ However, in remote parts of the country and in more deprived parts of the cities; such services are provided by medicine shops. Medicine shops are registered to provide a narrow range of products than pharmacies. Even though illicit, medicine peddlers (black baggers) operate in the open market by supplying medicines to clients at a fee. Because of the inadequacy of the registration system, counterfeit and substandard medicines and related products are widely available and illegal sales of all types of medicines take place in the street by the medicine peddlers.¹⁸ The quality of medicines to clients dispersed from the open market by medicines peddlers has always been subject of discussions.

1.7.4. Essential medicines Program

National Medicines Program (NMP) is a guide to action for the pharmaceutical sector. The existence of an NMP indicates commitment to improving pharmaceutical management in public and private sectors.¹⁶ Essential medicines are those that satisfy the priority health care needs of the population. These medicines are selected with due regard to public health relevance, evidence on efficacy and safety, and comparative cost-effectiveness. Essential medicines are intended to be available within the context of functioning health systems at all times in adequate amounts, in the appropriate dosage forms, with assured quality and adequate information, and at a price the individual and the community can afford.¹⁹

In Liberia, the registration of medicines for both the public and private sectors is haphazard and un-coordinated.² Essential medicine procurement is mainly paid for by government and INGOs pooled funds. In a pooled procurement system, purchasers join together to benefit from better pricing by increasing their bargaining position in negotiations with suppliers. In the private sector of Liberia, pharmaceutical dealers also freely import, distribute and sell medicines in shops in the open market. The procured medicines for government and international partners are freely stored and distributed to the various counties by the NDS.²⁰

A (NEML) exists for all diseases and STGs for few diseases. It covers commodities ranging from malaria and asthma medicines to family planning products and diarrhea treatments. Often, countries develop EMLs for different levels of care in the health system, based on disease patterns commonly treated at each level. STGs are suggested treatment protocols for the most optimal treatment of a specific clinical problem, in a given setting, based on consensus by experts. The treatments for specific clinical problems are selected based on common diseases in the area; they can vary based on the level of the treatment facility. Products chosen to be available at a particular facility, or level of facilities, should be based on STGs.

Adhering to STGs for prescribing has significant supply chain management benefits. If health practitioners adhere to suggested treatment protocols, a smaller range of products need to be available at each facility; and fewer stock keeping units (SKUs) are easier to manage. The STGs are developed based on the most effective and cost-effective treatment. If treatment providers prescribe the same product for the same condition, product demand

is more predictable, facilitating more accurate forecasts. Clear, well-defined STGs are, in fact, a prerequisite for conducting morbidity-based forecasts; they form the basis for the assumptions around forecasting. However, if clinicians do not follow the STGs, large stock-outs and/or expiries of unused medicines could result.

At the time of this study, it was noticed that these documents were not available for all disease conditions and the few available copies have not been updated for many years. Steps were taken in 2007 to revise the NEML.²

1.8. Liberia health sector financing

According to (MSH 2012), because pharmaceuticals save lives and improve health, financing systems must help ensure access to essential medicines for all segments of the population. Most countries rely on a diverse set of financing mechanisms for pharmaceuticals. Sources of funding may include public financing based on national budgets, donor contributions, and direct private spending or indirect spending through insurance programs.

From 1993 to 2003, the Liberian government expenditure on health declined steadily, averaging as low as 4% of the total national budget.² In 2003, the health budget was 8% of the interim budget of US\$ 10 m, with actual cash received by the MoHSW amounting to LD\$ 260,000. Per capita public expenditure on health dropped to an all time low of US\$ 3.65 or LD\$ 146. Ninety percent of all funding for the health sector during this period came from donors and UN agencies, and these funds were mainly channeled through INGOs. The funds were mainly devoted to addressing the prevailing acute humanitarian situation.²

Since 2006, financing of health services by Government has steadily improved. In 2006/2007, government spending on health care was estimated at US\$ 10.1 million, constituting 16.8% of the total health care expenditure, and 9% of the national budget. The fiscal budget (2008/2009) was estimated at US\$ 15.3 million, constituting 9% of the national budget of US\$ 276 million. To date, per capita public expenditure on health has gradually improved to US\$ 4.4, as compared to US\$ 1.3 during the war years.² The current total annual health care expenditure is estimated at about US\$12 per head, but could be higher if private spending is included. The state budget contribution to health is increasing.²² Most facilities supported by NGOs are providing services free of charge. Faith-based

organizations usually raise user fees. Other facilities charge for services, often on an informal basis. No global estimate of private health expenditure is available.

For Liberia, there are manifold reasons the majority of the population lack access to quality essential medicines. Some of these include the high prices of medicines with questionable quality sold in the private pharmacies. About 49 % of the Liberian population does not have access to quality essential medicines regularly.²² About 51% of the population has access to essential medicines through the government essential medicines program. Of those who have access to medicines, about 46% of them receive through the private sector.²² In some private health facilities rendering the BPHS, essential medicines for malaria, TB, contraceptives, and HIV/AIDs are provided free of charge. The BPHS is the cornerstone of Liberia's healthcare delivery strategy. It includes preventive and curative care services.²²

In Montserrado County, most of the public health facilities are centrally located in Monrovia, and only few are located outside of the city. This means in order to get quality care, many of those living in places where there are no healthcares facilities must travel to Monrovia. There are reasons of lack access to quality essential medicines in this county and the entire country can be attributed to the geographical isolation, misuse of medicines, none availability and high prices of medicines that are of questionable quality. Access to quality pharmaceutical products and services involves physical access to quality products and services that are provided. The medicines supply system is in its infancy of development. A medicine supply system is a system of selection, distribution, acquisition, rational use and management of medicines.

The bottlenecks in Liberia pharmaceutical system include

- ✓ Poor infrastructures and medicines supply systems;
- ✓ Substandard and counterfeit medicines & Waste / expired medicines and devices;
- ✓ Inefficiencies in managing logistics and low availability of essential medicines;
- ✓ Poverty, geographical isolation, poor education and lack of human resource.

1.9. Rational use of Medicines

Rational use of medicines requires that patients receive medications appropriate to their clinical needs, in doses that meet their own individual requirements, for an adequate period of time, and at the lowest cost to them and their community.²⁴ In order to facilitate rational use of medicines, sound prescribing guidelines and good dispensing practices should be provided to health providers. This requires ensuring the safety and timely availability of medicines and other commodities with strengthened and sustained funding.²⁴

In biomedical context, the following are criteria for rational use of medicines.²⁵

- ✓ Correct medicines and appropriate indications:- prescribing based on sound medical considerations;
- ✓ Appropriate medicines: be of the required quality, and efficacy at the time of uses;
- ✓ Appropriate dosage: administration of right quantities and duration of treatment;
- ✓ Appropriate patient:- no contraindications exist and adverse medicine reactions is minimal;
- ✓ Correct dispensing:- appropriate information to patient, patient adherence to the treatment; and adequate follow up.

1.10. Liberia health care challenges

While some level of progress has been attained in the health sector of Liberia, the country's health challenges still remain immense. Main causes of morbidity are malaria, Tuberculosis, ARI, Diarrhea, Vaccine-Preventable Diseases and malnutrition.²⁰ Contrary to improvement in the economy, the healthcare system of Liberia still remains underfunded, and medical facilities poorly maintained, irrational use of medicines high with many of the medical professionals needing updated training. The rural areas are facing worse of the healthcare conditions. Though things have improved since the election of President Ellen Johnson Sirleaf as president of Liberia, the war's legacy and its effects on health infrastructures is still evident in the capital, Monrovia, and across the nation.²⁶

Table 3: Issues that surround medicine use in developing countries.²⁷

| Level | Effects of IMU | Examples of IMU | Causes of *IMU | Strategies for Improvement | Challenges |
|---------------------------|--|--|--|--|---|
| National Level | Poor health indices | Substandard medicines | Budgetary constraints, weak laws & regulations, poor infrastructures | NMP & A | Budgetary constraints, poor infrastructures |
| Health System Level | Loss of confidence & wastage of resources | Medicine shortages, expired drugs, Lack of MIS | Unreliable supplies, bad Procurement practices, poor infrastructures | Medicine Committees Essential Medicines list | Lack of trained manpower, Budgetary constraints |
| Prescriber Level | Medicine wastage, & resistance | Polypharmacy, wrong medicines, over prescribing | Lack of knowledge, patient over load | Training, S.T.G | Lack of training |
| Dispenser Level | Medicine wastage, & resistance | Inadequate patient counseling | Lack of Knowledge, Patient overload | Training | Lack of training |
| Patient & Community Level | Medicine resistance, dependence, high costs of TX, Death | High cost of medicines, sharing of medicines, self medication, | Poverty, illiteracy, culture, self medication | Community outreach, Advertising, posters, Leaflets | Illiteracy, traditional medicines, Poverty |

*** IMU = Irrational use of medicines, Source ICCIUM**

The rational use of medicines is fundamental to the provision of universal access to adequate health care, satisfaction of health related human rights and the attainment of health-related MDGs.²⁸ It is therefore, incumbent upon all health providers, stakeholders and policy makers to take crucial measures for improving rational use of medicines. Two of the MDGs focus on significant reduction of the high level of child mortality. Goal 4 aims to reduce by two third, between 1990 and 2015, the mortality rate among children less than five and Goal 6 aims to halt and reverse the spread of HIV/AIDs and malaria incidences.²⁸ However, recent data suggest that few countries are on track for adults. The interventions entail the use of ‘essential medicines’ as the priority health-care needs of the population.²⁹ For Liberia, the lingering effects of the prolonged civil crises, lack of transparency, accountability and honesty in managing material and human resource allocations have diminished the hopes for positive outcomes by 2015.²⁶ But all are not

lost. With strong political commitment, scaled-up support and investments in capacity building, resource mobilization, and focus on 'quick wins' at the community level, Liberia can make good progress towards achieving the MDGs even if it does not achieve all the goals.²⁶

1.10.1. Irrational use of medicines in Montserrado County

The irrational use of medicines entails inappropriate use of medicines in its totality. It is characterized by polypharmacy (when more than one medicine is used unnecessarily), with the use of wrong or ineffective medicines or use of medicines of doubtful origin. The irrational use of medicines affects the more vulnerable people and occurs for extended durations. It also stimulates inappropriate patient demand, and leads to reduced access. It can have dire consequences such as hospitalization, disability and deaths. These actions negatively affect the quality of medicine therapy, raise health care cost, and may cause adverse reactions or negative psychosocial effects. Prescribers' lack of knowledge and experience is only one factor in irrational medicine use. Other underlying factors can affect the dispensing process, patient or community decisions and use, and the health system itself.

Strategies to improve rational use of medicines.³⁵

(I) Educational:

(a). Training of prescribers

- ✓ Formal education (preservice) & Continuing medical education
- ✓ Supervisory visits & Group lectures, seminars and workshops

(b). Printed materials

- ✓ Clinical literature and newsletters
- ✓ Treatment guidelines and formularies
- ✓ Illustrated materials (flyers, leaflets)

(c). Approaches based on face-to-face contact:

- ✓ Educational outreach & Patient education
- ✓ Influencing opinion leaders

(II). Managerial strategies**(a).Monitoring, supervising and feedback:**

- ✓ Hospital DTC & County Health Teams
- ✓ Government Inspectorate & Professional Organizations
- ✓ Self-assessment

(b). Selection, procurement and distribution

- ✓ Limited procurement lists & Medicine use review and feedback
- ✓ Hospital & Regulatory medicine committees & Cost information

(c). Prescribing and dispensing approaches:

- ✓ Structured medicine order forms
- ✓ Standard diagnostic and treatment guidelines & Course-of-therapy packaging

(III).Economical strategies

- ✓ Price setting & Capitation-based budgeting
- ✓ Reimbursement and user fees & Insurance

(IV).Regulatory strategies

- ✓ Medicines registration & Limited medicine lists
- ✓ Prescribing restrictions & Dispensing restriction

When implementing a medicine use intervention strategy, the logical steps are to-

- ✓ Identify the problem and understand the underlying causes
- ✓ Assess available resources and Choose an intervention
- ✓ Monitor and restructure the activity as necessary

In Montserrado County, the irrational use of medicines is a serious public health problem. In many of the health facilities, medicines are prescribed based on trade names. The high use of injections, anti-infective agents and analgesics in addition to poor storage and management is common. Rational use of essential has never been documented in Liberia. Many studies documented on the medicine use patterns indicate that multiple prescribing, misuse of medicines, use of unnecessary expensive medicines; antibiotics and injections are the most common problems of irrational use of medicines.²⁸ However, medicine shortages continue to undermine the performance of health systems throughout the developing world.³⁰ The commitment to ensuring the appropriate use of medicines is generally described in a national medicines policy.

Correcting irrational use of medicines

The first step to correcting irrational use of medicines is to measure its magnitude. The system must be assessed as part of measuring the magnitude of the problem. Prescribing, dispensing and patient use of medicines must be regularly monitored in terms of:

- ✓ The types of irrational use of medicines in order to design change strategies.
- ✓ The amount of irrational use, in order establish the magnitude of the problem and monitor strategies impact;
- ✓ The reasons medicines are used irrationally, in order to chose appropriate, effective and feasible strategies.

There are many reasons medicines for the irrational use of medicines. These include lack of knowledge, skills or independent information, poverty, unrestricted availability of medicines, overwork of health personnel, inappropriate promotion of medicines and profit motives from selling medicines. Although many promising and successful interventions were presented at ICIUM 2004, the global progress seems to be confined primarily to demonstration projects.³¹

Three major recommendations were made at the ICIUM conference:

I. Countries should implement national medicine programmes to improve medicines use and the programmes should:

- ✓ cover all levels of health care in public and private sectors;
- ✓ be based on local evidence from inbuilt monitoring system;
- ✓ separate prescribing and dispensing functions (since there is evidence that prescribers who dispense tend to prescribe more medicines and more expensive medicines than those prescribers who do not sell medicines);
- ✓ extend broad-based insurance coverage (since insurance systems have a strong incentive to monitor use of medicines and curtail unnecessary overuse);
- ✓ measure drug prices which influence access to medicines;
- ✓ avoid flat patient visit fees which encourage polypharmacy;
- ✓ Encourage generic prescribing and dispensing policies provided there are drug quality assurance programmes.

II. Successful interventions should be scaled up and impact regularly monitored e.g.

- ✓ An effective use of multi-faceted coordinated interventions.
- ✓ Implementation of structured quality- improvement processes possibly through Medicines and Therapeutic Committees.

III. Interventions should address community medicines use by:

- ✓ improving patient adherence as an integral part of global treatment programmes;
- ✓ encouraging school programmes that teach about how to use medicines;
- ✓ Regulating pharmaceutical promotion; evaluating medicines use in chronic diseases and how to promote more cost effective long-term use.

1.11. Coordinating Medicines Use Policies

There are many societal and health system factors, as well as professionals that contribute to how medicines are used. However, a multi-disciplinary approach is needed to develop, implement and evaluate interventions to promote more rational use of medicines. A MRA is the agency that develops and implements most of the legislations and regulations on pharmaceuticals. This means the rational use of medicines requires coordination with other stakeholders in more activities than those normally covered by MRAs. Thus a national body is needed to coordinate policy and strategies at national level, in both the public and private sectors. The form this body takes may vary with the country, but in all cases it should involve MoHSW, health professions, academia, MRA, pharmaceutical industry, consumer groups and non-governmental organizations involved in health care. The impact on medicines use is better if many interventions are implemented together in a coordinated way.

(a) Clinical guidelines

Clinical guidelines (STGs, prescribing policies) consist of systematically developed statements to help prescribers make decisions about appropriate course of treatments for specific clinical conditions. There are two reasons clinical guidelines are critical to promoting rational use of medicines.

- (1). they provide a benchmark of satisfactory diagnosis and treatment against which a comparison of actual treatments can be made.
- (2). they are a proven way to promote more rational use of medicines provided they are:

- ✓ developed in a participatory way involving end-users; easy to read;
- ✓ introduced with an official launch, training and wide dissemination;
- ✓ reinforced by prescription audit and feedback.

(b) Essential Medicines List based on treatments of choice

Essential medicines are those that satisfy the priority health care needs of the population. The use of an (NEML) makes medicines management easier in all respects. The procurement, storage and distribution are easier to do with fewer items. This makes and prescribing and dispensing are easier for professionals are acquainted fewer items.

(c) Medicines and therapeutics committees in districts and hospitals

A (MTC) is a committee designated to ensure the safe and effective use of medicines in facilities or areas under its jurisdiction. Governments should encourage health facilities to have MTCs by making it an accreditation requirement to various professional societies. The MTC members should represent the administration and all the major specialties in any given facility and be independent and declare any conflict of interest. A senior doctor would usually be the chairperson and chief pharmacist, the secretary. Their activities must be broader to include developing or adapting clinical guidelines, medicines selection, monitoring medicines use and taking corrective action, staff education, controlling medicines promotional activities.¹

Unfortunately many MTCs are procurement committees. Their activities should however be much broader and should include developing or adapting clinical guidelines, medicines selection, monitoring medicines use and taking corrective action, staff education, controlling medicines promotional activities by pharmaceutical industry within the premises of the health facility and monitoring adverse medicines reactions.³²

1.12. Continuing Medical Education

The quality of basic training in pharmacotherapy for undergraduate medical and paramedical students can significantly influence future prescribing, management and use of medicines. Rational pharmacotherapy training, linked to clinical guidelines and essential medicines lists, can help to establish good prescribing habits. CME is a requirement for licensure of health professionals in many industrialized countries. In many developing countries opportunities for CME is limited. In these countries, no incentives are offered for

CME since it is not required for continued licensure. CME is likely to be more effective if it is problem based, targeted, involves professional societies, universities and the ministry of health, and is face-to-face.³³

1.13. Supervision, audit and feedback

Supervision is the action, process, or occupation of supervising especially: a critical watching and directing (as of activities or a course of action). It is essential to ensure good quality of care. A Supervision that is supportive, educational and face-to-face will be more effective and better accepted by prescribers than simple inspection and punishment. Effective forms of supervision include prescription audit and feedback, peer review and group processes such as self-monitoring.

1.14. Independent information on medicines Use

The management of a patient's illness is a tripartite engagement involving the patient, the healthcare provider and the health care facility. Usually the physician makes a diagnosis of the condition and then prescribes the treatment, which may be medication. Moreover, there should be adequate follow-ups information accompanying explanation from the physician to the patient on how to administer prescribed medicines. The problem with irrational use of medicines in Montserrat County can also be attributed to lack of information and the high rate of self medication.

(a) Self-medication

Self medication is deciding by oneself on which medicines one needs. The forces that drive one to use medicines include real or perceived ill health, ignorance, and addiction or dependence on certain medications.³⁴

Self medication may also be facilitated by certain situations including:

- ✓ Poor access to desirable health care because of high costs, long distance and discriminatory policies;
- ✓ Poor regulation and/or implementation of regulations on prescription medicines and pharmacy practices (with profit motives overriding the professional requirements);
- ✓ Overzealous advertisements of medicines, that make claims of efficacy and scope of use but conceal adverse effects;
- ✓ Poorly informed public on matters of health and self-care;

- ✓ High burden of diseases, many of them with overlapping symptoms;
- ✓ Poverty which puts consultations out of reach for people who cannot afford to pay for professional health care services.

1.15. Health delivery system of Montserrado County

The supply system of Montserrado County is characterized by continuous out cry of inadequate and stock-outs quantities of health commodity in health facilities. Many of the health care providers rendering services lacked the basic skills and knowledge in commodity management.²³ The situation is complicated by government being incapacitated for providing and sustaining funding to the NDS for continuous procurement and supply of medicines to address the county needs. The funding for the procurement and storage of healthcare commodities are erratic (funds not disburse timely) and insufficient.¹⁶

1.15.1. Medicines dispensing practices in Montserrado County

The practice of good medicine dispensing in Montserrado County is grossly inadequate. Dispensing is considered secondary importance to diagnosis, procurement, inventory, management and distribution. Good dispensing practices entail the effective form of the correct medicine is delivered to the right patient , in the correct dosage and quality with clear instructions, and in a package that maintains the potency (effectiveness to cure disease) of the medicine. Dispensing includes all the activities that occur between the time the prescription is presented and the time the medicine or other prescribed items are issued to patients.³⁵

A superficial look at dispensing suggests that it is process of supplying goods to a patient on the basis of a written order, and that it can be done by anyone who can read the prescription, count, and pour. As a result, dispensing is often delegated to any staff member who has nothing else to do, who then performs this function without any training or supervision. This is irrational and dangerous. One major difference between supplying medicines or medical supplies as compared to other commodities is that the recipient / patients who receive medicines usually does not know the correct use and is unable to judge the quality of the product he or she receives.³⁵

The Dispensing quality may be affected by the training and supervision the dispenser has received and the availability of medicine information to the dispenser. A shortage of dispensing time caused by a heavy patient load may also have an adverse impact on dispensing. As with prescribers, dispensers, especially the private medicine sellers, may have a financial incentive to dispense irrationally. Finally, the low status of dispensers affects the quality of dispensing.³⁵ The contribution of dispensers to the delivery of health services is not emphasized during the development of health policy. This oversight is very unfortunate because the practice of dispensing is very crucial and integral part of the health sector. Poor and uncontrolled dispensing practices can have a detrimental impact on the healthcare delivery system and leads to waste of scarce resources and patient harm.³⁶ In order to facilitate RUM in Montserrado County, sound prescribing practices, use of updated STGs and EML, appropriate training in prescribing and good dispensing practices should be provided to health care providers.

Factors that influence dispenser behavior.³⁵

- ✓ Training and knowledge, professional compensation (salaries, prestige);
- ✓ Economic incentives and lack of supply (cannot dispense what is not in stock);
- ✓ Availability of dispensing equipment (counting trays, vials, bottles, syringes, labels, and so on);
- ✓ Social status of a dispenser and his or her role in the health care system
- ✓ Dispenser-prescriber relationship and lack of communication skill.

2. STATEMENT OF PROBLEM

The irrational use of medicines in Liberia is a widespread problem and worrying as resources are generally scarce and put consumers at risk. The situation is more pronounced in Montserrado County that has the highest proportion of health workers. The concept of rational medicines can help improve the situation if health providers are encouraged to follow its necessary principles of the RUM concept. However, it is difficult to implement these principles because staffs are overloaded with patients in public health facilities and from many different disciplines are involved.¹

The supply system of Montserrado County is inadequate with the issues of ineffective use and management of medicines at all levels. Examples: stock-outs of some basic health commodities, the presence of expired or none required medicines, and erratic (irregular)

medicines financing from central government just to name few. The lack of professionally trained healthcare providers is also posing serious problem.³⁷ Liberian health providers are underpaid, leading many to travel abroad for employment opportunities.³⁷ Procured medicines are inadequately supplied and managed. Many of the facilities lacked functional dispensaries. Functional dispensaries are dispensaries suitably designed with appropriate dispensary tools for the preparation and distribution of medicines to patients.³⁵ Health facility dispensaries are poorly maintained by inadequate skilled dispensers. Prescribers of medicines do not often consult the STGs and EML when prescribing. The rational use of medicines is fundamental to the provision of universal access. This is a key component to the Millennium Development Goals (MDGs). As such, it is crucial that measures be taken to improve the rational use of medicines.²⁴

For the private pharmaceutical sector, the quality of available medicines and services is directly proportional to the prices, counterfeits and lack of trained professionals. However, a majority of the population cannot afford high price quality medicines. Besides, the availability of quality medicines in health facilities in the private sector of Liberia is often questionable because most of the medicines are counterfeited.

The purpose of this study is assess the magnitude of irrationality of medicines use behaviors in Montserrado County and provides recommendations for corrective measures to the MoHSW-Liberia that could be use in promoting the concept of rational use of medicines. However, there is need for further research in the areas of the medicine availability, affordability and use including quality in the private sector health facilities.

3. STUDY RATIONALE

Governments in most developing countries spend between 20% - 50% of their national budget on medicines and sundries, thus making the economic impact of pharmaceuticals on those economies substantial.²⁴ Pharmaceutical products are the largest public expenditure on health after personnel costs and the largest household health expenditure in most developing countries.²⁴ Assessing and monitoring of pharmaceutical sector are important ways to determine if pharmaceutical objectives are being met or implemented.

The public pharmaceutical system in Liberia is complex because it involves many stakeholders and government programs. Presently the government is implementing a ‘Free Medicines Program and Community Outreach program’, in order to increase medicines

access to majority of the population. But these activities need to be scale-up, improved and supported by all. There were allegations of rampant mismanagement and irrational use of medicines at all levels. The inaccurate prescribing decisions, inappropriate treatment, and irrational use of medicines were major concerns among the health care service providers in the County and policy makers. These problems add to the already large expenditure on pharmaceuticals. However, this can be addressed by instituting the appropriate mechanisms for effective pharmaceutical management at all levels of the system. The effectiveness of the measures to alleviate the problems can only be recognized after a full and comprehensive assessment of the magnitude of the essential medicines usage problem.

For Montserrado County, a systematic method to assess and monitor the impact of essential medicines use will provide useful clue for addressing the situation. This study was meant to assess the category of health care providers rendering health services, their educational levels, prescribing and dispensing practices and whether these health providers (prescribers) adhere to the use of STGs and EML in their prescribing practices and whether they counsel patients adequately.

4. EXPECTED OUTCOMES

- a. The study will serve as snapshot of the medicine use situation in Montserrado County which could be a mirror image of the entire country;
- b. Initial resource material for encouraging the strengthening the rational medicines use concept through education of health providers and consumers;
- c. Recommendation to the MoHSW-Liberia to strengthen the frame work for promoting the rational use of medicines nationwide.
- d. The study will enlighten health providers, stakeholders of health on what is rational use of medicines, the consequences of irrational use of medicines;
- e. Recommendation for improving access, prescription and dispensing practices and management of essential medicines in health facilities.

5. Study Questions

1. Are essential medicines used rationally in the public facilities?
2. Are there stock- outs of essential medicines in public health facilities?
3. Are essential medicines always available in health facilities?
4. Do public health facilities have copies of STGs, and NEML?

5. Are LMIS, STGs and NEML used in the public health facilities?
6. Are pharmacists presence in all health facilities according to the law?

6. Objectives

6.1. Broad objective

To assess the rational use of essential medicines in health facilities in Montserrado County, Liberia.

6.2. Specific objectives

1. Assess the availability of thirty tracer essential medicines in health facilities;
2. Assess prescribing practice of essential medicines among health providers in Montserrado County
3. Assess dispensing practice of essential medicines among health providers in Montserrado County health facilities;
4. Assess the availability and use NEML and STG in health facilities during health services delivery.

CHAPTER TWO

7. STUDY METHODOLOGY

The study utilized some components of the qualitative research methods employed in social science such as in-depth interviews, structured, observational, exit questionnaires and interviews, and structured questionnaires. Dispensing and prescribing practices for health providers were assessed to determine whether the practices were standardized. The assessment took into consideration existence and use of STGs, and EMLs by health providers.

The study questionnaires were based on the WHO indicators regarding patient, facility and prescribing patterns relevant to RUM and WHO guidelines for monitoring and assessing pharmaceutical situation in developing countries.²⁵ The average number tracer essential medicines prescribed, percentage of medicines per prescription, and the percent availability of essential medicines in health facilities were assessed. Prospective data on the prescription of generic and trade names of medicines, out-patient exit interviews and the educational level of health providers involved with medicines use and management were collected.

7.1. Study Design

This was a descriptive cross-sectional study aimed to assess the rational use of medicines targeting health providers (prescribers, and dispensers), and out-patients. The assessment of the availability of 30 TEMs, STGs and NEML for promoting rational use of essential medicines in public health facilities in Montserrado County was done. The study captured the categories and qualification health providers working in the health facilities.

7.2. Study Setting

This study was conducted in 30 health facilities randomly selected through a blind draw procedure from three of the five political districts of Montserrado County. The County was selected for the study because of its numerous numbers of health facilities and huge patient population size as compared to other counties. It is believed that the results could be generalized to the whole country.

7.2.1. Montserrado County profile

Montserrado County is comprised of the first-level of administrative division in Liberia. Located on the coast in the northwestern third of Liberia, it hosts the country capital city and home to approximately 1,144,806 million people making it the populous county in the country.³⁸ It is about 1,909 square kilometers (737 Square miles), smallest by county size but largest County of Liberia.³⁸ The population density of Montserrado is 599.7 inhabitants per square meters (15,531 sq. mi), which is the highest in Liberia.³⁸ It has five districts: Greater Monrovia District, Todee District, Careyburg District, St.Paul District and Commonwealth District. Bensonville serves as the capital for the County. The county has about 279 health facilities 48 of which are public health facilities.³⁸ The sampled health facilities for this study were randomly selected from 279 health facilities in through a lottery draw system. The survey forms were tailored to suit the nature of the study and situations surrounding the RUM in County.

Fig3: Map of Montserrado County, Liberia.³⁹



Source: Google Maps

7.3. Sampling methods

The Multistage sampling method was used in order to clearly define our sampling frame from study population to unit in the below steps:³⁹

- ✓ We selected Montserrado County from among the list of 15 other counties;
- ✓ We selected 5 districts from Montserrado County but were able to assess only 3 districts.
- ✓ A total 30 HFs and 224 participants were randomly (blindly) selected.

7.3.1. Study Population

The study population was drawn from 30 health facilities within three of the five political districts of the county. The study participants of 224 consisted of 144 outpatients (targeting 10 patients per facility), and 80 health providers comprising of 44 prescribers (1 prescriber per healthcare facility) and 36 dispensers (1 dispenser healthcare facility).

7.4. Sample size formula.⁴¹

The sample size formula $N = Z^2 * P [1-p] / d^2$, N = Total sample size, Z = Z statistic for a level of confidence of 95% ($Z = 1.96$). It is also the point percent of normal distribution corresponding to significance level. Example, 5% or 0.05, P = expected prevalence or proportion. The 50% is used for expected prevalence since no other study has carried out in Liberia before. The principal investigator used 7% as the marginal error “ d ”. The selection of a larger value “ d ” (0.07) was based on the limited resource allocated for the study. Statistically, it is accepted that if resources to conduct a prevalence study are limited, larger value of “ d ” (margin of error) can be used.⁴² The use of the margin of error of value 5% would have resulted in huge sample size of 768 which would had financial implications. In reality, there was a need to strike a balance between what was desired (as reflected by the calculations below and what was feasible (as dictated by the available resources such as time, transport, manpower and finance, etc).⁴⁰

7.4.1. Sample size calculations

$N = [1.96]^2(0.50) / [1-0.50] / (0.07)^2$, $N = 196$. Adjusting for missing and recall bias, the principal investigator multiplied $7\% * 196 = 13.7 \sim 14$ participants. That is, $196 + 14 = 210$ **minimum sample size but a total of 224** participants were covered. The sample size of 224 participants reflected fairly balanced sample suitable to cover participants who were not present at the time the study team visited the health facilities.

7.4. 2. Sample size allocation

A simple random sampling procedure was employed for the selection of the 30 health facilities from a list of 279 healthcare facilities in Montserrado County to participate.

A total of 80 healthcare providers and 144 out-patients were interviewed. See details below: Healthcare facilities = 30 comprising of 6 hospitals, 5-health centers, and 19 clinics.

Study participants = 224 comprising of 80 providers (44 prescribers and 36 dispensers) and 144 out-patients.

7.4.3. Selection of Health facilities

Based on the limited financial resources and other constraints, the study was conducted in 30 public healthcare facilities systematically selected within three of the five political districts in Montserrado County. Healthcare facilities selection was based on whether the facilities had functional dispensaries and were involved with implementing the Ministry of Health BPHS and on the population proportion of patients seeking services.

Allocation of health facilities by district:

- Greater Monrovia district: 26 health facilities was surveyed;
- Careyburg district: - 2 health facilities was surveyed;
- St.Paul district: - 1 health facilities was surveyed;
- Todee district:-1 health facilities was surveyed;

Table-4, Sample size Calculation per District.⁴³

| # | District(Zone) (A) | Population (B) | Proportion (C) | Sample size participants (D) D=C*224 | # of HFs (E) HF=30*D/224 |
|---------|-----------------------|------------------|--------------------|--|-----------------------------|
| 1 | Greater Monrovia | 1,000,970 | 0.874(87.4%) | 196 | 26 HFs |
| 2 | St.Paul | 63,541 | 0.0555(5.5%) | 12 | 2 HF |
| 3 | Todee | 41,832 | 0.0365(3.6%) | 8 | 1HF |
| 4 | Careyburg | 30,463 | 0.0248(2.4%) | 6 | 1 HF |
| 5 | Commonwealth | 10,000 | 0.00879 (0.879%) | 2 | 0.026 HFs |
| Total = | | 1,144,806 | 1.00 (100%) | 224 | 30.026 HFs ~ 30 HFs |

The distribution of health facilities in the above table was based their population proportion per district. The number of interviewed subjects per facility depended on the attendants and availability of health providers and patients. There was difference in population attending health facilities with the highest being in central city and the least at the outskirts of Montserrado County.

7.4.3.1. Random selection procedures

Greater Monrovia district (the three of the five most populated 5 districts)

1. The selection of the set of first facilities from the list of health facilities in the district. The first facilities were 6 hospitals (Redemption, James N. Davies, Benson, ELWA SDA Copper and St. Joseph Catholic Hospitals in the district).
2. The second set of health facilities were 5 health centers with recognized storage areas and dispensaries and the rest of the 19 health facilities were mainly clinics.

Below are detailed procedures used for the sampling:

Calculation of sampling intervals (K^{th}) for selecting healthcare facilities was done as follows: $K^{\text{th}} = N / X$, $N = 279$, $X = 30$, $K^{\text{th}} = 279/30 = 9.3$ (sampling interval).

- a. We obtained a sampling frame of 30 public health facilities from a list of 279 health facilities choosing four (4) at a time.
- b. Identification of the K^{th} (3^{rd} , 4^{th} , 5^{th} and 6^{th} ...) facilities were selected by position as follow.
- c. We selected a facility occupying position 3 from the list of 279 healthcare facilities in the county.
 - i. a randomly chosen whole number between 1 and 9. For instance 2,
 - ii. The 3^{rd} health facility was be marked 2,
 - iii. The sampling interval was added to the randomly chosen number. That is 3^{th} , $[9^{\text{th}} + 3^{\text{th}}] = 13^{\text{th}}$, $[13^{\text{th}} + 3^{\text{th}}] = 16^{\text{th}}$, $[16^{\text{th}} + 3^{\text{th}}] = 19^{\text{th}}$
 - iv. Selection proceeded until all 30 health facilities from the three districts were selected.

7.4.3.2. Sampling of patients

We utilized a nonprobability sampling method referred to as purposive. The purposive sampling target a particular group of people.⁴⁴ When the desired population for the study is rare or difficult to locate and recruit for a study, purposive sampling may be the only option.⁴⁴ In this study, in order to measure the rationality of medicines use as per indicator, out- patients recruited for the study were those suffering from common ailments representing a mixture of health problems among the various ages and sex. A target of 10 out-patients with a range of (1 – 10 patients) per health facility was exit interviewed. The

number of patients interviewed was based on the patient turn out at the health facilities at the time of the study team visit.

Prospectively, after selecting the 80 health providers from among the list of 224. An average of 4 patients was randomly selected through a blind draw process from the remaining of the 144 out-patients. The selected patients were those immediately leaving the dispensing area and had received dispensed medicines. We ascertained as to whether the medicines were adequately labeled (the label containing the medicine's name and how it should be taken), and if the patients knew how to take their medicines (patients knew dosage and duration of all dispensed medicines). In the exit interviews, patients were asked to repeat the received instructions. Their satisfaction from received services was obtained. The availability of the 30 TEMs was investigated and healthcare providers interviewed. Additionally, enquiries were made on the availability and uses of copies of STGs and NEML in each healthcare facility.

7.4.3.3. Selecting the tracer essential medicines

A list of 30 TEMs used to treat common health problems in Montserrado County, Liberia, was selected in order to measure their availabilities, presence of expiration. The selected TEMs met the basic requirements at all levels of healthcare delivery system of Liberia. Additionally, the 30 TEMs included the basic WHO basket model list of 15 essential medicines and additional 15 other medicines of interest to this study. The additional list enables additional data to be collected without adversely affecting the results [See table 12].

7.5. Preparation of the Study

7.5.1. Study piloting

Notifications to the healthcare facilities to be visited for the piloting were obtained. The piloting of data tools was carried out at one of the public healthcare facility (New Georgia Health Center) in the county. This is one of the densely populated health facility involved with rendering free health services. The piloting was meant to determine participants' levels of understanding and responses to the study questionnaires and for the principal investigator to be able to identify, review and rectify questionnaires for completeness of the forms.

7.5.2 Health facility notification / Ethical consideration

The sampled healthcare facilities were presented with copies of letters for permission for conducting the study at the target facility. This was done after getting approval letters from the CMO and the informed consent from the MUHAS, Dar es Salaam, Tanzania.

7.5.3. Study indicators

In developing the indicators for the study, the principal investigator did utilize extracts from WHO medicines use operational package indicators to assess the medicines use situation in the target health facilities in Montserrado County. In doing so, the principal investigator extracted relevant components from the WHO package of RUM indicators. From the extracted indicators, the principal investigator was able to develop appropriate questionnaires that suited the county situation.

Below are WHO indicators for RUM.²⁵

(a) Availability and storage Indicators:

- ✓ Percentage of medicines prescribed that are dispensed at health facilities
- ✓ Percentage of essential medicines available in health facilities
- ✓ Percentage of premises stocking one or more medicines that have expired
- ✓ Percentage of medicine adequately stored (Storage 0 – 11)
- ✓ Mean stock out duration (Annual number of days on which a medicine was not available in the pharmacy)
- ✓ Affordability of medicines (ratio of treatment cost of pneumonia to the lowest government weakly salaries)

(b) Medicines dispensing indicators:

- ✓ Percentage medicine prescription adequately labeled.(Name of medicine, dosage, dose and quantity dispensed)
- ✓ Percentage of prescriptions whose indications were understood by patients (patients were able to recognize the medicine, its indications and use).

(c) Prescribing indicators:

- ✓ Average number of essential medicines per prescription at public health facility dispensaries
- ✓ Percentage of patients prescribed antibiotics in public health facilities

- ✓ Percentage of patients prescribed injectables in public health facilities
- ✓ Percentage of medicines listed on the EML at public health facilities
- ✓ Percentage of medicines prescribed by INN at public health facilities
- ✓ Percentage of prescriptions following STG

7.5.4. Data collection and procedures

7.5.4.1. Data collectors

Data collectors were hired and trained in the data collection, reporting and entry procedures with topics reflecting those of the developed research indicators and questionnaires. The data collectors were individuals with clinical backgrounds and experiences of the geographical locations of the study sittings. There were four research assistants (two pharmacists from the School of Pharmacy, University of Liberia, a registered nurse and a nurse aide of the MoHSW). These assistants did join the principal investigator to make up the five men research team. The data assistants were deployed along with the necessary study tools to the various target healthcare facilities within the confines of the study.

7.5.4.2. Data collection procedures

To assess medicines use situation in a healthcare facility, WHO defined certain medicines indicators into three types.²⁵

(a). Patient care indicators: (i) average consultation time, average dispensing time, percentage of medicines actually dispensed; (ii).Percentage of medicines adequately labeled and patient knowledge of correct dosage.

(b). Facility indicators: (i). availability of copies of STGs, or EML and the availability of key medicines.

(c). Prescribing Indicators: average number of medicines per prescription, percentage of medicines prescribed by generic name, percentage of antibiotic prescribed, and percentage of injectables prescribed.

Utilizing the above mentioned indicators, out-patients exit-interviews per healthcare facility were carried out to determine the patient level of understanding of the administration medicines as per received and level of satisfaction accrued from the services received. The accuracy of prescribing patterns, of polypharmacy, of appropriate labeling,

of rational use of essential medicines (anti-infective agents especially antibiotic, injectables, anti-hypertensive agents and other medicines uses) were also ascertained. Information on the uses of anti-infective agents, analgesics, vitamins, antimalarial medicines, hypertensive agents, heminthicides and injections were recorded as preference. At every stage of the data collection procedures, data were recorded on a pre- designed excels data spread sheets. Additionally, healthcare facility dispensaries were inspected to ascertain the storage conditions and handling of medicines. A face to face interviews guided by structured questionnaires together with checklists of 30 tracer essential medicines was employed for the data collection covering all the 30 public health facilities of the study.

7.5.4.3. Data collection tools and techniques

- ✓ Structured dispensers interviews;
- ✓ Structured out-patient exit-interviews;
- ✓ Prescribers interview &; Checklist of thirty tracer medicines availability

7.5.4.4. Data quality control

In order to maintain the authenticity in capturing reliable and valid data for analysis, the below listed steps were taken:

- ✓ Questionnaires were not be exposed before the actual data collection process;
- ✓ Answered questionnaires were counterchecked for consistency;
- ✓ Codes were be assigned to the districts which corresponded to questionnaires for said district.
- ✓ Data collection sites were re-visited by the principal investigator to make sure that collected data reflected the actual situation in the health facilities.

7.5.4.5. Data collection coverage

The data entry and analysis lasted for four months starting from March and ending June, 2012.

7.6. Inclusion criteria

- ✓ All public healthcare facilities with dispensaries /pharmacies in the Montserrado County, Liberia
- ✓ Participants included those who agreed to freely (no charge to researcher) take part in the study and had duly signed the MUHAS informed consent document

- ✓ Public healthcare facility dispensers, prescribers, and out-patients.
- ✓ Thirty public healthcare facilities implementing the Liberia BPHS

7.7. Exclusion criteria

Based on the logistical constraints (budget, transport, time and security) and inaccessibility of some areas in the county, the assessment was conducted only in areas that were accessible by vehicle.

- ✓ All areas inaccessible by vehicle were not considered in the study.
- ✓ All public health facilities and areas beyond the study area were excluded.
- ✓ All public health facilities that did not have dispensaries or storerooms.

7.8. Data entry, Processing, Analysis and Reporting

Prior to the data entry, data were entered and cross checked for completeness and consistency and then analyzed using excels spread and then Stata software version 10.0. Analysis of the data was done to characterize other identified indices including the percentage of antimalarial medicines, percentage of anti-hypertensive agents, percentage of analgesics, percentage of anti-infective agents and multivitamins prescribed in addition to the 30 tracer essential medicines The data were presented as percentages and averages as seen in the results of this study.

7.8.1. Computation of indicators for data

7.8.1.1. Availability of basic information in health facilities

- **Purpose:**-to ascertain the availability to the 30 tracer medicines in the sampled health facilities.
- **Prerequisites:** - 30 tracer medicines of common use in health facilities.
- **Source of Data:** - the 30 healthcare facilities included 6 hospitals, 5 health centers and 19 clinics within three of the five districts of Montserrado County, Liberia.
- **Process:** - at each healthcare facility, the study team used the government approved EML of Liberia. The principal investigator did inspect the various stores, and store room shelves to identify the available medicines in stock in order to see whether the 30 tracer medicines were available among them.

- **Calculation:** - the percent of the 30 tracer essential medicines per type in stock per health facility equals the amount of 30 tracer essential medicines identified per type divided by the total number of target tracer essential medicines per type counted times 100.

That is the percentage of one type of tracer medicines = [qty of tracer medicines type]/ [total qty. of medicines in stock].

7.8.1.2. Healthcare providers (prescribers) in health facilities

- **Purposes:** - to ascertain the prescribers prescribing attitudes and degree to which prescribers in healthcare facilities were adhering to the standard treatment guidelines in prescribing practices. To ascertain encounters with anti-infective agent, antimalarial medicines, analgesics, antacids, injectables and others prescribed from among the tracer essential medicines list and determine educational level of the prescribers.
- **Sources of data:** the sampled prescription slips from outpatient prospective exit interviews per facility.
- **Calculation:** the percent of medicines dispensed = number of medicines dispensed per prescription divided by the number of medicines prescribed times 100.

7.8.1.3. Health providers (dispensers) in health facilities

- **Purposes:-** to identify staff responsible for dispensing in health facilities and how many and what percent underwent formal training in dispensing.
- **Sources of data:** Health facility staff interviews.
- **Calculation:** the percent of identified dispensers = number of identified dispensers divided by the number of health providers interviewed times 100.

7.8.1.4. Patient care in health facilities

- **Purpose:-**to assess the average level of patient knowledge on how to take prescribed medicines as per instructions.
- To ascertain the actual number of medicines dispensed per patient as proportion to the patient turnout with filled prescriptions in each studied health facility.
- To ascertain patient level of satisfaction from services accrued.
- **Prerequisites:** Knowledge of the appropriate doses, dosages frequencies and indications.

- **Source of Data:** the sampling a target of ten prospective outpatient encounters through patient exit interviews at each surveyed health facility.
- **Calculation:** percent of patient with knowledge of how to take medicines per instruction equals the number of patients with knowledge of taking medicines divided by the total patient sampled times 100.

7.8.1.5. Average number of medicines prescribed per prescription

- **Purpose:** to determine the average number of medicines per prescription.
- **Prerequisites:** total sampled outpatient prescription slips from the healthcare facilities selecting a target of ten outpatient encounters.
- **Calculation:** the average number of medicines per encounter equals total number of medicines prescribed divided by the number of patient encounter at review.

7.8.1.6. Percent of anti-infective agents prescribed to out-patients

- **Purpose:** to determine the number of anti-infectives per prescription. Since over prescription of anti-infective agents is one common type of irrational use of medicines.
- **Prerequisite:** ascertaining from the analyzed prescription slips whether prescribers know the difference between antibiotics and anti-infective agents.
- **Source of data:** sampling a target of ten out-patients encounters conducted prospectively at the various selected health facilities.
- **Calculation:** percent of patients prescribed anti-infective agents equals to the number of encounter in which one or more anti-infective agents was prescribed divided by the number of patients encounter reviewed times 100.

7.8.1.7. Percent of injections prescribed to out-patients

- **Purpose:** to determine the prevalence of injections use; since overprescribing of injections is considered as one common type of irrational medicines use.
- **Source of data:** sampling of a maximum of ten out-patients encounters prospectively at the various selected health facilities.
- **Calculation:** percent of patients prescribed injections equals to the number of encounter in which one or more injections was prescribed divided by the number of patients encounter reviewed times 100.

Note: This calculation was also carried out for groups of medicines classified as others. Examples: Vitamins, anti-hypertensive, analgesics, antacid, antimalarial medicines and heminthicides.

7.8.1.8. Percent of essential medicines prescribed either by INN or trade names

- **Purpose:** to measure the degree to which prescribing practices habits that confirm to the principles of generic prescribing.
- **Prerequisite:** a clear understanding of what is meant by the terms generic and trade name medicines.
- **Source of data:** sampling a target of ten out-patients encounters prospectively at each of the 30 sampled health facilities.
- **Calculation:** percent of prescribed medicines listed on the national essential medicines list as generic = number of prescribed generic medicines included on the list divided by the total number of medicines prescribed time 100.

Note: Similar calculations were done for medicines prescribed by trade name medicines.

7.8.1.9. Availability of STGs and NEML in health facilities

- **Purpose:** to determine the availability of STGs and NEML as well as whether prescribers were adhering to the STGs and NEML usage in their daily prescribing practices.
- **Prerequisite:** the current MoHSW-Liberia endorsed STGs and NEML.
- **Source of data:** a study of the 30 healthcare facilities in Montserrado County.

CHAPTER THREE

8.0. RESULTS

This chapter provides the results of the study conducted in 30 sampled healthcare facilities using 30 tracer essential medicines.

8.1. Demographic characteristics of the study population and areas

The findings of the study were summarized into three main indicators:

- I. Healthcare provider (Prescribers and Dispensers)
- II. Medicines availability
- III. Out-patient exit interview

The categories facilities covered were hospitals = 6 (20%), health centers =5(16.7%) and 19 clinics = 19(63%). These healthcare facilities were identified in three of the five political districts in Montserrado County, Liberia. The study was conducted from March to June, 2012. The sample size of 224 participants, of 80 (36%) interviewed were healthcare providers and 144 (64%) were patients. The HPs were made up of 44(55%) prescribers, 36 (45%) dispensers.

8.2. Healthcare Providers' Interviews

As part of this study, interviews with HPs were conducted. The interviews were meant to ascertain the healthcare providers' educational levels, the categories of providers, whether the providers were trained in prescribing and dispensing medicines and if so, for how long. Additionally, the interviews sought to establish if STGs and NEML were available and in use in the facilities. Where guidelines existed questions were asked on whether the providers routinely consulted these guidelines. Detailed description of the study results for healthcare providers interviewers are listed below.

8.2.1. Categories of healthcare providers involved in prescribing

A total of 38 (47%) of health professionals involved in prescribing essential medicines in healthcare facilities in Montserrado County were registered nurses while the minority 2(3%) were either LPN or nurse aides. However, many of these need upgrade training in their respective professional areas. Figure 4 below categorizes prescribers by profession and shows the relative percentages of each profession.

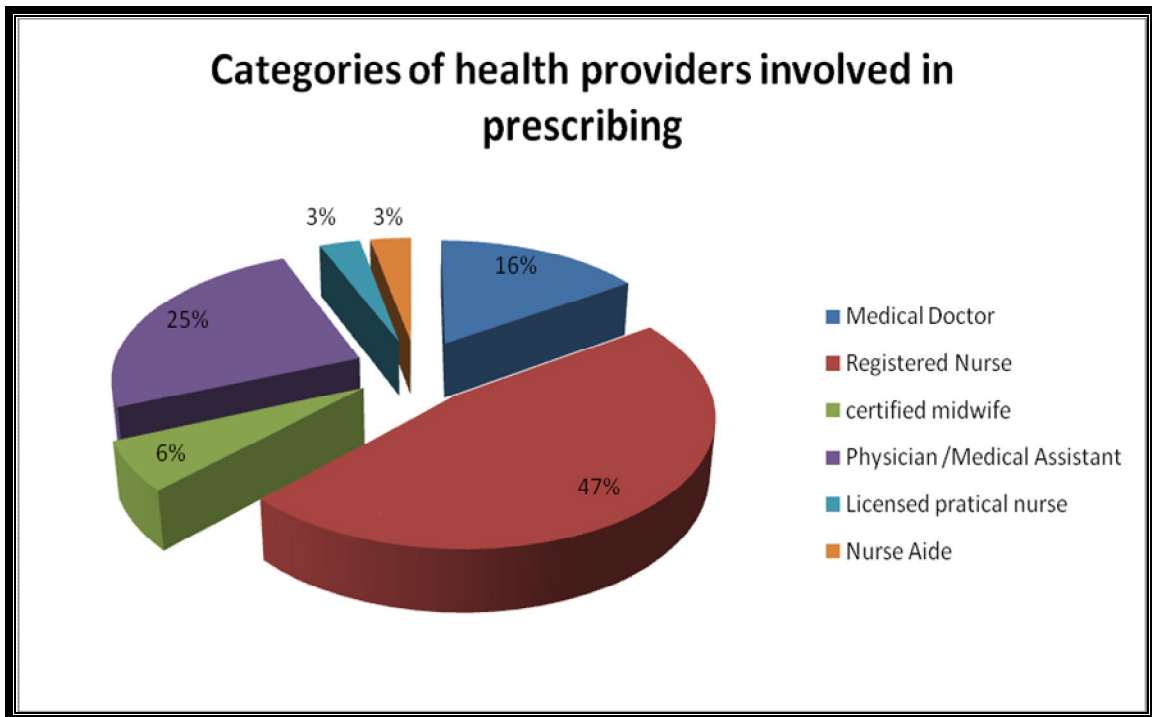


Figure 4: Categories of health providers involved in prescribing.

8.2.2. Educational levels of prescribers

The study was conducted to determine the educational levels of prescribers rendering services in healthcare facilities. More than half 23.3 (53%) of the interviewees were high school graduates while only (1) 2% of the respondents were below 12th grade education. (See figure 5).

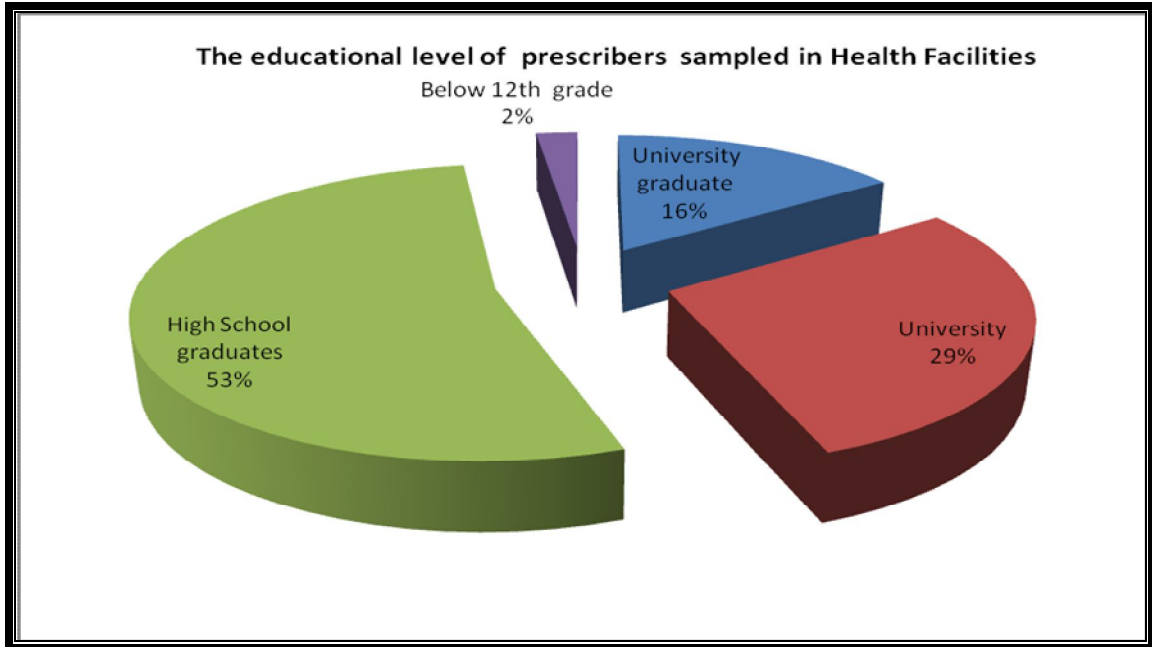


Figure 5: The educational level of prescribers sampled in health facilities.

8.2.3. Health providers views on Polypharmacy and Irrational use of medicines

The majority 34 (77.3%) of the health providers interviewed agreed that polypharmacy increases irrational use of medicines. About 10 (22.7%) of the health providers (prescribers) said polypharmacy did not exist in their practices.

8.2.3.1. Prescribers' experiences and responses on training in prescribing

From the 44 prescribers interviewed, 25 (56.8%) confirmed receiving formal training in prescribing medicines while 19 (43.2%) did not. However, in term of years of experience in prescribing medicines maximum was 34 years and minimum of 1.3 years.

8. 3. Staff responsible for dispensing medicines

The results show that among the interviewed health providers involved in dispensing medicines, the majority (70%) were nurse aides. This was followed by the category of dispensers classified as others 6 (17%). The registered nurses were 4(10%) and the registered pharmacists were 1(3%) on the list of dispensers. The others are individuals that never underwent any formal training in dispensing medicines but learned the practice on the job. Figure 6 below presents the categories of professionals involved with dispensing medicines and the relative percentages by profession.

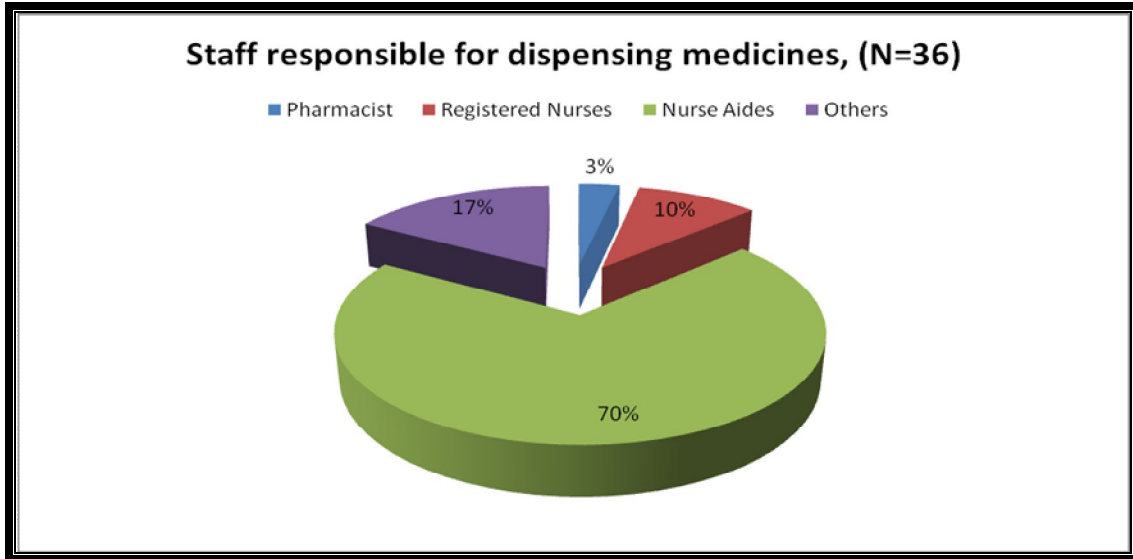


Figure 6: Staff responsible for dispensing medicines

8.3.1. Duration of training of Dispensers

In addition to information collected on staff responsible for dispensing medicines, we were able to capture the number and duration of training of the dispensers interviewed. The below table provides the detailed information of the various levels of dispensers interviewed.

Table 5: Duration of Dispensers training

| Training duration | Total number of dispensers | % of dispensers |
|-------------------|----------------------------|-----------------|
| < 1 month | 16 | 44 |
| >1 month | 12 | 33 |
| ≥ 1 year | 4 | 12 |
| Never | 4 | 11 |

From the above table, majority (77%) of the dispensers received very short duration of training in dispensing. The dispensing practice among health providers (see 8.4 on patients counseling by health providers on page 50).

8.4. Out-Patient exit interviews

The third component of this project conducted patient exit interviews. From the outpatient exit interviews, patients with prescription slips were interviewed to ascertain the understanding of patients of received instructions for specific medicines administration including the precautions for taking medicines. Additionally, this was done to ascertain whether patients were satisfied with received services. Patients who said they were satisfied were marked YES = 1 and those who were not were satisfied marked NO = 0. The below sections presents the results of the out-patient exit interviews.

8.4.1. Assessment of medicines per Prescription Slip sampling

From the sampled prescription slips analyzed, a total of 486 medicines were prescribed in prescriptions and only 121 actually dispensed. The average number of medicines on each prescription was 4.

8.4.2. Assessment of medicines Prescribed by INN and trade names

During the out-patient exit interviews, it was noticed that majority of medicines 301 (62%) were prescribed by trade names. Paracetamol was the most frequently (95%) prescribed followed by ACT about (90%). Figure 7 below presents the details of the frequency of medicines prescribed by trade or generic names.

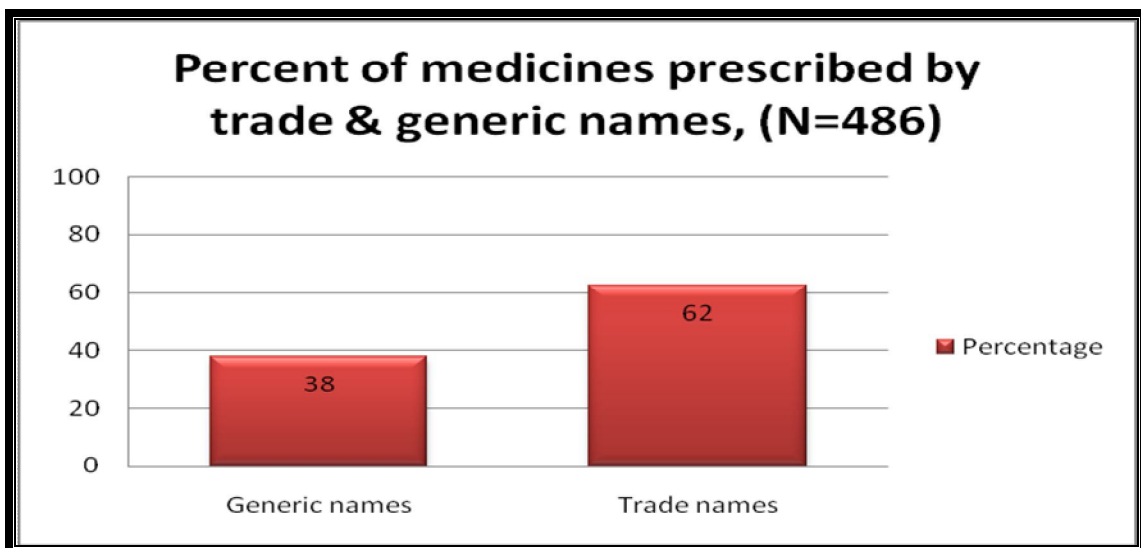


Figure 7: Percent of medicines prescribed by genetic and trade names.

8.4.3. Patients' counseling by health providers

From most of the health facilities visited, the counseling of patients by prescribers was less than 25 minutes. Around the various consultation rooms were densely populated with patients. Additionally, the dispensaries areas were populated with patients waiting to be served. The number of dispensers was fewer. Patients counseling at the various dispensaries were less than 10 minutes. Instructions were hastily passed on the patients as there was long queue of patients.

8.5. Availability of essential medicines

As part of this project, the study was conducted in 30 health care facilities. The study was meant to investigate the availability of the 30 tracer essential medicines within 30 sampled healthcare facilities. The table below provides the WHO/HAI standard reference values for difference availability parameters for medicine.

| | | | |
|-------|-----------|-------------|-------|
| < 30% | 30% - 49% | 50% - 80% | > 80% |
| Poor | Low | Fairly high | High |

8.5.1. Percent availability of Standard Treatment Guidelines in health facilities

From the 30 healthcare facilities visited, 11(37%) STGs for HIV/AIDs, Malaria, and TB were identified. STGs for the three disease states were available in all categories of health facility survey. But STGs for other diseases were not available including EML in all the healthcare facilities covered in this study. This indicates that although the STGs for above mentioned diseases were available, there was a serious need for further distribution of STGs for other diseases and EML to the health care professional in the county.

8.5.2. Availability of tracer items

The below table provides the list of healthcare facilities with specific quantities of the TEMs identified there. The percent availability of TEMs in the HFs irrespective of facility categorized either as government or private was statistically insignificant

Table 6: Medicines Availability by Health Facility

| # | HEALTH FACILITY | # of TEMs presence | Percentage availability |
|----|--------------------------------|--------------------|-------------------------|
| 1 | A.F. Russell Clinic | 4 | 13 |
| 2 | Duport Road Health Center | 10 | 33 |
| 3 | St.Joseph Catholic Hospital | 29 | 97 |
| 4 | Banjor Clinic | 13 | 43 |
| 5 | Blamacee Clinic | 9 | 30 |
| 6 | Bromely Clinic | 10 | 33 |
| 7 | Clara Town Health Center | 11 | 37 |
| 8 | Bardnesville Health Center | 11 | 37 |
| 9 | Dr.Agnes Varis Clinic | 17 | 57 |
| 10 | Snapper Hill Clinic | 8 | 27 |
| 11 | Imani House Clinic | 12 | 40 |
| 12 | JAW Clinic | 13 | 43 |
| 13 | Gardnerville (S.T.) Clinic | 7 | 23 |
| 14 | Mawah Med. Clinic | 13 | 43 |
| 15 | Kpallah Community Clinic | 13 | 43 |
| 16 | Redemption Hospital | 15 | 50 |
| 17 | Pipeline Clinic | 13 | 43 |
| 18 | S.D.A. Hospital | 13 | 43 |
| 19 | People United Community Clinic | 12 | 40 |
| 20 | RCD Marshall Clinic | 6 | 20 |
| 21 | R.H. Ferguson Clinic | 14 | 47 |
| 22 | Slipway Clinic | 11 | 37 |
| 23 | Soniwein Health Center | 9 | 30 |
| 24 | Star of the Sea Health Center | 13 | 43 |
| 25 | James N.Davis Hospital | 14 | 47 |
| 26 | Ahmadiyya Clinic | 19 | 63 |
| 27 | P.K.Nyansaige Med. Clinic | 14 | 47 |
| 28 | Benson Hospital | 22 | 73 |
| 29 | Chocolate City Clinic | 24 | 80 |

| # | HEALTH FACILITY | # of TEMs presence | Percentage availability |
|----|------------------|--------------------|-------------------------|
| 30 | E.L.W.A Hospital | 21 | 70 |

8.5.3. Percent availability of tracer essential medicines in stock by category of health facilities

The results of the % availability of TEM in stock by category of HFs as public and private show the private healthcare facilities demonstrated higher availability 57 (57% = high) of essential medicines and compared to the public healthcare facilities, 43 (43% = Low). This is probably owing to the effective pharmaceutical management system and better incentives for healthcare providers. The question of theft and mismanagement of medicines are controlled. Medicines are rationally used in the private unlike the public health facilities. In the public healthcare facilities, probably pharmaceutical management system is poor and is characterized irrational use of medicines, poor incentives to HPs, and high rate of medicines theft and stock outs. However, subsidies and health commodities are freely provided to all health care facilities by the government of Liberia.

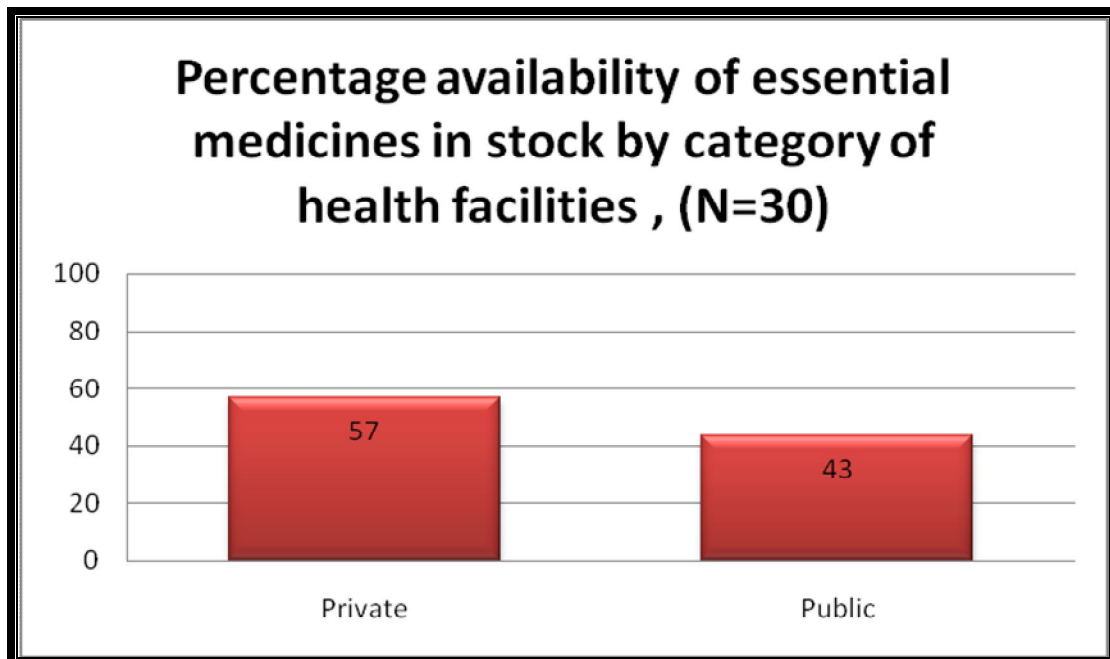


Figure 8: Percent availability of tracer essential medicines in stock by category of health facilities

8.5.4. Availability of each tracer item in health facilities

The results on the availability of each tracer items in health facilities reveal that paracetamol is the best stocked item as compared to other items.

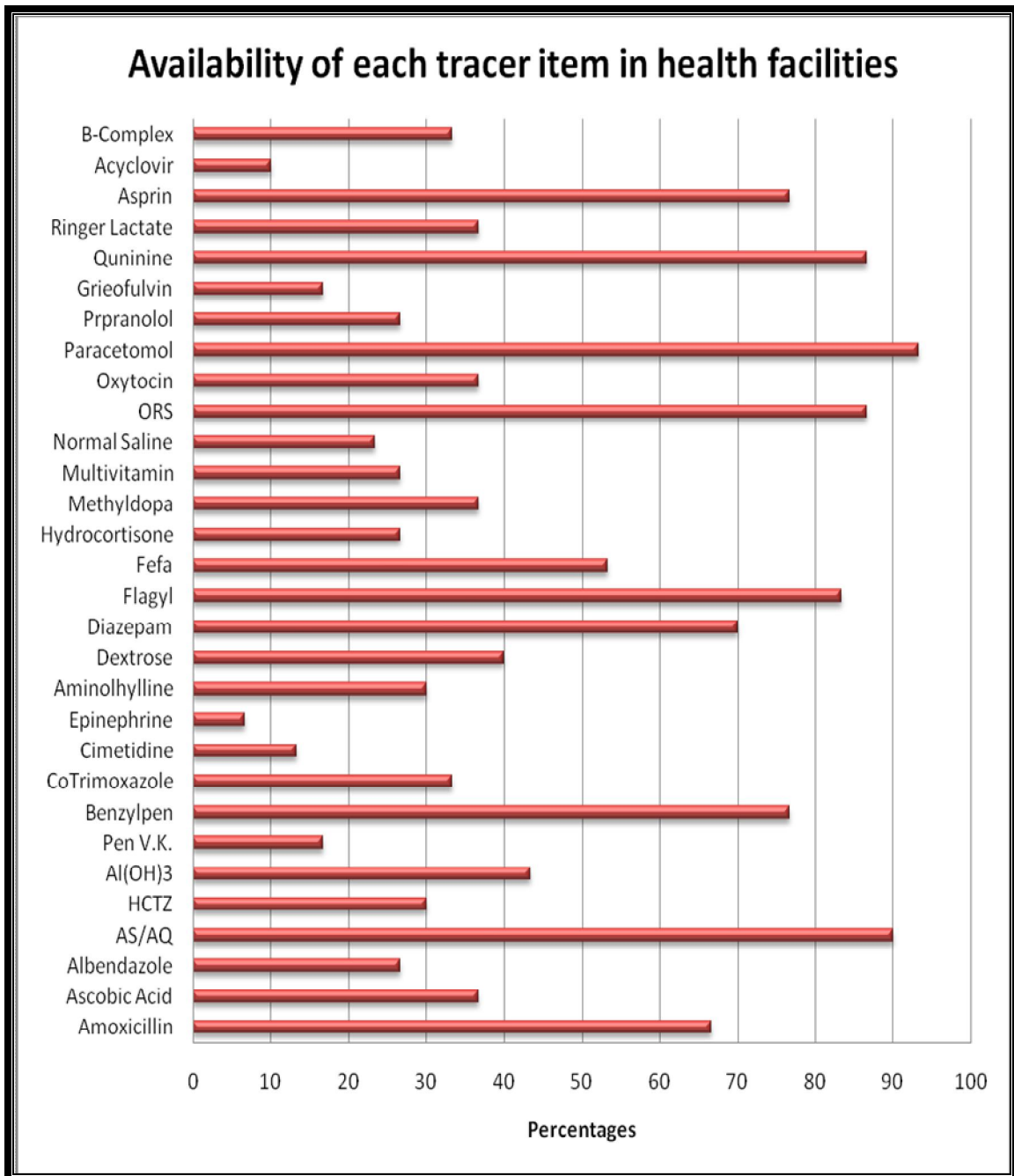


Figure 9: Below provide the percent availability of each tracer item in health facilities.

8.5.5. Comparative availability of TEMs among major hospitals

The majority of clients, who visited public healthcare facilities, did visit the major hospitals. Within the Monrovia metropolitan area, there are seven such hospitals. Six of these were sampled for this exercise, while for access reasons one could not be visited.

Figure 10 below presents comparative figures of availability between the six major hospitals.

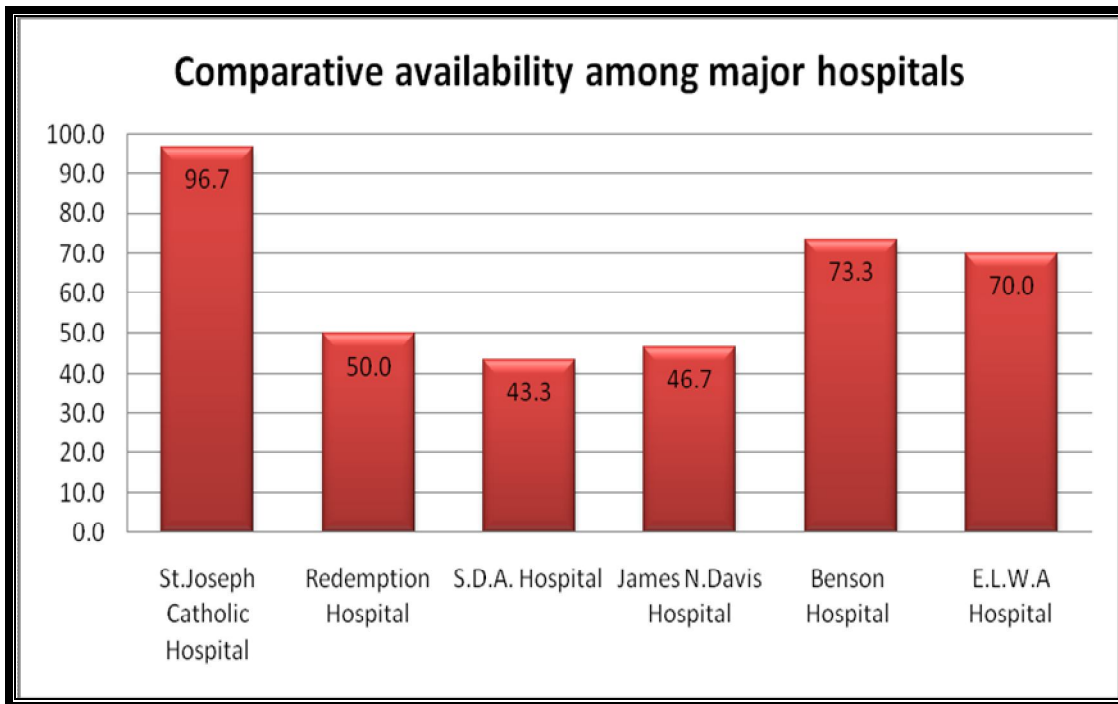


Figure 10: Comparative availability of TEMs among major hospitals

8.5.6. Comparative availability of tracer items among health Centers

In the Monrovia metropolitan areas, where hospitals are not available, majority of clients seeking healthcare services not provided at the clinic levels also visit major health centers.

There are 19 of such health centers in the metropolitan area of Monrovia. Five major health centers were sampled for this exercise as indicated in Figure 11.

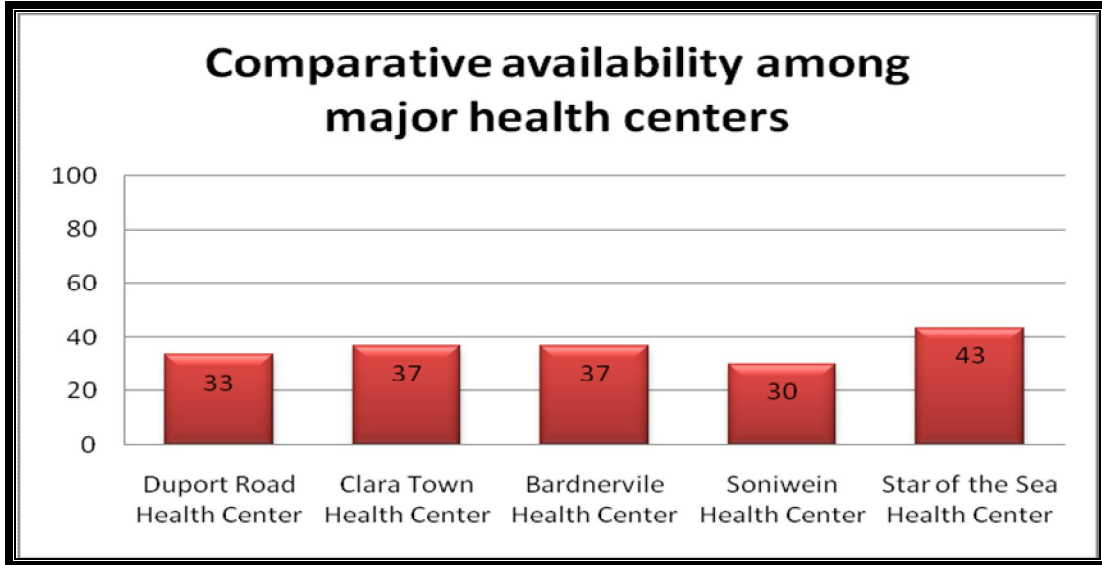


Figure 11: Comparative availability of TEMs among health centers

8.5.7. Comparative availability of essential medicines among clinics

Montserrat County has about 236 clinics where majority of healthcare seekers visit. During the study, nineteen 19 (8.05%) of these clinics were randomly selected and covered for this exercise. Of the 19 health facilities, pipeline clinic (a private health facility) revealed the highest (90%) availability of tracer essential medicines while the lowest A.F. Russell (government health facility) had the lowest (13%) (Figure12).

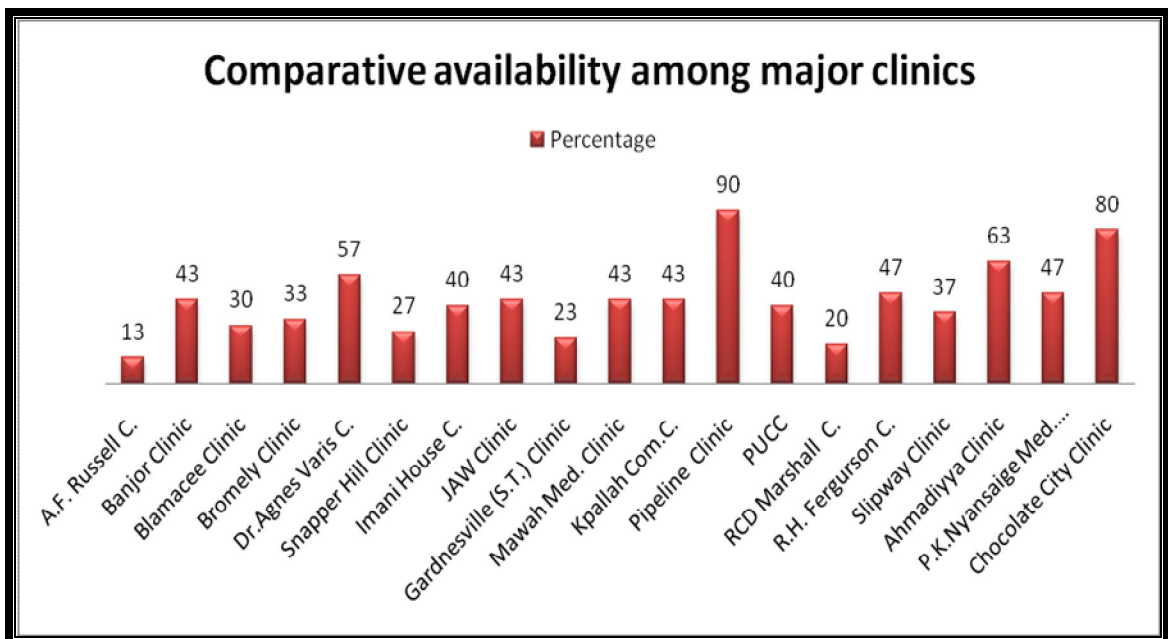


Figure 12: Comparative availability among major clinics

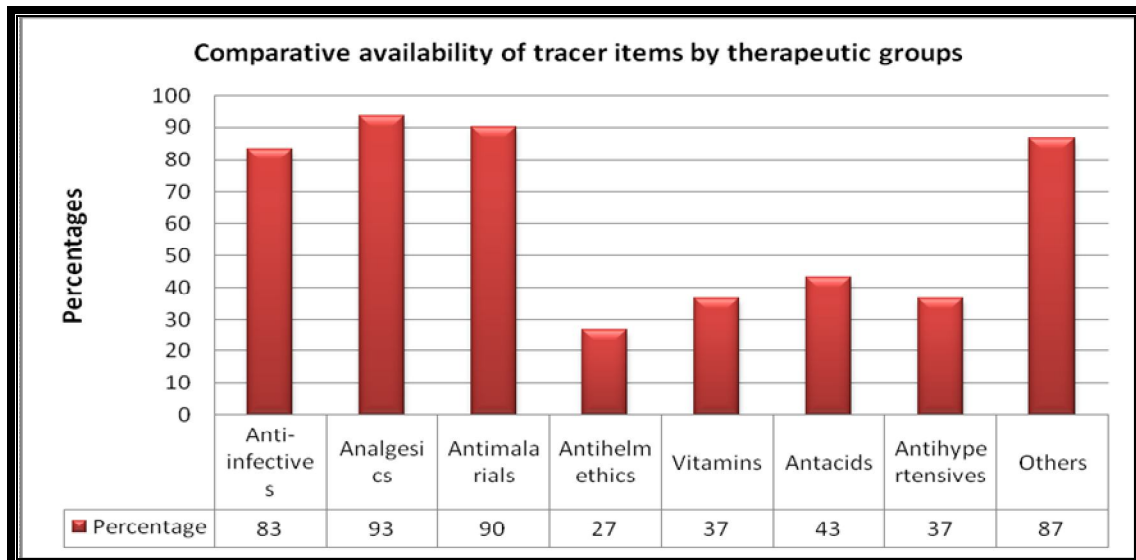
Table 7: Relationship between availability of medicines by health facility levels.

| Availability | Levels of health facilities | | | Total |
|--------------|-----------------------------|---------------|------------|-----------|
| | Hospital | Health center | Clinic | |
| < 50% | 0 (0.00%) | 4(28.87%) | 10(71.43%) | 14(100%) |
| >50% & < 97% | 6 (37%) | 1(16.67%) | 9(56.25%) | 16 (100%) |
| ≥ 97% | 6(20%) | 5(16.67%) | 19(63.3%) | 30(100%) |

From the above mentioned table, the availability of TEMs by health facility levels indicates no medicines < 50% availability was found in the hospitals covered. However, 28.57% of TEMs < 50% were found in 4 health centers and 71.43% found in 10 clinics. The availability of TEMs >50% & < 97% indicates that 6 hospitals had 37% of the TEMs available, 1 health center 6.25% and 9 clinics had 56.25%. Additionally, of TEMs of >97%, six hospitals had 20%, 5 health center had 16.67% and 19 clinics had 63.33%.

8.5.8. Comparative availability of tracer medicines by therapeutic groups

Comparative availability of tracer essential medicines by therapeutic groups was meant to ascertain from among the sampled medicines which group of medicines were more readily available. From the data analgesics were the most available medicines (93%), followed by antimalarials (90%) while antihelminthics were the least available (27%) as shown in figure 13 below:

**Figure 13: Percent availability of tracer items by therapeutic groups**

8.5.9. Availability of anti-infective agents in health facilities

From the comparison of the individual anti-infective agents available in sampled health facilities, the results (Figure 14) show that metronidazole was most readily available (83%). This was followed by penicillin V. K. and then benzyl penicillin (80%).

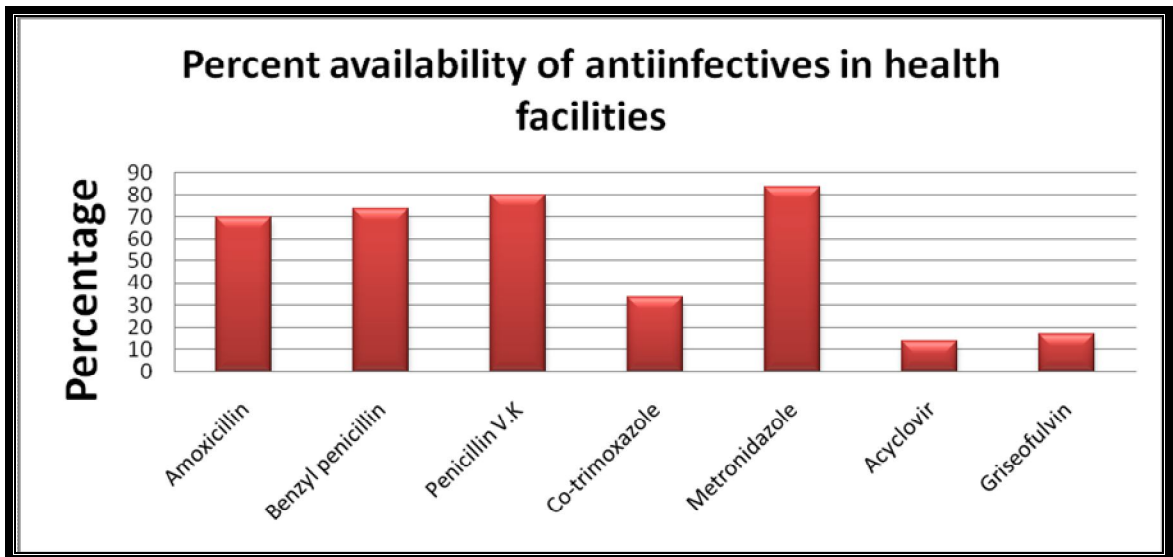


Figure 14: Percent availability of anti-infectives in health facilities.

8.5.10. Availability of antimalarial in health facilities

Through the government of Liberia free essential medicines program, malarial commodities were being distributed in health facilities in the county. The survey was meant to determine the availability of antimalarials in the sampled health facilities. Figure 15 below provides comparison of the percent stock status of two identified products

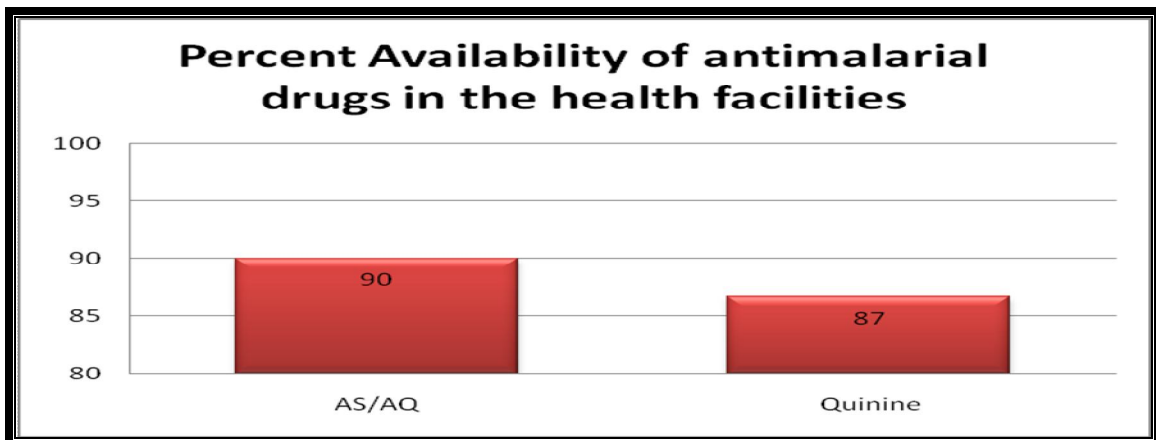


Figure 15: Availability of antimalarials (Quinine and AS/AQ) in health facilities

8.5.11. Availability of vitamins in health facilities

Figure 16 below presents the percent availability of the identified vitamins. From among the 30 health facilities sampled, three different types of vitamins were identified in 16 of the health facilities. Among the vitamins, ascorbic acid was readily available (38%).

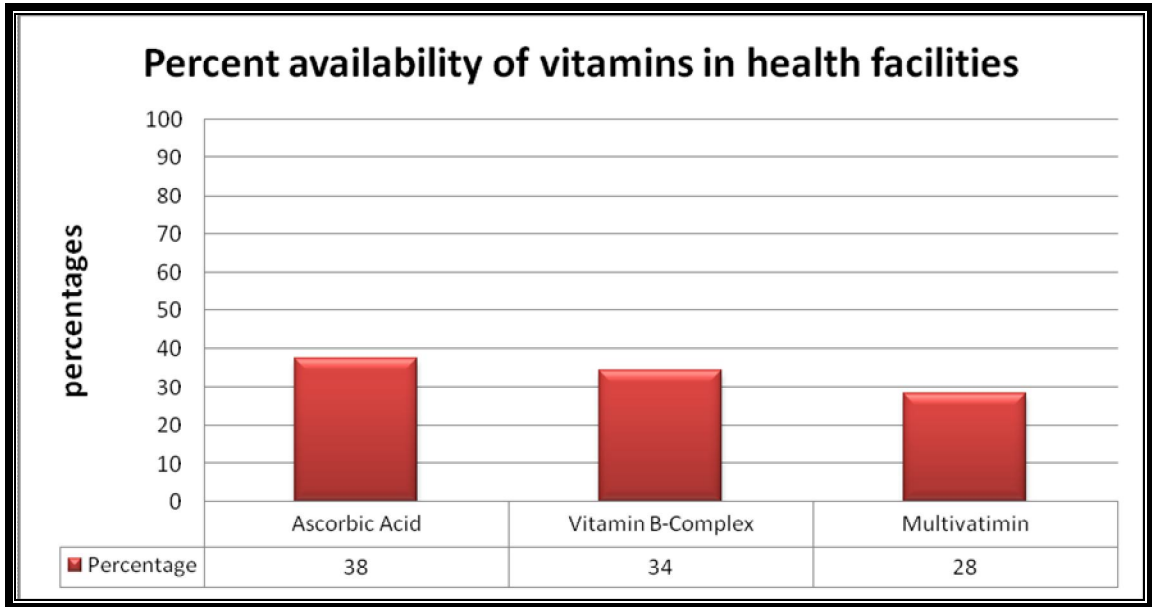


Figure 16: Percent availability of the identified vitamins

CHAPTER FOUR

7. DISCUSSION

The chapter provides detailed discussion and interpretation of the study results taking into consideration analysis of the results as compared to other similar studies done in other countries.

In all of the health facilities visited, the prescribing of essential medicines was not restricted one specific cadre but other health cadres excluding pharmacists and dispensers. This study showed that from the prescribers' interviews, there were five categories of such health provider professionals involved in prescribing of essential medicines in the study area. These include medical doctors, physician assistants, medical assistants, nurses, certified midwives and nurse aides. A total of 38 (47%) of the prescribers were registered nurses, (16%) medical doctors, (25%) physician assistants, (6%) midwife and 2(3%) either LPN or nurse aides. This suggests that there is a need for the government of Liberia to institute interventions to increase investment in the training of doctors and other prescribers.

With regards to prescribing practices of prescribers, the average number of medicines prescribed per prescription was four (4) with a range of 1- 8 medicines per encounter. The WHO guidelines on RUM stipulates a value of between 1.6 -1.8, [4.4±0.1] medicines per encounter.⁴⁶ So four (4) medicines per patient encounter for this study was comparatively high but lower than similar study conducted in Benin City, Nigeria ten years ago which had recorded a value of 4.4 in a study conducted in private institution in the south-south region.⁴⁸ However, this average exceeds those reported from developing countries where there are no programmes for promoting rational use of medicines as well as standard proposed for locality including Bangladesh and Lebanon⁴⁷ Bahrain⁴⁹ and Mali.⁵⁰

The high number of medicines prescribed to patients tends to increase the risk of medicines interactions, affects patient compliance, encourages polypharmacy and causes serious patient harm. The overprescribing may have psychosocial impact on patients in that this encourages patients to believe that they need medications for any and all conditions, even trivial one. The concept that there is a pill for every ill is harmful. Many of the medicines were written in trade names. About 10 (22.7%) of the prescribers interviewed said polypharmacy did not exist in their practices. This implies that some of the prescribers did

not know what polypharmacy was and whether it contributes to irrational use of medicines. There is also a need for prescribers to be trained in appropriate prescribing practices. Polypharmacy is the multiple prescriptions of medicines for the same medical condition.

The STGs consist of systematically developed statements to help prescribers make decisions about appropriate course of treatments for specific clinical conditions. The STGs provide benchmark of satisfactory diagnosis and treatment against which a comparison of actual treatment can be made. About 63% of the sampled health facilities lacked STGs for common diseases. The exception was STGs for malaria, HIV and TB. The STGs for these three conditions were readily available and some were in use. Even though some of the prescribers interviewed said they consulted STGs when prescribing and 80% also said they underwent formal training in prescribing, the results showed that there were problems with prescribing of essential medicines in the county and this figure forms majority of the prescribers. Many of the health facilities visited did not have copies of EML; however, most of the medicines prescribed were listed on the EML. Copies of the EML were only identified in the major hospitals covered.

The findings of this study showed that 62% of prescriptions had medicines written in trade names. The 67% generic prescription of medicines was considerably low when compared to WHO stipulated reference value of 100% [50.5 ± 1.2]. According to international standards, the WHO expects 100% of essential medicines to be prescribed in INN and the WHO stipulated reference value for medicines listed on EML being 100% [96.9 ± 0.6]. Liberian situation is not unique with regard to generic prescribing. Similar values have been reported for Ghana⁵¹, Nigeria⁴⁸, Lebanon and Nepal⁴⁰ to mention just a few. In this study, the use of injectables was 26.2%. This is comparatively high as compared to the WHO stipulated standard reference values of 10.1 – 17.0, [53.7 ± 4.3], for prescribing injection as reported from WHO sponsored field test in South Africa, Nigeria.⁴⁷ This figure is much higher than that reported in other countries like Sudan and Uganda⁵², Nigeria.⁴⁶ It is therefore important that efforts to be made by the government of Liberia, professional associations and NGOs to provide education on the danger of high injection use in this era of blood-borne infections like hepatitis B and AIDs / HIV.

The prescribing of antibiotics in the sampled health facilities was (83%) relatively high. The figure includes other anti-infective agents like anti-fungi, acyclovir, co-trimoxazole and metronidazole. The rational use of anti-infective agents especially antibiotics is

necessary to prevent emergence of resistant strains of microorganisms. Other countries in the region do not fare better in the over use of anti-infective agents. In 2004, a study conducted in Kano, Nigeria reported this at 67.7%.⁴⁶ Training of prescribers and other interventions are necessary to preserve antibiotic efficacy and cut down on health care expenditure due to re-treatment. The MoHSW must develop rational medicines use policy and enforce the continuous in-service training of health workers in order to equip them with updated knowledge and practical skills necessary for the effective management and use of medicines.

The study results showed a percentage of encounters with analgesics was 93%, 27% antihelmethics, 43% antacids and 87% other tracer medicines prescribed. This is similar to study conducted in private institutions in Edo and Delta States, Nigeria.⁴⁸ This further demonstrates that these medicines were prescribed to satisfy patients' desires for having received services rather than for therapeutic purposes. However, these medicines may have served the purpose of placebo in many of the cases. The high percentage of analgesics could be due to the fact that these medicines are prescribed concomitantly with other medicines such as antimalarial medicines and many times patients preferred taking pain killers.

Antimalarial medicines prescription was 90% and this justifies high usage of malaria commodities. This is encouraging because it demonstrated that the battle against malaria by the roll back malaria program, INGO such as PMI, GFTAM and various governments is succeeding.⁴⁷ The anti-hypertensive agents' prescription was 37%. This is higher than that seen in a similar study in public facilities in Nigeria.⁵² This could be attributed to the increased number of hypertensive cases reported especially after the war. Liberia has very few specialists and specialist health-care facilities rendering cardiac services. Health facilities rendering cardiac these services are private and expensive for majority.

In the public health facilities of Liberia, a dispenser in Liberia refers to anyone who is not a graduate pharmacist but who is trained to dispense medicines, maintain stock records and assist in the procurement activities of assigned health facility. In this study pharmacists (3%) involved in dispensing of essential medicines work in the referral hospitals. The majority 25 (70%) of the dispensers interviewed were nurse aides who did not have any formal of training. Most of the dispensers were below high school and other learned the art

of dispensing on the job. Even though 29(81%) of these dispensers said they received formal training in dispensing. The results further show that effective practice of good dispensing is far from being achieved considering the skill and knowledge of those serving as dispensers. This implies that the management of pharmaceuticals at facility levels is a problem. Most of the interviewed dispensers demonstrated poor self-esteems and did not consider their practice as important in the healthcare delivery system. This oversight is very unfortunate because the practice of dispensing is a very crucial and integral part of the health sector. To remedy the poor self-esteem of dispensers, supervisors must constantly make the dispensers to know that their work is important and that their practice is significant to the healthcare delivery system. Poor and uncontrolled dispensing practices can have a detrimental impact on the healthcare delivery system and leads to irrational use of medicines which can result to waste of scarce resources.

Many of the dispensaries visited lacked the necessary dispensing tools such as tablet cutters, dispensing spoons, dispensing trays, calculator, dispensing bags, plastic mugs and even utensils for water storage. In addition, the dispensers worked under unhygienic conditions with huge workloads. It is recommended that the government of Liberia provides training opportunities accompanied by appropriate compensations for dispensers to undergo training up to pharmacy technician level. This is necessary to improve the skills and knowledge in commodity management. In other countries, dispensers are trained as pharmacy technicians with skill and knowledge in pharmaceutical management obtained through two years formal training.

During the study, it was observed that prescribing was done on pieces of papers and labeling was inadequate (containing trade names of products, the dosage and frequencies on medicines not properly written). There were long lines of patients seeking services at some public health facilities and the time allocated for information dissemination per patient was not sufficient (less than 5 minutes per patient). The long lines mean the limited staff can spend less than five minutes with each patient. It takes more than five minutes to adequately conduct an assessment, evaluate laboratory reports, and prescribe a treatment regimen. Additionally, many of the health facilities had fewer dispenser workforces with huge patient turnout. This also contributed to the speedy instruction for the dissemination of information of medicines to patients. From the out-patient exit interviews, it was observed that non-adherence to prescribers' prescription was high. Patients did not understand the

instructions on medicines usage because of poor information on medication to patients. Instructions for medicines administration to patients must be simple, cleared and well explained. There should be adequate follow-ups information accompanying explanation from the prescribers to the patients on how to administer prescribed medicines. If the patients are not properly advised, or misunderstand the instructions, then the medications may not be used appropriately. There lack of publicly available and transparent information concerning medicines quality might also be one of the contributing factors.

The average percent availability of medicines in the sampled health facilities was 13.33% with a range of 13% - 97% in all health facilities. The percent availability of sampled medicines in the health facilities was 57% in the private (fairly high) and 43% in public was lower. The private health facilities provide fees for services and justly compensate healthcare providers. Besides in private facilities, commodity management is of high priority and hence medicines are used rationally. Unlike the public health facilities, health providers are not justly compensated. The Commodity management in the public facilities is characterized by stock-out of basic health commodities even though supplies of medicines and medical devices are provided on bi-monthly basis.

The newer and more effective medicines were often unknown to majority of HPs due to lack of information availability or training. On the other hand, large patients' turnout or work load was identified as contributing factor affecting the healthcare providers' judgments also contributing to irrational prescription. The condition is further buttressed by the lack of acceptable government's incentives to the health workers. Stock-out duration could not be calculated in all of the health facilities covered because of the lack of adequate records for the tracer medicines sampled. Only 4 referral hospital and 2 health centers had records of stock duration. However, the stock-out duration of the tracer medicines in those sampled health facilities ranged from 2 to 3 months with highest being in the government owned health facilities. About 66.60% of the referral hospitals and 40% the health centers visited had adequate stock records.

10. The Scope and Limitation of the study

This study was not intended to provide interventions in the medicines use situation in the county even though these are highly important but to provide an overview of the medicines use situation in the county, to help policy analysis and in the design of appropriate intervention in strengthening and promoting rational use of medicines.

The regions and facilities selected cumulatively represent the county situation. However, Liberia is a small country and the majority of the population resides around the sampled areas. It is therefore likely that the results of this study reflect the actual situation of medicines availability and use in the country. Additionally, Even though issues around the RUM also pertain to the private sector, our study did not look at this sector in detail. There is a need for the government to support research work on the rational use of medicines in the private sector.

Main difficulties during field visitation:

Geographical accessibility: Two districts were inaccessible because at the time the data collection, Liberia was experiencing down pull of rain (rainy season).

Some facilities were also closed at the time of the assessment as a consequence; they were replaced with other facilities in the immediate environs.

CHAPTER V

11. Conclusions and Recommendations

11.1. Conclusions

Availability of tracer medicines

- ✓ There were no problems of medicines availability in Montserrado County.
- ✓ There were STGs for malarial, TB & AIDs/HIV but none for other diseases.
- ✓ There were no copies of the NEDL found in the sampled health facilities.
- ✓ There were significant variabilities of medicines availability, prescription patterns, and dispensing patterns.

Prescribing practice

- ✓ Irrational use of medicines (polypharmacy), especially anti-infective agents was evident/high.
- ✓ Irrational prescription practice was observed especially unnecessary prescription of injectables and use of brand names.
- ✓ Inadequate patient counseling on medical conditions

Pharmacists were not found in the clinics and health centers but only in referral hospitals. The public health law of Liberia does not require the presence of pharmacists in clinics and health centers.

Dispensing practice

The study has revealed inadequate skills in dispensing and pharmaceutical management, lacked necessary dispensing tools and poor communication (Inadequate patient counseling on medicines use) between health care providers and patients.

Majority of the healthcare providers lacked basic skills and knowledge in pharmaceutical management. All these show that severe challenges exist to ensuring rational use of medicines in healthcare facilities in Montserrado County.

11.2. Recommendations

This research has thrown up many questions in need for further investigation to obtain a more in-depth understanding of the causes and consequences of the findings. The results of this study provide broad directions for future study and action for effective pharmaceutical management system in the country. It is therefore recommended that the following steps be taken to improve medicine access and rational use:

- ✓ Investigating reasons for the high use of anti-infective agents especially antibiotics and injectables.
- ✓ An investigation into why healthcare providers are not adhering to the use of STGs and EML in their prescribing practices.

For policy implications, these findings suggest the below courses of action:

- ✓ Continuous monitoring and supervision of the medicines management system should be enhanced to ensure health providers' accountability for medicines and quality delivery of health services;
- ✓ Continuous education professional development for health providers is needed to curb indiscriminate prescribing and dispensing especially the anti-infective agents in order to diminish the potential development of resistance and harm;
- ✓ There is a need for the availability of the STGs, NEML and appropriate dispensing tools in all health facilities and prescribers be mandated to adhere to the use of these documents in prescribing medicines;
- ✓ There is a need to enhance rational use of medicines and improve use of NEDL & STGs within health facilities as well as carrying out patient educational interventions for promoting the rational use of medicines;
- ✓ The study underscores the need for vigorous enlightenment on evidence-based prescription practices in all healthcare facilities;
- ✓ The essential medicines concept must be taught at the University of Liberia medical and pharmacy schools.

CHAPTER SIX

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CHAPTER SEVEN**APPENDICES****Appendix 1:****LETTER TO HEALTH FACILITIES**

Dear _____,

Pharmaceuticals and their management are vital components for providing quality services to the Liberian population. Based on this fact, we will be conducting a survey to assess the rational use of essential medicines in selected thirty (30) public health facilities to be able to provide some solutions on the way forward to the use of medicines, medicines management and provide recommendations to address issues of stock-outs if any.

In doing so, your health facility has been selected as one of the thirty (30) public health facilities in Montserrado County to be included in the assessment survey. On day one of our visit, the assessment team will be presenting to you a letter of permission to conduct the survey along with a copy of the approved informed consent from Muhimbili University of Health and Allied Sciences. The visiting team will be at your facility there to gather some information on how medicines are used. The team will be assessing thirty (30) key essential medicines on their availability of other medicines in addition to their uses. While at your facility, our staff will need to access all records and interview your patients.

In this light, we are kindly asking you to permit the survey team to conduct the survey.

Thanks for your cooperation

Best regards

| # | Table-8: List of Health Facilities surveyed |
|----|--|
| 1 | Redemption Hospital |
| 2 | Soniwein Health Center |
| 3 | Duport Road Health Center |
| 4 | Star of the Sea Health center |
| 5 | Slipway clinic |
| 6 | People United Community Clinic |
| 7 | Pipeline Health center |
| 8 | Benson Hospital |
| 9 | JAW Community Clinic |
| 10 | Gardnerville Clinic |
| 11 | Clara Town Health Center |
| 12 | Chocolate city community Clinic |
| 13 | Bardnesville Health center |
| 14 | Agnes Varies Health Center |
| 15 | SDA Cooper Hospital |
| 16 | R.H Ferguson Clinic |
| 17 | Kpallah Clinic |
| 18 | A.F.Russel Clinic |
| 19 | Imani House Clinic |
| 20 | James N. Davies Hospital |
| 21 | Snapper Hill Clinic |
| 22 | ELWA Hospital |
| 23 | P.K.Nyansaige Medical Clinic |
| 24 | Bromely Clinic |
| 25 | Blamacee Clinic |
| 26 | Banjor Clinic |
| 27 | St.Joseph Catholic Hospital |
| 28 | Mawah Med. Clinic |
| 29 | RCD Marshall Clinic |
| 30 | Chocolate city clinic |

The above health facilities were classified based on location in each district. Only three districts were assessed at the time this study. Health Facilities that were inaccessible were replaced by other facilities near to the districts.

Appendix 2: Instructions for Data collectors

This study is to be applied to selected public hospitals, health centers and clinics within assessable areas in Montserrado County. On arrival at the health facilities, the data collectors must ask to speak to the officer in charge (OIC) of the clinic or health center or medical director of the hospital and take a brief tour in order to be able to understand the patient flow, where to locate the desired patients, and the existence and location of the necessary records. Present the letter of introduction from MoHSW-SCMU and a copy of Muhimbili University of Health and Allied Sciences (MUHAS) informed consent. Explain the purpose of the research and the amount of time required to complete the questionnaire (about one to one and a half hours). Respond to any questions or concerns about confidentiality and obtain permission to carry out the survey. It is essential for the data collectors to carry out these activities before data is collected otherwise incomplete or incorrect data might be gathered.

The data collectors confirmed the availability and accessibility of the necessary records:

- ✓ Location of the general outpatient encounter records;
- ✓ Patient records;
- ✓ Stock records;
- ✓ The presence of physical stock from among the thirty (30) surveyed medicines.

| Table 9: General Checklist | |
|--|--|
| Questionnaire number: _____ | |
| Name of Health Facility: Hospital (), Health Center (), Clinic () | |
| District: _____, Location: _____ Date: _____ | |
| Investigator: _____ Contact: _____ | |
| Qualification and position of interviewee: Medical Doctor (), Pharmacist (), Registered Nurse (), Physician (Medical) Assistant (), Nurse Aide () other () | |
| In the below questionnaires, select the appropriate answer that suits your situation: Yes! or No! | |
| 1. Does your facility have assigned & trained certificated dispenser? Select Yes! () or No! () | |
| 2. Who is dispensing during the time of visits? Dispenser: (), Pharm () Nurse (), OIC Other() | |
| 3. Where any of the thirty (30) surveyed medicines available? Yes! () NO! () | |
| Table 10: Study Indicators | |
| •Prescribing practices in health facilities in Montserrado County | |
| 1. Percentage of medicines prescribed by generic and trade names; | |
| 2. Percentage of medicines prescribed from the essential medicines list or formulary; | |
| 3. Percentage of encounter with antiinfectives prescribed; | |
| 4. Percentage of encounter with an injection prescribed; | |
| • Patient Care in health facilities in Montserrado County | |
| 1. Percentage of medicines actually dispensed; | |
| 2. Percentage of patients who know how to take their medicines per indication; | |
| • Public Facility Indicators | |
| 1. Availability of standard treatment guidelines and essential medicines list or formulary; | |
| 2. Availability of thirty (30) sampled medicines in health facilities; | |
| 3. Percentage of prescriptions written in accordance with treatment guidelines; | |

Table 11: List of 30 Tracer Essential Medicines

| # | Description of medicines |
|----|--|
| 1 | Artesunate 50mg tablets + Amodiaquine 153 mg |
| 2 | Acetylsalicylic Acid 250mg tablets |
| 3 | Aluminum Hydroxide 500mg tablets |
| 4 | Albendazole 500mg tablets |
| 5 | Aminophylline 10ml Amp. |
| 6 | Acyclovir 200mg tablets |
| 7 | Amoxicillin 250mg tablets |
| 8 | Benzyl penicillin 2.4 miu |
| 9 | Cimetidine 200mg tabs |
| 10 | Co-trimoxazole 480mg tabs |
| 11 | Metronidazole 200mg tablets |
| 12 | Oral Rehydration Salts 1 liter 20.5mg sachet |
| 13 | Paracetamol 500mg tablets |
| 14 | Quinine Sulphate 300mg tablets |
| 15 | Vitamin B-Complex |
| 16 | Ferrous 5mg+ Folic Acid 25mg |
| 17 | Ringer Lactate 500ml |
| 18 | Griseofulvin 250 mg tablets |
| 19 | Oxytocin 10 iu/ml |
| 20 | Normal saline 0.9% sodium chloride , 500ml |
| 21 | Hydrocortisone 100mg tabs |
| 22 | Diazepam 5mg tablets |
| 23 | Penicillin V.K. inj. |
| 24 | Epinephrine 1 mg/ml |
| 25 | Folic Acid 5mg tablets |
| 26 | Methyl Dopa 250 mg tablets |
| 27 | Propranolol HCL 40mg tablets |
| 28 | Multivitamin tablets |
| 29 | Ascorbic Acid 250 mg tabs |
| 30 | Hydrochlorothiazide 25mg tabs |

STUDY QUESTIONNAIRES

Appendix3: Health providers' interviews Questionnaires

GENERAL INSTRUCTIONS

Interviewer Name _____ Facility: ____ Sex: F () M () Age _____ yrs, Date: _____

Good morning/afternoon, Dr. /Mr./Ms. _____,

In trying to learn more about your work in the health centers, we are interviewing health care personnel in selected of the public health facilities in Montserrat County. Your input will be extremely valuable as the collected information will be used to identify the needs of each health facility and to make proper recommendations to the MoHSW/R.L for action.

No identifying names or characteristics will go into our report, so you may share your thoughts openly. Would you be willing to assist us by having a 30-45 minute interview with me?

1. Interview accepted: ____ Yes ____ No
2. What formal education have you received? __ Less than High School __ High Sch. __ Univ.
3. Are you patient screener? __ Yes ____ No. If yes which profession?
4. How long have you been screening patients and prescribing medicines? _Yrs_ month (s)
5. Are there any standard treatment guidelines in your health facility? __ Yes __ No
6. Did you receive any training in the use of STGs? ____ Yes ____ No
- 7 Are you supervised when working? ____ Yes ____ No
8. How many times have you received supervision in the last year? ____ Times
9. Have you received formal any training in prescribing medicines? ____ Yes ____ No
10. When did you receive the training? ___/___/___ (dd/mm/yy)
11. Does polypharmacy increase irrational use of medicines? Yes____ No ____

Appendix-4: Dispensers' interviews Questionnaires

1. What formal education have you received? ___below high school. ___ High School ___Univ. ___ Professional/Technical
2. What is your profession? ___Pharmacist ___ Nurse, ___Nurse Aide,___ Other
3. Do you dispense medicines? ___ Yes ___ No
4. How long have you been dispensing? _____ Years _____months
5. When working, do you receive supervision? Yes ___ No ___
6. How do you feel about the supervision you receive? Not at all helpful ___Extremely helpful___ Do not know___
7. Do you have suggestions or changes you feel would be useful? _____
8. Have you received any training on dispensing medicines? ___Yes ___No
9. How long was the training? _____ (Hours, days. or months - specify)

Appendix 5: Out-patient exit interview Questionnaires

1. How many different medicines are there in your hand? Number _____
2. Can you tell me the indication for each medicine? (e.g. pain, itching, infection, etc.).
(Data collector) Did person correctly identify what ALL medicines are for? Yes _No_
3. For each medicine, can you tell me how and when to take them? (Data collector) Did the person correctly describe quantity and frequency of ALL drugs to take? Yes _No _
4. Are you satisfied with the service you received? Yes___ No___

Table 12: Prescribers' views and responses on irrational use of medicines

| Parameters | Percent of Prescribers | |
|--|------------------------|-----|
| | YES! | NO! |
| Does polypharmacy increases irrational use of medicines? Polypharmacy = as the concurrent use of 2 or more medicines by the same patient. | | |
| Is polypharmacy a component of irrational medicines use? | | |
| Did you attend a seminar or workshop on Rational Use of Medicines (RUM)? | | |

Table 13: Pharmacists' and /or Dispensers' responses on dispensing practices

| Parameters | Percent of Pharmacist/Dispensers' | |
|--|-----------------------------------|-----|
| | YES! | NO! |
| Assess prescription validity? | | |
| Double check prescriptions before dispensing? | | |
| Explain possible side effects to the patients? | | |

Table 14: Pharmacists' and or/ Dispensers' patients care

| Parameters | Percent of Pharmacist/Dispenser | |
|---|---------------------------------|-----|
| | YES! | NO! |
| Availability of appropriate dispensing tools? | | |
| Explain the effect of medicines? | | |
| Explain in detail to the patients on how to take medicines? | | |

Table 15: Rational Use of Medicines Questionnaires

| District: _____ Date:(dd/mm/yy): _____ | | |
|---|--|-----------------------------------|
| Name of respondent(s): _____ Position(s): _____ | | |
| # | Questionnaires | Responses |
| 1 | Are there standard treatment guidelines in your health facility? (STGs are recommendations on how to treat a clinical condition) | Yes! =1 No! = 0 |
| 2 | Are there essential medicines lists (EMLs) in your health facility? | Yes! =1 No! = 0 |
| 3 | Has there been any public education campaign on rational medicines use for the past years conducted by the MoHSW? | Yes! =1 No! = 0 Don't know = X |

MD = Medical Doctor, P= Pharmacist, MA = Medical Assistant, RN = Registered Nurse,
NA = Nurse Aide.

| Table 18: Out-patient exit interview Data entry form | | | | | | | | |
|--|--|-------------------|------------------------------|------------------------------------|--|-----------------------------------|--------------------|-------------------------|
| | HOSPITALS | # of Meds in Hand | Understands Meds instruction | KNOWS HOW & WHEN TO take medicines | KNOWS HOW TO take medicines by indications | Precaution received for medicines | Paid for medicines | Satisfied with services |
| 1 | Seven Day Adventist Hospital | | | | | | | |
| 2 | Redemption Hospital | | | | | | | |
| 3 | Banjor Clinic | | | | | | | |
| 4 | Blamacee Clinic | | | | | | | |
| 5 | Imani House Clinic | | | | | | | |
| 6 | Star of the SEA Catholic Health Center | | | | | | | |
| 7 | Bromley Clinic | | | | | | | |
| 8 | A.F.Russell Clinic | | | | | | | |
| 9 | Kpallah Clinic | | | | | | | |
| 10 | R.H. Ferguson Clinic | | | | | | | |
| 11 | Gardnerville Health Center | | | | | | | |
| 12 | JAW Clinic | | | | | | | |
| 13 | Bardnesville Health Center | | | | | | | |
| 14 | PUC Clinic | | | | | | | |
| 15 | E.L.W.A. Hospital | | | | | | | |
| 16 | Pipeline Clinic | | | | | | | |
| 17 | Duport Health Center | | | | | | | |
| 18 | RCD Marshall Clinic | | | | | | | |
| 19 | Slipway Clinic | | | | | | | |
| 20 | Soniwein Health Center | | | | | | | |
| 21 | Clara Town Clinic | | | | | | | |
| 22 | James N Davies Memorial Hospital | | | | | | | |
| 23 | St.Joseph Catholic Hospital | | | | | | | |
| 24 | Snapper Hill Clinic | | | | | | | |
| 25 | Mawah Clinic | | | | | | | |
| 26 | Ahmadiyya Clinic | | | | | | | |
| 27 | P.K.Nyansaige Clinic | | | | | | | |
| 28 | Dr. Agnes Health Clinic | | | | | | | |
| 29 | Chocolate City Health Clinic | | | | | | | |
| 30 | Benson Hospital | | | | | | | |

| Table 20: Summary form | | # of copies needed for | | | Total copies |
|---|--|------------------------|-------|--------|--------------|
| Health facility pharmacies/dispensaries | | Training | Pilot | Survey | |
| SF-1 | Availability of the thirty(30) sampled medicines | 5 | 5 | 30 | 40 |
| SF-2 | Average # of medicines per prescription % medicines dispensed or administered % medicines adequately labeled % of patients who know how to take medicines | 5 | 5 | 30 | |
| Health facilities | | Training | Pilot | Survey | Total copies |
| SF-3 | Average # of medicines per prescription % of patients prescribed antiinfectives / injections % of prescribed medicines on the NEML % of medicines prescribed by generic names (INN) | 5 | 5 | 30 | 40 |

INFORMED CONSENT AGREEMENT

Appendix 6:



INVITATION

Good morning / Good afternoon

My name is _____

From Muhimbili University of Health and Allied Sciences (MUHAS), Dar Es Tanzania.

You are invited to take part in a research project, which aims to ascertain (find out) the use of medicines in selected public health facilities Montserrat County. Your decision to take part in this assessment is voluntary and you may refuse to take part or to stop taking part at any time of the study and may refuse to answer any questions asked.

This assessment has to approved by Prof.M.M About (The Directorate of Research and Publications of the Muhimbili University of Health and Allied Sciences (MUHAS), Dar Es Salaam, Tanzania (Email address:drp @muhas.ac.tz ,Phone number:+255222152489).

Additionally, permission to do research has been obtained from the Dr. Bernice T. Dahn, Chief Medical Officer (CMO), Liberia MoHSW-Liberia, P.O. Box, Contact number:+2316557636 email:bernicedahn59@yahoo.com

PROCEDURE

If you agree to participate, you will be interviewed today. The interviewer (s) will be asking you about the availability, accessibility, consumption and management of essential medicines in your health facilities. This interview will take about 30 to 45 minutes.

BENEFIT

The information you provide will help the researcher to design a better strategy for intervening the problem of pharmaceutical management in public health facilities in Montserrado County. Additionally, the information will help to further strengthen the ongoing supply chain implementation activities in the County.

Your information will be very useful to the research, policy makers, communities and other beneficiaries of the pharmaceutical sector of Liberia.

RISK /DISCOMFORT

Some of the questions may be sensitive and personal, so you might feel uncomfortable at the same time we are going to take your time.

ALTERNATIVE

The only alternative is not to take part in this study

STUDY WITHDRAWAL

You can decide to stop being a participant at any time. During the interview, you can stop the interview by asking the interviewer to stop. The interviewer may stop you from being in the assessment if he or she believes you are unable to answer questions.

QUESTION OF COST AND COMPENSATION

The exercise is voluntary, therefore there will be no payment given to the participants.

CONFIDENTIALITY

All the information provided will be confidential. Code number will be used on the information you will provide in research record. The researcher will not use your identity in what so ever means in any report or publication of this research.

ANY QUESTIONS ON STUDY

| |
|--|
| In case you have any question (s) please feel free to asked the principle Investigator: Pharm. John T. Harris, contact numbers:+231688737310 or +255769672174 |
| Prof. Kennedy Mwambete cell number:+255787508782, Assistant Dean, Muhimbili University of Health and Allied Sciences. |
| Dr.Lloyd Matowe-Country Director, PharmaSystAfrica, +231886735886 |
| ACCEPTANCE |
| If you have understood and ready to participate in the research, please sign below: |
| Signature of the respondent / or witness: _____ Date:_____ |

_____ Date:_____