



DEBRE MARKOS UNIVERSITY, COLLEGE OF HEALTH SCIENCE  
DEPARTMENT OF PUBLIC HEALTH.

DRUG USE PATTERN AND ITS ASSOCIATED FACTORS AT OUTPATIENT  
PHARMACY IN DEBRE MARKOS REFERRAL HOSPITAL, EAST GOJJAM,  
NORTHWEST ETHIOPIA.

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Drug use Pattern and Its Associated factors At Outpatient Pharmacy In Debre Markos Referral Hospital, East Gojjam, Northwest Ethiopia.

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## Abbreviations

ADR	Adverse Drug Reaction
DTC	Drug Therapy Committee
EDL	Essential Drug List
FDC	Food and Drug Control
GITI	Gastro Intestinal Tract Infection
OPD	Outpatient Department
RDU	Rational Drug Use
RTI	Respiratory Tract Infection
STG	Standard Treatment Guide line
UTI	Urinary Tract Infection
WHO	World Health Organization

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## ABSTRACT

**Background:** Worldwide, half of medicines were used irrationally, only half of all patients take their medicine correctly. Irrational use of drugs leads antibiotic resistance, drug related problems and increase drug cost. WHO developed core drug use indicators for evaluation of drug use pattern and to identify drug use problems in health care settings.

**Objective:** To assess drug use pattern and its associated factors at outpatient Pharmacy in Debre Markos Referral Hospital.

**Methods:** Facility- based cross -sectional study design was employed to assess the drug use pattern and its associated factors. Systematic random sampling was used as sampling technique. The data collection process was based on prescription recorded. Data was entered in to EPI Data Version 3.1 and analyzed using computer software SSPS version 20. Descriptive statistics and multivariate logistic regression analysis model were used. Variables with, a P-value <0.25 in bivariate analysis were included in the multivariate logistic regression model. The cut off P-value for statistical significance was 0.05.

**Results:** The mean number of drugs per patient encounter was 2.14. The prevalence of antibiotics were 39.3% (95%CI: 35.5-43.5), polypharmacy was 62.2% (95%CI: 58.3-66.2) and injections were prescribed 13 % (95%CI: 10.2-15.7) in a total prescriptions surveyed. The percentage of drugs prescribed with generic name was 95.5% and the percentage of drugs prescribed from the Debre Markos Referral Hospital drug list was 99.8%. In multivariable logistic regression co-morbidities, training and prescriber experience were all found to be significantly associated with polypharmacy and patient age, co-morbidity, chronic condition, training and type of disease were significantly associated with antibiotic prescribing.

**Conclusion:** The results show, inappropriate prescribing, particularly the prevalence of polypharmacy and antibiotics were high. Continuous seminars and trainings on prescribing about rational prescribing and periodic prescription surveys recommended to identify any forms of irrational prescribing. The findings of such studies should be disseminated to all healthcare workers and particularly for prescribers, followed by relevant interventions to correct any problems identified

**Key words:** WHO drug use indicators, drug use Pattern, factors for drug use problem.



## Chapter one: introduction

### 1.1 Background

Assessment of drug use pattern is a method of obtaining information to identify problems related to drug use and if properly developed, it also provides a means of correcting the problem and thereby contributes to rational drug use(1).

Irrational drug use continues to be serious and widespread public health problem in developing countries because of the shortage of trained personnel, gap of knowledge and economically problems (2-4). Resistance to antibiotics, inappropriate prescribing, inappropriate dispensing and inappropriate patient use of medicines in the diagnosis, prevention and treatment of diseases a major public-health concern globally (5, 6).

Based on WHO definition: "irrational use of drugs requires that patients receive medications inappropriate to their clinical needs, dose not that meet their own individual requirements for an adequate period of time (7). Worldwide, irrational drug use is estimated that over half of all medicines are prescribed, dispensed or sold inappropriately, and only half of all patients take their medicine correctly. Irrational use occurs when one (or more) of core drug use indicators is not met based on WHO indicators ((8-11).

In the world, the use of wrong or unnecessary drug use seriously affects public health. This effect leads to decreased treatment outcome, the risk of resistance to drugs, increased treatment costs and risk of death. (12, 13). There are numerous ways to decrease and avoid of these medication errors like establishment of committees to coordinate policies on rational drug usage, appropriate implementation and enforced regulation of clinical guidelines, continuing assessing, monitoring and evaluating drug use utilization (14-16).

WHO develop core drug use indicators for evaluation of drug use pattern in developing country healthcare settings. The indicators were validated by WHO for measurement of drug use. There are two major categories of core drug use indicators, namely, prescribing indicators, and health facility (14, 17). The core drug use indicators are more informative, more feasible, less likely to fluctuate over time and place as well as easier to measure drug use(18, 19).

## 1.2 Statement of problems

Irrational drug use is a global problem. The problem includes prescribing using brand names, polypharmacy, overprescription of antibiotics and overuse of injections among other practices(20). Prescribing using proprietary brand names poses a great challenge during dispensing. Brand name prescribing also increases drug costs since for most of the innovator branded drugs are more expensive compared to the generic products(20). Polypharmacy is associated with increased risk of drug-drug interactions which may result in adverse drug reactions, decrease adherence of patients due to pill burden and unnecessary high drug costs, Overprescription of antibiotics increases the risk of drug resistance as well as increasing drug costs, while injections overuse increases the risk of tissue injury and transmission of blood-borne diseases such as HIV/AIDS and Hepatitis B. Moreover, injections are relatively more expensive compared to oral medications (8, 20). Analysis of prescriptions and drug utilization studies can identify the problems and provide feedback to prescribers so as to create awareness about irrational prescribing and put mechanisms in place to curb the problem (8, 17, 20).

Annually, multi-drug resistant bacteria are estimated to claim the lives of more than 20,000 patients in North America, 25,000 patients in Europe and more than 90,000 patients in Southern Asia(21). Deaths from drug-resistant infections are projected to increase from the current 700,000 to 10 million annually, and cost estimates are expected to be as high as US\$ 100 trillion worldwide by 2050(22).

A study, done in Australia indicated that 69% of peoples reported a history of injury related to injection drug use (23). irrational use of medicines also inadequate dosage, use of antimicrobials even for non-bacterial infections, excessive use of injections when oral forms are available and inappropriate drug use (24). Poor availability of clinical guidelines like STG, Formulary and drug list in a health facility can affect rational drug use in the facility. Inadequate continuous training for health professional, lack of essential drugs, workloads also can cause irrational drug use in the facility (18).

In Ghana drugs use evaluation shows high prevalence of polypharmacy, overuse of antibiotics and underuse of drugs prescribed by their generic names (24). Similarly, in Hawassa, study shows high prevalence of inappropriate drug use (8).

Most drug use pattern done in facilities indicates, the irrational drugs use is the most challenge in Ethiopia and irrational prescribing of drugs leads to misuse, overdose, underdose, toxicity, adverse drug reaction, cost and shortage of the availability of drugs nationally and health facility (25, 26). injections were found out to be unsafe for the health workers, recipients was 74% (27).

A Study done at Jimma University Hospital, from a total of 2072 medication ordered, 58 ADRs were identified and from this 47 % of ADR due to errors in the administrations of medication use; 91 % caused temporary harms and 9 % resulted in permanent harm/death (28).

A study done in Kenya and Zambia, Age and Sex of the patient, the disease status of the patient and prescriber related factors (qualification, age, sex, years of experience, training) are proximal independent variables with drug use pattern/prescribing practice (20, 29).

In Ethiopia, most studies indicate that, drug use evaluation was unmeet WHO drug use indicators and limited study done on identifies the possible factors. Drug prescribing practices have not been studied extensively in Ethiopia, hence there is limited data on the extent of irrational prescribing in healthcare facilities in the country. The types of irrational prescribing should be characterized so that strategies can be targeted towards solving specific problem. Irrational antibiotic drug use, over injectable drugs use, polypharmacy and non-generic name drugs use was the major drug prescribing problems in the majority of health facility (31).

Interventions were made with different studies, like Continuous drug use monitor and evaluation facility, and make sure the local drug information resource like drug formulary, STG. prepare rational drug use campaigns, make aware about patients for their medications, ministry of health also strength the health worker and facilities(8, 29). Identifying prescribing problems with drug use and rationalize drug use problems in most facilities (24, 29)

### 1.3 Justification of study

Studies done in various countries have reported a remarkable degree of irrational prescribing of drugs in healthcare facilities(20). The rational use of medicines for all medical conditions is fundamental to the provision of universal access to adequate health care. It is crucial measurement drug use be taken to improve the correct use of medicines by identifying associated factors with drug use patterns (19).

In Debre Markos Referral Hospital Stock out drugs were high and the availability of drugs were decreased from time to time. The poor treatment outcomes for some antibiotics were increasing and disease pattern increase. Drugs prescribed with non-generic name were increased in hospitals. This study used to determine the drug prescribing practices in the Debre Markos Referral Hospital so that mechanisms can be put in place to address any gaps found. Identification of risk factors for inappropriate prescribing as well as the prescribers and practices would help in addressing the root cause of the problem and make an intervention and provide solution for all possible problems in Debre Markos Referral Hospital, East Gojjam, and Northwest Ethiopia 2019.

## 1.4 Significance of study

The significance of the study is to evaluate the extent of drug use and associated factors that are affecting drug prescribing patterns. The study will provide evidence with drug use evaluation and identify the problems with rational drug use at the facility. Used to overcome these problems with regular assessing, monitoring and evaluating drug use patterns based on WHO drug use criteria. The study is significant to address the finding for prescriber, health worker and hospital DTC. The study is significant for the next researcher for further study. It also will provide available information on drug use patterns for programmers to planning, intervention, monitoring and evaluation of drug use.

## 1.5 Literature review

### 1.5.1 Patient Socio-demography

In a study done at Saudi Publican, 550 prescriptions were analyzed, a mean of 2.8 drugs per prescription. Drugs were prescribed by generic name was 39.2%. antibiotics were 66.2% and 46.0% of contained injectable drugs (32).

In a drug use utilization done in Greece Drug use and Polypharmacy were more common among women and increased with age. Advanced age 65+ (OR: 11.6), prescriber education (OR: 2.3), co morbidity (OR: 6.8) were associated with a higher likelihood of using drugs. Polypharmacy depended on co morbidity, and increased age, but insignificantly with gender(33)

In a study done in Catalonia, Spain, age and gender influence prescription drug use, the overall prevalence of drug use was 74.5%. This was higher in the group of 0–4 year-olds, and in the 55 year-olds. Age ( $P < 0.001$ ) produced a statistically more significant effect than gender ( $P < 0.05$ ) (34).

A study done on evaluation of drug use in Ghana, showed Patient age and sex were significant determinants of antibiotic prescribing patterns and injection use. Antibiotics and injection were more prescribed for younger patients compared with older patients (35).

A study done in Zambia, at Kapiri Mposhi District Hospital, showed Prevalence of irrational drug use was 51.4%. antibiotics 65.4% and polypharmacy 52.2%. A mean 2.5, drugs were prescribed, prescribing by generic name 56.9% , injections were 9.7% , drugs were from the essential drugs list 95.9%) while drug availability was 92% (29). Patient age and sex were the main determinants of irrational drug use. Age one-year increase in age reduced the odds of using injections by 1%, although this was not influenced by gender (29).

A study done on rational use of medicines in Brazil, indicted there was a significant association between the number of drugs per encounter and patient age. aged <65 years, most patients were prescribed only one drug and patients aged  $\geq 65$  years were prescribed a mean of 2.6 drugs, which was significantly different from the value obtained for younger patients with a mean of 2.1 drugs. Aged <65 years were prescribed two or more antibiotics, while antibiotics received by elderly patients was 2. The most commonly prescribed antibiotics were amoxicillin (23.6%),

cephalexin(14.6%), metronidazole (14.2%), sulfamethoxazole and trimethoprim (9.4%), norfloxacin (6.9%), ampicillin (5.2%), and azithromycin (5.2%), accounting for 79.1%(36).

A study done on prescribing Pattern in the Tertiary Care Hospital in South India , A total of 608 prescriptions, average prescribed drug was 3, percentage of antibiotic was 58.04% and percentage of generic form were 1.42% (37).

A study done on prescribing practice and associated factors in Asmara; showed that Eritrea Patient age, gender and were significantly associated with antibiotics. Subjects under the age of 15 were approximately three times more likely to be prescribed antibiotic compared to subjects whose age was 65 and above (AOR: 2.93 (38).

A study done on assessment of antibiotics Prescribing at Health care Facilities in Addis Ababa, showed Amoxicillin was 44.8% prescribed antibiotic and upper respiratory tract infection was the most common diagnosis. Prescribing antibiotics to patients in the age group of 0–14 years and 15–34 years were about 4 times and 2.5 times higher, respectively, than patients in the age group of 55 years and above. But patient sex not significantly associated with antibiotic prescribing. male OR 0.955 with constant female(22).

In a study done at Tigray region on a total of 768 prescriptions showed, average number of drugs were 1.77, antibiotic 45.3% ,drugs were prescribed by generic name72.4%, 16% prescriptions had injections and drugs were prescribed from essential drug list 98.0%(39).

### **1.5.2 Prescriber related factors**

In a study conducted at the outpatient Federal Neuropsychiatric Hospital, Yaba, Lagos, a total of 600 prescriptions showed, Mean drugs per encounter was 3.5 and generic name prescribed was 58.5%. A significantly higher proportion of prescribers who prescribed four or more drugs per encounter were junior doctors 59.7% compared to senior doctors and consultants 40.3% and higher proportion of prescribers who prescribed drugs in non-generic names were junior doctors 61.3% compared with senior doctors 38.7%) (6).

Study done on polypharmacy Among the Elderly in Norway, general practitioner contributes importantly to polypharmacy, an increased general awareness of the problem and its

consequences focus on the practice situation may influence prescribing and necessarily training was important(40).

A study done on the variation of polypharmacy in Malaysia in prescriber status showed; Prescribers with specialization had five-fold higher odds of polypharmacy prescribing while none of the factors at practice level were significantly associated with polypharmacy. Was patient with multi-morbidity, where they had five times higher odds of having polypharmacy compared to patients with single morbidity(41).

A study done in Ghana, indicted that Patient's characteristics such as age, higher co-morbidity have significant effects Physician characteristics, including gender, age, time since graduation, and volume of practice, significantly influence antibiotic prescribing. A higher ratio of specialists to general physicians and over-prescription in the previous year had a higher antibiotic prescribed (OR, 4.8 )(42).

Study done on doctor's injection prescribing in China, prescriber who had full-time medical education prescribed less injections than those without full-time education (OR=0.65) The injection proportion was higher among children less than 3 years old in comparison with adults aged 18–44 years (OR=1.72) (43).

A study done on assessment of prescriber practice in the London Hospital, among junior doctors' reported confidence in prescribing antimicrobials was greater among those with more experience, i.e. their number of years in practice. Having training were less prescribed antibiotics (OR 0.32), men were significantly more likely to prescribed being confident than women (OR 2.5) .the older age of prescribers were significantly more likely to prescribed antibiotic(OR 3.17) (44). physician specialty was significantly associated with antibiotic use(45).

Study done in Kenya, Prescriber qualification was significantly associated with antibiotic prescribing. Medical practitioners were 43% less likely to issue a prescription with an antibiotic compared to clinical officers (AOR= 0.57) nurses and dental officers were 71% less likely to issue a prescription with an antibiotic. compared to clinical officers (AOR 0.29) (20).

A study done on antibiotic prescription patterns for upper respiratory tract infections in the outpatient Qatari population in the private sector, the largest number of prescriptions came from

General Practice physicians; Showed the inappropriate prescription rate was lowest among the Pediatrics physicians (34%) and higher among the Emergency Department physicians (74%) for URTIs. (46).

A Study done on prescribing practice and associated factors in Asmara; showed with the gender of prescriber, males were more likely to be prescribed antibiotic than females (AOR: 1.57) (38).

### **1.5.3 Disease related factors**

A study done on drug prescribing pattern in a tertiary care teaching hospital in Madurai showed, the average number of drugs per prescription was 3.75, antimicrobials which accounted for 27% and only 3.5% were prescribed by brand names. Amoxicillin was the preferred drug. Since upper respiratory tract infection was at the top of the morbidity list, clinicians tend to prescribe amoxicillin. (2).

A study done on Polypharmacy at Funen in European journal indicated; the odds ratio (OR) for major Polypharmacy was substantially increased for individuals treated for cardiovascular diseases (OR, 4.5), anaemia (OR, 4.1) and respiratory diseases (OR, 3.6) (47).

A study done on sex difference on drug prescribing in Swedish population during 2006; showed the odds of having prescription drugs for males was less compared to females (OR 0.45). After adjustment for age, multi-morbidity and prescription drugs used to treat diseases that afflict females to a higher extent than males, the odds ratio of having prescription drugs for males increased to OR 0.82 (48).

A study done on drug utilization pattern in Asian Tertiary care; teaching, the prevalence of Diseases showed; cardiovascular system (57.6%), Diabetes mellitus (12.1%), respiratory conditions (6.8%) and Psychiatric diseases (1%) have been frequently encountered respectively. There was significant association was found between co morbidity and polypharmacy ( $p < 0.001$ ) but not with gender(49).

A study done on among Pennsylvania Medicaid fee-for-service recipients Upper respiratory tract infections (URIs) are one of the most frequent disease. The presence of any acute concurrent illness was significantly associated with antibiotic use, the strength of association was greatest in

the youngest age group (OR 4.63) .the presence of chronic and co morbidity were associated with drug use (45).

Study done on the Kenya presence of co morbid conditions and chronic condition were strongly associated with polypharmacy and antibiotic prescribing. Prescriptions for co-morbid conditions were 6.3 times more likely to exhibit polypharmacy compared to the ones with non co-morbid. The prevalence of polypharmacy in prescriptions for chronic conditions was eight-fold that of prescriptions for non-chronic conditions. Prescriptions for co morbid conditions were 4.78 times more likely to have an antibiotic prescribed compared to the ones with no co morbidities (AOR 4.78). This may be explained by the fact that co morbidities usually involve several diseases which require different management approaches including antibiotic use. presence of chronic condition were 0.14 times prescribe antibiotics(20).

A study done in Ghana, antibiotics commonly prescribed were amoxicillin (26.7%), metronidazole (18.2%), flucloxacillin (8.9%), amoxicillin/clavulanic acid (8.2%), ciprofloxacin (8.2%), erythromycin (4.7%), chloramphenicol (3.4%) and co-trimoxazole (2.8%). URTI diagnosis and musculoskeletal disorder diagnosis each independently significantly were associated with an antibiotic prescription(42).

A study done on antibiotic assessment at Addis Ababa showed; URTI (49.5%) AFI(80.8%),and diarrhea (29.4%) were the most common diagnosis for the prescribing of amoxicillin, amoxicillin + clavulanic acid, ciprofloxacin, doxycycline, and cotrimoxazole, respectively(22).

#### **1.5.4 Health Facility**

A study done on the description of the pattern of rational drug use in Ghana Police Hospital indicted; from 120 outpatients, Average number of drugs was 3.7 , drugs prescribed by their generic names were 62.6 % , drugs prescribed with injection and antibiotics were 8.3% and 11.9% respectively, Percentage of key drugs and treatment guidelines availability were 75.8% and 77.8% respectively (24).

In Asian Tertiary care, teaching, the mean number of drug prescribing per prescriptions was 4 OPD. The prevalence of polypharmacy was 62.5%. Drugs prescribed by their generic names were 71.3% in OPD and 98% of the drugs that were included in the National Essential Medicines(49).

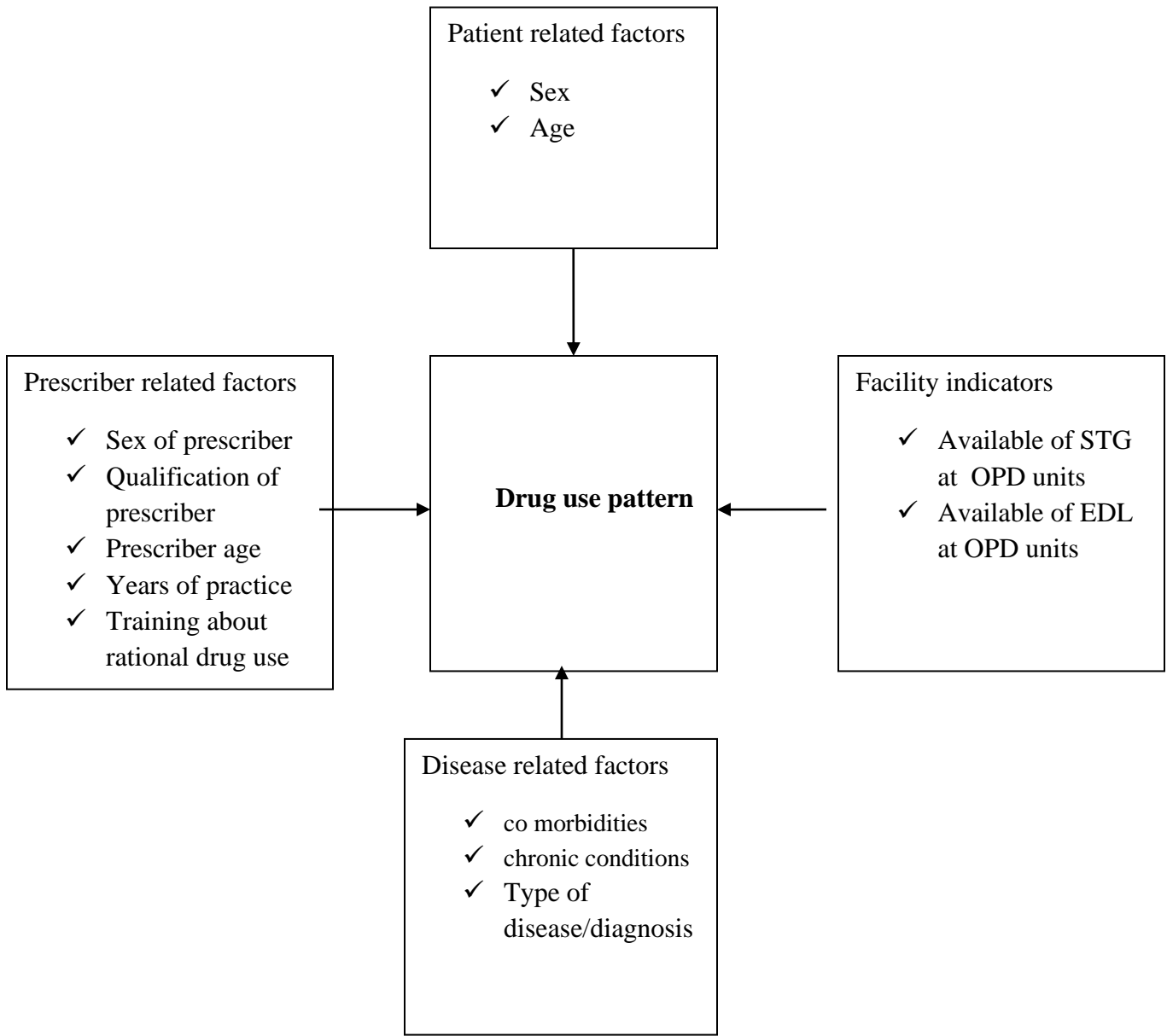
Prescribing practice and associated factors in Asmara; the average number of drugs per prescription was 1.76, the drugs were prescribed using generic names was 83.14%, the percentage of antibiotics were 53% and the percentage of injections were 7.8%. While 98.39% of the medicines were from the National Essential Medicines List (38).

A study done in Hiwot Fana Harar showed; the average number of drugs was 1.7, the percentage antibiotic and injection was prescribed 57.2% and 59% respectively. The percentage of drugs prescribed by generic name and from an essential drug list (EDL) were found to be 92.1% (954) and 68.94% (708 respectively)(17).

Study done on evaluation of drug prescription pattern in Tikur Anbessa specialized hospital showed; the average number of drugs per encounter was 2.84, drugs which were prescribed by generic name were 97.9% , drugs from Essential Medicine List was 99.3% and use of antibiotics which accounts 6.6% (50).

Study done on assessment of drug prescription pattern in Two District Hospitals, Northwest Ethiopia, showed; the average number of drugs prescribed per encounter was 2.1, The percentage of antibiotic or injection was 58.8% and 3.6%, respectively, while drugs prescribed by generic name and from an essential drug list was 98.4% and 81% respectively. Amoxicillin (9.2%), ciprofloxacin (6.2%), and doxycycline (4.8%) were among the common antibiotics prescribed(51).

### 1. 5.6 Conceptual frame work



**Figure 1: the conceptual frame work Drug use pattern and its associated factors at Debre Markos Referral Hospital adopted from literature review (6, 20, 29, 34, 52).**

## **Chapter two- objectives**

### **2.1 General objective**

Drugs use pattern and its associated factors at outpatient Pharmacy in Debre Markos Referral Hospital, Amhara Regional State, Northwest Ethiopia, 2019.

### **2.2 Specific objectives**

- ✓ To determine the drug use pattern at the outpatient pharmacy in Debremarkos Referral Hospital.
- ✓ To identify associated factors with drug use pattern

## **Chapter three-Methodology**

### **3.1 study area and study periods**

The study was conducted at Debre Markos referral hospital, the capital city of East Gojjam zone. It is located in Northwestern Ethiopia, in Amhara Regional State. It is a distance of 300 km from Addis Ababa, the capital city of Addis Ababa and 265km from Bahirdar the regional capital. Debre Markos referral hospital provides services for More than five million peoples in the area (53) . There are outpatient, inpatient and emergency pharmacy units. At OPD pharmacy, there are 4 pharmacists and 10 druggists. Averagely more than 228 per day and annually more than 83,000 prescriptions are dispensed. The study period was from Sept 1, 2018 to August 31, 2019

### **3.2 Study design**

Facility-based cross-sectional study design was employed to determine the drug use pattern and its associated factors based on WHO core drug use indicators.

### **3.3 populations**

#### **3.3.1 Source of population**

All encountered prescription papers at OPD pharmacy in Debre Markos Referral Hospital

#### **3.3.2 Study population**

Prescription papers in a period of only one year from Sept 1, 2018 to August 31, 2019.

### **3.4 eligibility criteria**

#### **3.4.1 Inclusion criteria**

All prescriptions that contain medicine

#### **3.4.2 Exclusion criteria**

A Prescription with incomplete standard parameters

Prescriptions contain only medical equipments and supplies

### **3.5 Sample size determination**

Based on WHO drug use indicators, the minimum recommended sample size was 600 to perform drug use pattern in one health facilities (8, 17, 20, 54). Since the study participant was prescription paper, non response rate was not concenter for sample size determination.

### **3.6 sampling technique and procedure**

The study populations were prescription papers ordered for the last one year that is from September 1, 2018 to August 31, 2019. All prescriptions were arranged based on prescribing date and month. The interval value was calculated by using total prescription and divided it with total sample size. The study prescriptions were selected using systematic random sampling at the OPD pharmacy and facility indicators were observed at each unit.

### **3.7 variables**

#### **3.7.1 Dependent variables**

polypharmacy, antibiotic use and injection use were the most focused and interested dependent variables.

#### **3.7.2 Independent variables**

Patients sex, patients age, prescribers sex and age, prescribers qualification, prescribers years of experience, prescribers having training about rational drug use, presence of co-morbidities and chronic conditions were the independent variables.

### 3.8 Operational definitions

**Antibiotics:** Drugs such as penicillins, cephalosporine, fluoroquinolone, aminoglycoside, tetracycline and metronidazole are considered antibiotics (8).

**Chronic condition:** patients with cardiovascular problems, renal and hepatic failure, hormonal, asthmatic and other disease. It may be a single chronic disease or complicated condition (20, 48).

**Co morbidity:** having more than one concomitant disease condition (20, 48).

**Dispenser:** a health profession to counsel about drugs and give medication for patients (8).

**Generic drugs:** The essential drug list of Ethiopia is used as a basis to determine drugs as generic or brand name (8, 29).

**Prescribing indicators:** used to measure the performance of prescribers in several key dimensions related to the rational use of drugs based on indication and evaluation (8, 29).

**Prescriber:** a health profession that order the drugs on the prescription or patient chart (22, 30).

**Polypharmacy:** the prescription contains two or more drugs to treat the disease (1, 29)

**WHO drug use indicators:** used to determine the drug use pattern in the health facility. The prevalence of drug use higher than WHO reference showed; there is irrational drug use in the health facility. So indicators were calculated based on the following(18, 55).

A, Average number of drugs per prescription = total drugs prescribed divided by total prescriptions.

B. Percentage of drugs prescribed by generic name = total generic drugs prescribed divided by total drugs prescribed multiply 100.

C. Percentage of antibiotics were prescribed = prescriptions in which at least one antibiotic was prescribed divided by total prescriptions multiply 100 WHO.

D. a percentage of an injection was prescribed = prescriptions in which at least one injection was prescribed divided by total prescriptions multiply 100.

E. Percentage of drugs prescribed included in the EDL = total drugs prescribed included in the EDL divided by total drugs prescribed multiply 100.

### **3.9 Data collection and procedures**

WHO drug use indicator data compilation form was used as a tool. Data was collected with a structured observational checklist for prescribing, and health facility indicators. Data regarding prescribing indicators were taken from sample prescription records with systematic sampling methods and filled in structured checklist accordingly by careful observation. Facility indicators were collected by simple observation at all OPD units. Some of prescriber's information was collected from the personal file in Hospital administrative body.

### **3.10 Data quality assurance**

To ensure the data quality, training was given to data collectors and supervisors. Check the validity of tools by performing pre-test 5% samples of prescription based on WHO drug use indicator tools.

### **3.11 Data process and Data analysis**

After appropriate coding, the data was entered to EPI Data Version 3.1 and was analyzed using computer software SSPS version 20. The data were evaluated as per the WHO guidelines. The overall irrational drug used was determined by aggregated the weighted score of each prescribing indicators. Weighted ( $W=n/N$ ) and total score of indicators was computed with aggregated all  $W \times$  percentage of each indicators. Descriptive analysis and multivariate Logistic regression were used to determine the associations of dependent variables on one hand and independent of the other. On bivariate analysis p-value of each variable less than 0.25 was included under multivariate logistic regression. The cut off for statistical significance was set at 5 percent level. The results were edited and presented in graphical and tabular form. (29, 31).

### **3.12 Dissemination plan**

The results of this study will be presented to Debre Markos Referral Hospital board and management members so that the recommendations will be implemented, for regional health bureau of the regional state of Amhara region and to Debre Markos University, College of Health Sciences. In addition, an attempt was made for publication in scientific journal to make it accessible in a wider range.

### **3.13 Ethical approval**

Ethical clearance was obtained from Debre Markos University, College of Health Sciences Ethical review committee. In addition, formal letter was secured from Debre Markos Referral Hospital. The collected data was locked into a separate room before data entry. Furthermore, the data were not disclosed to anyone other than principal investigator.

## Chapter four -Result

### 4.1 General characteristics of study participants in the prescription survey

A total of 600 prescribing encounters were surveyed and the average age of patients attended at OPD pharmacy was 35 years. Of the total participants, 323 (53.8%) were females and 277 (46.2%) were males see (Table 1).

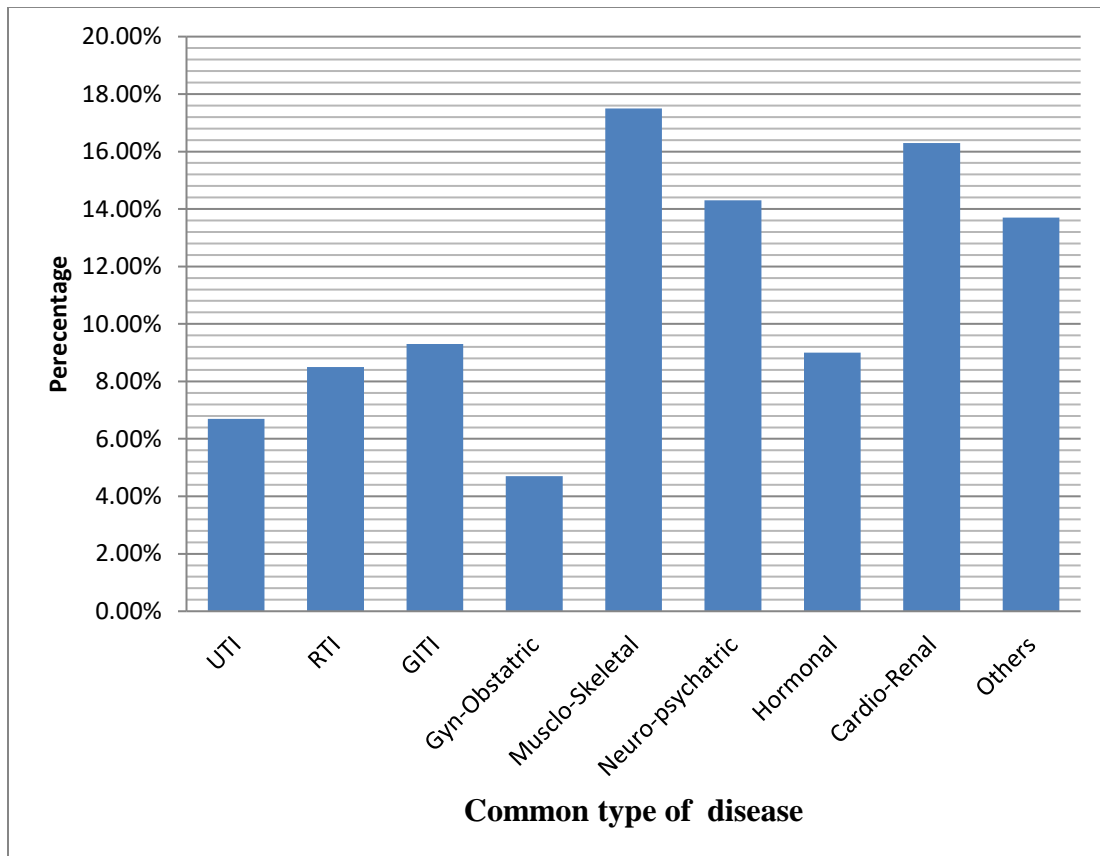
A total of 67 prescribers participated in drug prescriptions included in the study. The prescribers were selected with their name and signature on prescription profile and related the necessary data with their personal profile to be recorded. Regarding the prescriber's profession and educational status, Nursing 27(40.3%), General practitioner 18 (27%), Senior/specialty 5(7.5%) and Students (Interns and Msc Students) 17(25.4%) had prescribed drugs at OPD. But each prescriber might see more than one prescription throughout the years, therefore on sample of the total prescription, about 57% of prescriptions were seen by male prescriber and 43% of prescriptions were seen by female prescriber. The average age of prescribers was 34.5 years. Regarding to qualification 22.3%, 34.3%, 36.2%, and 7.2% of prescriptions were prescribed by Students, Nurses, Junior/ General Practitioners, and seniors prescriber respectively. Most of prescriptions (38.3%) were seen by prescribers having 1-5 years of experience. about 22 % of prescriptions were prescribed with trained prescribers. Regarding to disease related factors; patients had co-morbidity 144 (24%) and patients had a chronic disease condition 220 (36.7%) (Table1).

**Table 1 : Baseline characteristics of study participants in the prescription survey at Debre Markos Referral Hospital, 2019**

Baseline characteristics		Prescription (600)	
		Frequency	Percent
Patients sex	Male	277	46.2%
	Female	323	53.8%
Patients age in years	0-14	65	10.8%
	15-34	250	41.7%
	35-54	181	30.2%
	≥55	104	17.3%
Prescribers sex	Male	342	57%
	Female	258	43%
Prescribers age in years	25-30	146	24.3%
	31-36	256	42.7%
	37-42	170	28.3%
	43-48	16	2.7%
	>48	12	2%
Prescribers qualification	Students(17)	134	22.3%
	Nurses(27)	206	34.3%
	Junior(GP)(18)	217	36.2%
	Senior(consultant) (5)	43	7.2%
prescribers experience in years	<1	100	16.7%
	1-5	230	38.3%
	6-10	192	32%
	>10	78	13%
Prescribers having training about rational drug use	Trained	132	22%
	Not trained	468	78%
Co-morbidity	Yes	144	24%
	No	456	76%
Chronic condition	Yes	220	36.7%
	No	380	63.3%

## 4.2 Percentage of disease

From a total 600 sample survey patients who had musculo-skeletal disorder was 105(17.5%), cardio-renal disorder was 98(16.3%), neuropsychiatric disorder was 86 (14.3%), other disease(trauma, dermatology...) was 82(13.7%), GIT disorder was 56(9.3%), RTI was 51(8.5%), Hormonal disorder was 54(9%), urinary tract infection was 40(6.7%) and gynecological disorder was 28(4.7%) (Figure2).

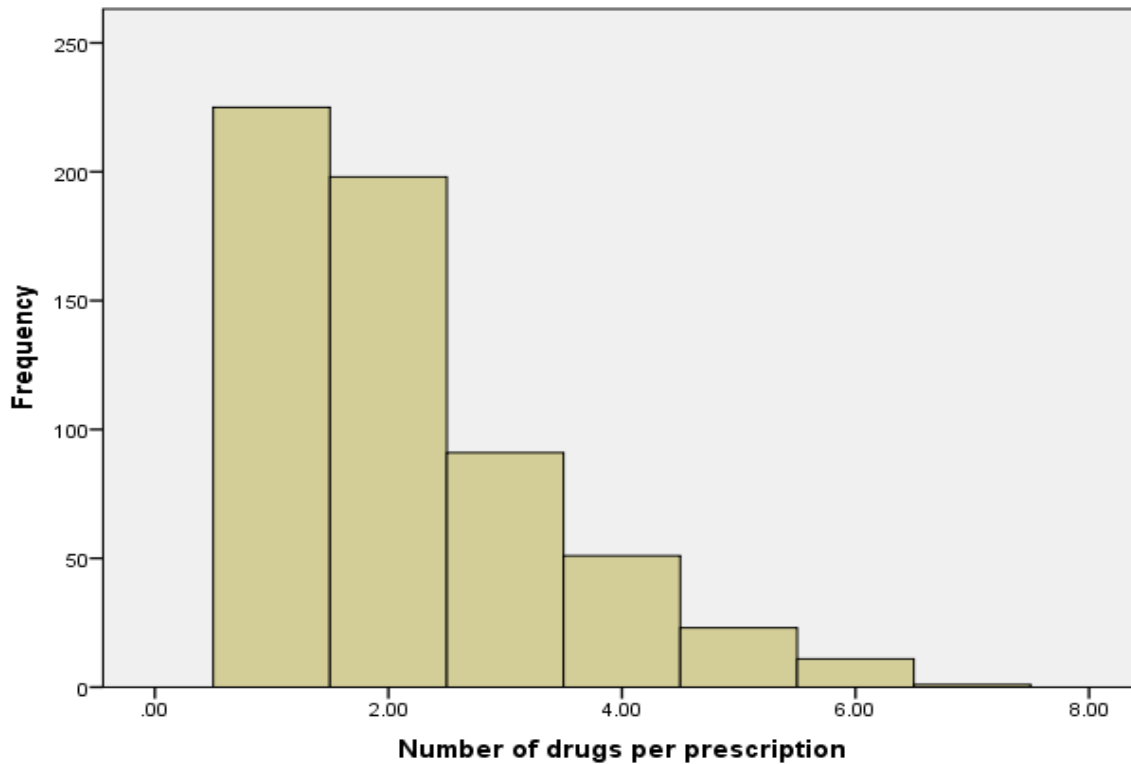


**Figure 2 : Percentage of disease in sample prescription survey at Debre Markos Referral Hospital, 2019**

### 4.3 WHO Prescribing indicators

The prescribing indicators measured the performance of prescribers to prescribe rational and appropriate drug for patient's clinical need.

During prescription surveyed, 225(37.5%) prescription had one drug, 198(33%) prescription had two drugs,91(15.2%) prescription had three drugs, 51(8.5%) prescription had four drugs, 23(3.8%) prescription had five drugs 11(1.8%) prescription had six drugs and only 1(0.2%) prescription contained seven drugs. The overall prevalence of polypharmacy was 62.2% (n=373) (95%CI: 58.3-66.2) (figure 3).



**Figure 3 : number of drugs prescribed per prescription in sample of prescription at Debre Markos Referral Hospital, 2019 from September 1, 2018 to August 31, 2019.**

The mean number of drugs prescribed per patient encounter was 2.14 (SD  $\pm$ 1.24). The percentage of patients receiving an antibiotic was 39.3% (95%CI: 35.5-43.5) of the total sample surveyed. Prescriptions had two and more than two antibiotics were 50 (21%) of. When the usage of antibiotics was compared to the percentage of disease types, the highest usage of antibiotics was in muscle-skeleton 54(23%) and the lowest usage was in neuropsychiatric disorder 3(1.3%) (n=236). Overall usage of injections was <13% (95%CI: 10.2-15.7). When the usage of injections was compared against disease percentage, the highest usage of injections was in hormonal disorder 33(42%) and cardiac disorder 22(28%) (n=78). From a total of 1,284 drugs were prescribed, the drugs were prescribed with generic name was 95.5% (1226 drugs). Similarly, 99.8% (1281 drugs) of drugs were prescribed from Hospital drug list. Regarding to the health facility, only 41% drug formulary but 100% drug list were provided at 22 OPD unities in Hospital (table 2).

**Table 2 : WHO core drug use indicators comparison in the prescription survey at Debre Markos Referral Hospital, 2019.**

Indicators	Prescription (600)		
	Finding	95%CI	WHO
<b>Average number of drugs per encounter</b>	2.14	(2.04-2.24)	(1.6-1.8)
<b>Percentage of drugs prescribed by generic name</b>	95.5%	- - -	100%
<b>Prevalence of encounters with an antibiotic prescribed</b>	39.3%(n=236)	(35.5-43.5)	24-26%
<b>Prevalence of encounters with an injection prescribed</b>	13%(n=78)	(10.2-15.7)	<10%
<b>Percentage of drugs from EDL</b>	99.8%	- - -	100%
<b>Availability of drug formulary</b>	41%(n=22)	- - -	100%
<b>Availability of essential drug list</b>	100%(n=22)	- - -	100%

#### 4.4 Common antibiotics prescribed at outpatient pharmacy

From total prescribed antibiotics, the most commonly prescribed drugs were Amoxicillin 96(33.8%) followed by Ciprofloxacin 37(13%) and the least prescribed antibiotics was Clarithromycin 6(2.1 %) and Ceftriaxone 5(1.8%) (Table 3).

**Table 3 : common antibiotics prescribed at Debre Markos Referral Hospital, 2019**

<u>Antibiotics</u>	<u>Frequency</u>	<u>Percentage</u>
Amoxicillin	96	33.8%
Metronidazole	21	7.4%
Azithromycin	20	7.04%
Cloxacillin	24	8.4%
Doxycycline	18	6.3%
Clarithromycin	6	2.1%
Ciprofloxacin	37	13.00%
Ceftriaxone	5	1.8%
Benzyl penicillin	9	3.2%
Cotrimoxazole	21	7.4%
Augmentin	17	6.00%
Cephalexin	10	3.5%
Total	284	100%

#### 4.5 Composite measure of irrational drug use

The overall aggregated irrational drug use was found to be 45.5%. This finding was computed from aggregated of each drugs used indicators weighted score or by compute the weight score composite measurement based on WHO optimal drug use indicators. The finding of this study indicated that there was a high prevalence of irrational drug use compared with WHO reference of drug use evaluation (Table 5).

**Table 4 : Composite measure of irrational drug use at Debre Markos Referral Hospital, 2019**

Indicators	Number(n)	Weight(n/N)	Percentages × weight
<b>Antibiotic given</b>	236(39.3%)	0.32	12.6%
<b>Injection given</b>	78(13%)	0.1	1.4%
<b>Polypharmacy</b>	373(62.2%)	0.5	31.1%
<b>Non –generic name</b>	58(4.5%)	0.08	0.36%
<b>Drugs not on EDL</b>	3(0.23%)	0.004	0.00092%
<b>Total</b>	748(N)	1.004	45.5%

As can be seen from the (Table 4) above, the prevalence of antibiotics was 39.3% (95%CI: 35.5-43.5), prevalence of polypharmacy was 62.2% (95% CI: 58.5-66.2) and prevalence of injection was 13% (95%CI: 10.2-15.7) were the highest drug use problems in the assessment of drug use pattern.

## **4.6 Factors associated with drug use patterns**

### **4.6.1 Factors associated with polypharmacy**

Multivariable logistic regression model was used to determine the most important factors associated with polypharmacy and to control for confounding. With bivariable analysis, patient age, presence of co-morbidities, prescriber practice, and prescriber age were all significantly associated with polypharmacy. After adjusting for confounders and other variables Patients age from 15-34 (adjusted OR 0.28; 95% CI: 0.14-0.55;  $p < 0.001$ ) and age 35-54 (adjusted OR 0.34; 95% CI: 0.17-0.69;  $p < 0.001$ ) were significantly associated with polypharmacy. On the other hand, presence of co morbidity (adjusted OR 5; 95% CI: 2.81-8.88;  $p < 0.001$ ) and prescribers having trained about rational drug use (adjusted OR 0.15; 95% CI: 0.09-0.24;  $p < 0.001$ ). Similarly prescribers having the experience of 6-10 years (adjusted OR 2.47; 95% CI: 1.31-4.66;  $p < 0.005$ ) and experience more than 10 years (adjusted OR 2.55; 95% CI: 1.05-6.20;  $p < 0.039$ ) were still significantly associated with polypharmacy even after multivariable analysis (table 5).

**Table 5 : Bivariable and Multivariable logistic regression analysis of factors associated with polypharmacy at Debre Markos Referral Hospital, 2019**

Factors	Polypharmacy use		Bivariable analysis		Multivariable analysis	
	<u>Yes</u>	<u>No</u>	COR( 95%CI)	P-value	AOR(95%CI)	P-value
Patients age in years						
0-14	41(63%)	24(37%)	0.28(0.14-60)	<b>0.001</b>	0.66(0.28-1.56)	0.347
15-34	133(53%)	117(47%)	0.19(0.10-1.35)	<b>0.001</b>	0.28(0.14-0.55)	<b>0.001</b>
35-54	110(61%)	71(39%)	0.26(0.14-0.49)	<b>0.001</b>	0.34(0.17-0.69 )	<b>0.003</b>
≥55	89(86%)	15(14%)	1.00		1.00	
prescribers age in years						
25-30	81(55%)	65(45%)	1.00		1.00	
31-36	154(60%)	102(40%)	1.21(0.80-1.83)	0.362	1.13(0.69-1.84)	0.634
37-42	121(71%)	49(29%)	1.98(1.24-3.16)	<b>0.004</b>	1.23(0.66-2.31)	0.513
43-48	9(56%)	7(44%)	1.03(0.37-2.92)	0.951	0.65(0.18-2.34)	0.502
>48	8(67%)	4(33%)	1.60(0.46-5.57)	0.465	0.70(0.14-3.53)	0.672
Training about rational drug use						
Yes	41(31%)	91(69%)	0.18(0.12-0.28)	<b>&lt;0.001</b>	0.15(0.09-0.24 )	<b>&lt;0.001</b>
No	332(74%)	136(26%)	1.00		1.00	
Prescribers experience in years						
<1	55(55%)	45(45%)	1.00		1.00	
1-5	126(55%)	104(45%)	0.9(0.62-1.59)	<b>0.036</b>	1.16(0.67-2.01)	0.594
6-10	137(71%)	55(29%)	2 (1.23-3.37)	<b>0.016</b>	2.47(1.31-4.66)	<b>0.005</b>
<10	55(70%)	23(30%)	1.95(1.04-3.66)	0.893	2.55(1.05-6.20)	<b>0.039</b>
Co-morbidity condition						
Yes	125(87%)	19(13%)	5.5(3.29-9.25)	<b>&lt;0.001</b>	5(2.81-8.88)	<b>&lt;0.001</b>
No	248(54%)	208(46%)	1.00		1.00	

#### 4.6.2 Factors associated with Antibiotic prescribing

The results of the bivariable logistic regression analysis show that, patient age, presence of co-morbidities, presence of chronic conditions, prescriber qualification and having trained were all significantly associated with antibiotic prescribing. After adjusting for confounders and other variables, in multivariable logistic regression analysis, the association between prescriber qualification and antibiotic prescribing was abolished. However, patient age from 35-54 years (adjusted OR 0.31; 95% CI: 0.16-0.61;  $p < 0.001$ ) and  $\geq 55$  years (adjusted OR 0.24; 95% CI: 0.11-0.53;  $p < 0.001$ ) were significantly associated with antibiotic. Regarding to disease conditions, Presence of co-morbidities (adjusted OR 3.48; 95% CI: 2.07-5.85;  $p < 0.001$ ) and presence of chronic conditions (adjusted OR 0.09; 95% CI: 0.05-0.15;  $p < 0.003$ ) were significantly associated with antibiotics drug use. Similarly prescriber having trained about rational drug use (adjusted OR 0.49; 95% CI: 0.29-0.83;  $p < 0.008$ ); were still significantly associated with antibiotic prescribing after multivariable analysis (table 6).

**Table 6 : Bivariable and Multivariable logistic regression analysis of factors associated with antibiotic prescribing at Debre Markos Referral Hospital, 2019**

Factors	Antibiotic prescribed		Bivariable analysis		Multivariable analysis	
	<u>Yes</u>	<u>No</u>	COR(95%C.I)	P-Value	AOR(95%C.I)	P-Value
Patients age in years						
0-14	38(58%)	27(42%)	1.00		1.00	
15-34	116(46%)	134(54%)	0.61(0.35-1.07)	0.082	0.65(0.35-1.20)	0.173
35-54	55(30%)	126(70%)	0.31(0.17-0.56)	<b>&lt;0.001</b>	0.31(0.16-0.61)	<b>&lt;0.001</b>
≥55	27(26%)	77(74%)	0.24(0.13-0.48)	<b>&lt;0.001</b>	0.24(0.11-0.53)	<b>&lt;0.001</b>
Prescriber qualifications						
Students	52(39%)	82(61%)	1.00		1.00	
Nurses	79(38%)	127(62%)	0.98(0.63-1.53)	0.931	1.2(0.72-2.07)	0.423
General practitioners	98(45%)	119(55%)	1.29(0.84-2.01)	0.243	1.4(0.84-2.33)	0.191
Seniors physicians	7(16%)	36(84%)	0.30(0.13-0.74)	<b>0.009</b>	0.93(0.32-2.66)	0.89
Having trained about rational drug use						
Yes	36(27%)	96(73%)	0.503(0.329-0.768)	<b>0.001</b>	0.49 (0.29-0.83)	<b>0.008</b>
No	200(43%)	268(57%)	1.00		1.00	
Co-morbidity conditions						
Yes	65(45%)	79(55%)	1.37 (0.939-2.003)	0.103	3.48 (2.07-5.85)	<b>&lt;0.001</b>
No	171(38%)	285(62%)	1.00		1.00	
Chronic condition						
Yes	26(12%)	194(88%)	0.108(0.069-0.171)	<b>&lt;0.001</b>	0.09 (0.05-0.15)	<b>&lt;0.001</b>
No	210(55%)	170(45%)	1.00		1.00	

#### **4. 6.3. Factors associated with injection drug use**

As the logistic regression analysis is presented in (Table 7). On bivariable analysis, patient's sex, patients age, presence of training about rational drug use for prescriber's and prescribers experience were insignificant with injection drug use. On the other hand prescriber sex and presence of chronic disorder became significant with an injection. After analysis of multivariable logistic regression, only prescriber sex (female) (adjusted OR 0.42; 95% CI: 0.25-0.72;  $p < 0.002$ ) and presence of chronic conditions (adjusted OR 5.11; 95% CI: 2.94-8.87;  $p < 0.001$ ) became significant with injection drug use.

**Table 7 : Bivariable and Multivariable logistic regression analysis of factors associated with injection Drug prescribing at Debre Markos Referral Hospital, 2019**

Factors	Injection prescribed		Bivariate analysis		Multivariate analysis	
	<u>Yes</u>	<u>No</u>	COR (95% C.I)	P-Value	AOR (95% C.I)	P-Value
Prescriber sex						
Males	31(9%)	311(91%)	1.00		1.00	
Females	47(18%)	211(82%)	2.2(1.374-3.633)	<b>0.001</b>	0.42 (0.25-0.72)	<b>0.002</b>
Prescribers qualification						
Students	20(15%)	114(85%)	1.00		1.00	
Nurses	31(15%)	175(85%)	1.01(0.55-1.85)	0.975	0.83 (0.43-1.59)	0.580
General practitioners	18(8%)	199(92%)	0.51(0.26-1.01)	0.055	0.61(0.29-1.24)	0.177
Senior physicians	9(20%)	34(80%)	1.5(0.63-3.61)	0.357	0.81(0.32-2.08)	0.675
Co-morbidity conditions						
Yes	25(17%)	119(83%)	1.59(0.953-2.68)	0.076	1.26 (0.72-2.21)	0.136
No	53(12%)	403(88%)	1.00		1.00	
Chronic conditions						
Yes	55(25%)	165(75%)	5(3.074-8.707)	<b>&lt;0.001</b>	5.11 (2.94-8.87)	<b>&lt;0.001</b>
No	23(6%)	357(94%)	1.00		1.00	

## Chapter Five: Discussion

### 5.1 Discussion

The mean number of drugs prescribed per patient encounter was 2.14 (SD  $\pm$ 1.24). The result was higher than the WHO standard indicators (1.6-1.8). This indicated the prevalence of polypharmacy in the facilities was high. The number of drugs were prescribed ranges from 1-7. More than 62.2% (95%CI: 58.3-66.2) of patients got two or more than two drugs; this could be the presence of co-morbidity conditions and lack of adequate training for the prescriber. The result was higher than the WHO standard (1.6-1.8) and similarly the finding was higher than study done at Tigray region (39), Hiwot Fana Harar (17), Asmara (38), Northwest Amhara(51). This average was lower compared to that reported in a survey done on drug use evaluation in Saudi Publican (32), Zambia (29), Kenya (20), Ghana (24), Tikur anbessa (50).

On multivariable logistic regression analysis patient age was associated polypharmacy. Patients having 15-34 age and 35-54 age were 72% and 64% less likely having polypharmacy compared with age  $\geq$ 55 years respectively. This could be several disease may occur in older patients than younger and needs more drugs for treatment. Similar study done in, Kenya (20) and Spain (34). Prescribers experience was positively associated with polypharmacy. Prescribers having 6-10 years of experience and having more than 10 years of experience 2.45 and 2.55 times more likely to prescribe Polypharmacy respectively compared with having less experience of drug prescribing. This could be explained by more experienced prescriber had more confidence to prescribe multiple drugs and identifying all the possible cause of disease. Similar study done in, Kenya (20) and Spain (34), Lagos (6). Having trained for prescriber was negatively associated with polypharmacy. Prescribers having trained about rational drug use 85% less likely to prescribe polypharmacy. This could be prescribers had trained about rational drug could decrease the use of polypharmacy because prescribers aware that using multiple drugs could lead drug to drug interaction, financial problems and other co morbidity conditions. A similar study in Malaysia (41). Presence of co- morbid conditions was strongly associated with a higher prevalence of polypharmacy. Prescriptions for co- morbid conditions were 5 times more likely to prescribe polypharmacy compared to the ones with prescription had no co-morbidities. This was expected since co-morbidities involve several diseases which may require different drugs to

manage hence leading to polypharmacy. There was a similar study in Kenya (20), Swedish (48), and patients had co-morbidities more likely used polypharmacy compared with non-co-morbidities.

From sampling, 39.3% (95%CI: 35.5-43.5) of prescriptions had at least one antibiotic prescribed, which shows a high prevalence of antibiotic prescribing in Hospital. The prevalence of antibiotic prescribing very high compared to WHO standard (24-26%). this indicated that there is more antibiotic prescribing practice in Hospital, this could be due to inadequate training for prescriber, presence of co-morbid condition in the patient and type of disease caused by infectious. This percentage was lower compared to that reported in Saudi Publican (32), Zambia (29), South India (42), Kenya (20), Asmara (38), Tigray region (39) Hawassa (8), Hiwot Fana Harar (17), Northwest Amhara (51). But higher compared to that reported in Madurai (2), Ghana (35), Tikur anbessa (50).

In multivariate logistic regression analyses, patient age was associated with antibiotic drug use/prescribing. Patients age from 35-54 years and age  $\geq 55$  years of patients 69% and 76% less likely to have antibiotics. Antibiotic drug prescribing was more likely to occur in prescriptions of younger patients compared to those of older patients. Similarly, study in Kenya (20), Addis Ababa (22) which was antibiotic use more likely used in younger patients. This could be more infectious disease were common than chronic disease in younger age. But a study done in Zambia (29) age of patient was insignificant with antibiotic use. Having trained for prescriber was negatively associated with antibiotic drug use. Trained prescriber was 51% less likely to prescribe antibiotic drug prescribing for patients compared to non-training prescriber. This is similar to study done in London (45). This could be Training about antibiotic drug use for prescribers and overuse of antibiotic drugs leads antibiotic drug resistance and it caused treatment failure. Presence of co-morbid conditions was strongly associated with a higher prevalence of antibiotic Prescribing. Prescriptions for co-morbid conditions were 3.48 times more likely to have an antibiotic prescribed compared to the ones with no co-morbidities. This result was similar to Kenya (20), Asmara (38), and Korea (42). This may be explained by the fact that co-morbidities usually involve several diseases which require different management approaches, including antibiotic use and increased the chances of antibiotic prescribing. Presence of chronic conditions was strongly associated with a lower prevalence of antibiotic

prescribing. Prescriptions for chronic conditions were 91% less likely to have an antibiotic prescribed compared to prescriptions for non-chronic conditions. Similar to studies done in Kenya (20), Zambia (29), Ghana (42). This may be explained by the observation that, most of the chronic conditions were cardio-renal disorders, neuropsychiatric and hormonal disorder, which did not necessarily require antibiotics for management.

The prevalence of injection drug prescribing was 13% (95%CI: 10.2-15.7). This indicated that there was slightly less practice of injection prescribed in Hospital. There was similarly studying in Northwest Amhara (51), Ghana (42), and Zambia (29). The prevalence of injection prescribed was less compared with studies done in Hawassa (8), Tigray region (39), Hiwot Fana Harar (17), Saudi Publican, (32). From the result of multivariable logistic regression analysis prescriber being female, 58% less likely prescribe injection drugs for patients compared to male prescriber. This could be females have more confidence than male to use oral drugs rather than injection. But studies done in Asmara (38), China (43) and males were less prescribes injections for patients. This could be prescriber's professional and educational status difference in health facility. However, in the presence of chronic conditions 5.11 times more likely had injected drugs than non-chronic condition patients. This could be hormonal disorders and cardiac disorder that must to prescribe injection drugs like insulin and B. Penicillin drugs.

Prescribing using international (generic) names was widely practiced in the Hospital (95.5%) and it was low compared to WHO standard (100%). Similarity this percentage was lower compared to survey done on drug use evaluation Tigray region (39), Hiwot Fana Harar(17), Kenya (20), Ghana (24),.But more than compared to study done in Tikur Anbessa (50), and Northwest Amhara region (51).

Based health facility indicators, (99.8%) of the drugs were prescribed from the Hospital drug list; this indicated there was a high compliance with EDL of the hospital during prescribing. This could be attributed to the availability of copies of EDL in the facility and probably hospital DTC work strongly in continuous updated and distributed of copies of EDL for all Hospital unities (100%) and comparable to studies done in Hawassa (8), Tikur Anbessa(50).but better than in Northwest Amhara (51) on around 81% of drugs were prescribed from hospital drug list. but low compliance by using Hospital Standard Guide line of drug formulary in facility (41%), which was more less compared to WHO standard (100%) and Similar study done in Ghana(24).

## **5.2 Limitation of study**

This study included only proximal associated factors with drug use pattern, because the associated factors of drug use pattern were so complex, so it was difficult to study all distal or underlying factors for drug use pattern.

## **Chapter SIX: Conclusion and Recommendations**

### **6.1 Conclusion**

From the result of drug use pattern assessment; there were some of the prescribing indicators showed a deviation from the standard values recommended by WHO. The overall assessment showed; there was irrational/inappropriate drug prescribing in the hospital, particularly polypharmacy, overuse of antibiotics and non-generic name drugs.

In the Hospital, lack of the drug formulary and standard treatment guideline, lack of continuous education, presence of concomitant infection and prescriber status were identified to have contributed to irrational drug use.

The magnitude of irrational drug use was high in the hospital and this was vital in providing necessary information to monitor trends in drug use at the hospital. The findings indicate that irrational drug use at the Debre Markos Referral Hospital is similar to other studies done in other developing countries.

## 6.2 Recommendation

### 6.2.1 Health professionals

- Pharmacy personnel's should conduct periodic prescription surveys and drug utilization studies to assist and identifying any forms of irrational prescribing.
- Prescribers should be prescribed antibiotics with care. This can be done by limiting prescription of antibiotics by level of prescriber and ensuring that all recommended prescribers submit their names and signatures to the pharmacy department so that these are monitored.
- Health professionals should reduce co-morbidity disease, being a chronic condition and their complication may reduce overuse of drugs. Reduce the disease burden and make the general public more aware about rational drug use.

### 6.2.2 Health facility

- The hospital should strength the function of drug therapeutic committee.
- The drug therapeutics committee of the hospital should take the leading role in rationalizing the prescribing and dispensing pattern at the hospital.
- Provide local drug information resources such as the national standard treatment guidelines and the national formulary of essential drugs are available at the hospital. The health facility provides continuing education about the rational use of drugs for all health workers. And prepare rational drug use campaigns for general awareness.

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## 8. Appendix

### 8.1 Appendix 1: WHO core drug use indicators and their optimal values

WHO Core drug use indicators	Optimal values
Average number of medicines prescribed per patient encounter	<2
Percent medicines prescribed by generic name	100%
Percent encounters with an antibiotic prescribed	24-26
Percent encounters with an injection prescribed	<10
Percent medicines prescribed from essential drug list	100%

## 8.2. Appendix 2 : Debre Markos Referral Hospital permission information sheet

**Introduction:** My name is Legese Melku, Student in a master's degree in public health at Debre Markos University. For the need of partial fulfillment of the master's degree program. I want to do research on the title "drug use pattern and its associated factors" at your institution .The purpose of the study is to assess the prevalence of drug prescribing/use and its associated factors.

**Title:** Drug use pattern and its associated factors in Debre Markos referral hospital, Amhara Regional state, Northwest Ethiopia, 2019; a retrospective cross-sectional study.

**Objective of the study:** To determine the drug use pattern and its associated factors at Debre Markos referral hospital, Amhara Regional State, Northwest Ethiopia, 2019.

**Organizations:** The study was conducted by Debre Markos University, College of health sciences, Department of Public health. The data Collection is to be carried out at Debre Markos Referral Hospital.

**Permission:** As my study design stated on the title, Retrospective cross-sectional study, needs some sort of kindly permission from your institution. The data collection was carried out after getting your willingness to give me a formal letter that links me to different departments in your hospital, especially OPD pharmacy unit. So that, tangible information was obtained and the data collection was proceeded.

**Confidentiality:** From medical ethics point of view and research ethics, every part of patient's and prescriber personal information was kept confidential. Information was collected from patient's prescription record and variables expressing their identity were coded secretly.

**Dissemination of the result:** The result of this study will be presented at the Workshop in your institution so that the recommendation will be implemented.

**Contact Addresses:** Legese Melku ,student at Debre Markos University, College of Health Science, department of Epidemiology in public health, Mobile: +251921577135 and E-mail – [legesemelku8@gmail.com](mailto:legesemelku8@gmail.com)

Thank you!!!

### 8.3. Appendix 3: Check list for the compilation of data

This check list was developed for data collection on the drug use pattern and its associated factors in Debre Markos Referral Hospital.

Date: -----

Code: -----

<b><u>i .Patient socio-demography</u></b>	Possible Answers
1 .Age	_____
2.Sex	<input type="radio"/> Male <input type="radio"/> Female
<b><u>ii. prescriber related factors</u></b>	
3. Age	_____
4. Sex	<input type="radio"/> Male <input type="radio"/> Female
5. Qualification	<input type="radio"/> Students(Interns,Msc) <input type="radio"/> Nurses <input type="radio"/> General practitioner (GP) <input type="radio"/> Senior physician(Specialist)
6. years of experience (include internship)	<input type="radio"/> Under 1 year <input type="radio"/> 1 – 5 years <input type="radio"/> 6 – 10 years <input type="radio"/> Over 10 years
7. Do have training about RDU?	<input type="radio"/> Yes <input type="radio"/> NO
<b><u>iii. disease related factors</u></b>	
8. Type of disease/specify diagnosis	

9. Are there co morbidities?	<input type="radio"/> Yes <input type="radio"/> NO
10. Is there a chronic condition?	<input type="radio"/> Yes <input type="radio"/> NO
<b>iv. <u>drug use indicators</u></b>	
11. Is there any polypharmacy prescribed?	<input type="radio"/> Yes <input type="radio"/> NO
12. How many drugs prescribed per prescription?	-----
13. Any non generic name drugs prescribed?	<input type="radio"/> Yes <input type="radio"/> NO
14. If Q13 yes, number of drugs prescribed with non generic name	-----
15. Any antibiotics prescribed?	<input type="radio"/> Yes <input type="radio"/> NO
16. If yes Q15, What the antibiotics was prescribed	-----
17. Any injection prescribed?	<input type="radio"/> Yes <input type="radio"/> NO
18. Number of drugs prescribed from facility EDL	-----
<b>V. <u>facility indicators</u></b>	
19. Does the facility have STG or drug formulary at OPD units	<input type="radio"/> Yes <input type="radio"/> NO
20. Does the facility have EDL at OPD units	<input type="radio"/> Yes <input type="radio"/> No

