SCHOOL OF PUBLIC HEALTH
COLLEGE OF HEALTH SCIENCES
UNIVERSITY OF GHANA

DEPARTMENT OF HEALTH POLICY PLANNING AND MANAGEMENT

INSTITUTIONAL COST OF IRRATIONAL PRESCRIPTIONS FOR
UNCOMPLICATED MALARIA

BY
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PUBLIC HEALTH DEGREE

JULY, 2017
DECLARATION

I hereby declare that excluding precise references which have been duly acknowledged, this submission is my own work towards my MPH degree and that, to the best of my knowledge, it contains no material previously published by another person nor material which has been accepted for the award of any other degree of the University or elsewhere.

BRIGHT SASU BAABU

CERTIFIED BY:
PROF MOSES AIKINS
(ACADEMIC SUPERVISOR)

DATE
DEDICATION

To my wife, Vivian, who has lovingly helped and to my baby girl, Nana Abena, who has lovingly hindered.

I love you both, dearly.
ACKNOWLEDGEMENT

I am grateful to God Almighty for His grace and sustenance throughout my life and throughout the period of studying for this degree and working on this dissertation.

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<tr>
<td>ACT</td>
<td>Artemisinin-based Combination Therapy</td>
</tr>
<tr>
<td>OPD</td>
<td>Out Patient Department</td>
</tr>
<tr>
<td>STG</td>
<td>Standard Treatment Guideline</td>
</tr>
<tr>
<td>UNESCO</td>
<td>United Nations Educational Scientific and Cultural Organization</td>
</tr>
<tr>
<td>UNICEF</td>
<td>United Nations Children’s Fund</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organization</td>
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<tr>
<td>IMF</td>
<td>International Monetary Fund</td>
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<tr>
<td>NMCP</td>
<td>National Malaria Control Program</td>
</tr>
<tr>
<td>MOH</td>
<td>Ministry of Health</td>
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<tr>
<td>GHS</td>
<td>Ghana Health Service</td>
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ABSTRACT

Background

Information on cost of management of malaria is important for improved financial management but is sparse. The objective of this study was to estimate the Institutional cost of irrational prescriptions for uncomplicated malaria.

Methods

A retrospective cross-sectional study approach was used to review 140 prescriptions issued for uncomplicated malaria at the Madina Polyclinic, Kekele. The prescriptions were judged to be rational or irrational according to the Standard Treatment Guideline of the Ministry of Health. Key informant interviews were also conducted on prescribers and dispensers for data on contact time with patients and gross salaries. Triangulation was used to combine data from review of the prescriptions and the key informant interviews to estimate the overall cost of irrational prescriptions for uncomplicated malaria.

Results

Uncomplicated malaria cases make up 2.2% of cases at the OPD. About 33% of prescriptions for uncomplicated malaria were irrational. The estimated total institutional cost was GHS 4,737.37 ($1,091.56). The cost per irrational prescription was GHS 12.73 ($2.93). Co-infections, prescriber preferences and patient preferences were the main reasons for irrational prescriptions.

Conclusion

Irrational prescriptions lead to inefficient cost management of uncomplicated malaria and must be reduced for improved financial management of malaria.
CHAPTER ONE

1.1 BACKGROUND

Malaria is a parasitic infection caused by Plasmodium species and is transmitted through bites of female anopheles mosquitoes infected with the parasite. It affects some 214 million people globally, majority of them in the developing world (WHO, 2015). In Ghana malaria has remained prominent on the morbidity and mortality charts for as long as those charts have been recorded, even though modest gains have been made in reducing its prevalence over the years (National Malaria Control Programme, 2013). The World Health Organization estimates that over half a million people succumb to the disease annually (WHO, 2015). Majority of these deaths occur in the developing world and mainly in children (WHO, 2015). Malaria affects some 3.5 million people annually in Ghana, accounting for 25% of deaths in children under five (UNICEF Ghana Fact Sheet, 2007).

Clinical features include fever, chills, rigors, malaise and generalized body pain. Other symptoms may ensue from complications arising from end organ damage. Uncomplicated malaria is treated with an oral antimalarial and an analgesic. Artemisinin-based combination therapies (ACTs) are the present recommended first line choice for antimalarial in managing uncomplicated malaria. The management of complicated malaria is dependent on what target organ has been damaged (Standard Treatment Guideline, 2010).

Rational use of medicines, according to the World Health Organization (WHO), demands 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”. Rational prescriptions are prescriptions that meet this standard. The WHO further
estimates that, “more than half of all medicines are prescribed, dispensed or sold inappropriately, and that half of all patients fail to take them correctly”. The Standard Treatment Guidelines published by the Ministry of Health of Ghana directs that uncomplicated malaria be managed with oral Artemisinin-based Combination Therapy (ACT) antimalarial medication for 3 days and an oral analgesic or antiemetic as may be indicated. An irrational prescription for uncomplicated malaria is one that departs from this standard.

In sub-Saharan Africa morbidity and mortality from malaria continue to be high because too many people who need medical attention for malaria are unable to access healthcare, resulting in increased incidence of complications from the disease (Chuma, Okungu, & Molyneux, 2010). The factors that have been mentioned as barriers to accessing treatment belong to five main thematic areas; financial barriers, access barriers, knowledge and information barriers, socio-cultural and religious barriers and health facility deterrents (UNICEF, 2012). Irrational prescriptions increase the cost of healthcare from the patients’ perspective and from the healthcare system’s perspective. Institutional costs are the costs incurred by a service provider to make a particular healthcare service available or the costs that accrue to a service provider from a service or phenomenon associated with a service. Studying institutional cost of irrational prescriptions provides data for greater efficiency in financial management for malaria which would translate into reduced patient costs, greater access to care and ultimately, reduced morbidity and mortality from malaria.
1.2 PROBLEM STATEMENT

Malaria is a global disease burden of immense proportions. It affects some 214 million people in the world, majority of them in the developing world (WHO, 2015). Sub-Saharan Africa suffers a disproportionate share of this burden (WHO, 2015). In Ghana malaria has remained prominent on the morbidity and mortality charts for as long as those charts have been recorded, even though modest gains have been made in reducing its prevalence over the years (National Malaria Control Programme, 2013). The World Health Organization estimates that over half a million people succumb to the disease annually (WHO, 2015). Majority of these deaths occur in the developing world and mainly in children (WHO, 2015). Malaria affects some 3.5 million people annually in Ghana, accounting for 25% of deaths in children under five and inflicting an economic burden equivalent to 1-2% of national Gross Domestic Product (UNICEF Ghana Fact Sheet, 2007).

In sub-Saharan Africa, too many people who need medical attention for malaria are unable to access healthcare, resulting in increased incidence of complications and mortality from the disease (Chuma, Okungu, & Molyneux, 2010). The factors that have been mentioned as barriers to accessing treatment belong to five main thematic areas: financial barriers, access barriers, knowledge and information barriers, socio-cultural and religious barriers and health facility deterrents (UNICEF, 2012).

Irrational prescriptions have been mentioned as contributing significantly to increased cost of healthcare. Irrational prescriptions in the management of malaria have been reported to be as high as 68% in other sub-Saharan African countries, at a cost in excess of $13,000 (Aina, Tayo, & Taylor, 2008). The increased healthcare costs accrue to both the institutions providing the care and the patients receiving the care. Those increased healthcare costs, in addition to constituting a
barrier and taking healthcare beyond the reach of people in lower socio-economic groups who may need it the most, increased healthcare costs from irrational prescriptions lead to inefficient financial management in the healthcare system, which may further decrease the facility’s capacity for effective and efficient healthcare. Studying irrational prescriptions and their associated institutional cost may provide ideas for effective ways to address the challenges of inefficient case management in the healthcare system through evidence based advocacy and education.
1.3 CONCEPTUAL FRAMEWORK OF STUDY

A patient diagnosed of uncomplicated malaria would receive a prescription from a prescriber in the facility. This prescription is rational if it comprises an oral ACT antimalarial and an analgesic (Standard Treatment Guideline, 2010). A prescription that contains anything apart from those two, or in addition to those, is irrational. Rational prescriptions do not lead to other costs to the institution. Irrational prescriptions, on the other hand, lead to other costs to the institution from medication costs and personnel costs from prescribers and dispensers.

**Figure 1: Conceptual framework of Institutional cost of irrational prescription**

<table>
<thead>
<tr>
<th>Diagnoses</th>
<th>Nature of prescription</th>
<th>Medication</th>
<th>Institutional costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uncomplicated malaria</td>
<td>Rational</td>
<td>- ACT</td>
<td>No cost</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Other(s)</td>
<td>- Medication (i.e., number of medication/prescription)</td>
</tr>
<tr>
<td></td>
<td>Irrational</td>
<td>- ACT</td>
<td>- Personnel (i.e., consultation &amp; dispensing costs)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Other(s)</td>
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1.4 JUSTIFICATION

Providing quality healthcare, in the management of malaria, requires commitment of many resources. In resource poor countries, providing quality healthcare is challenging. It is imperative that available resources be marshalled in a way that enhances efficiency in service delivery. While developing nations continue to have a high share of the disease burden of the world, it would appear that those who need quality healthcare the most are those who are least likely to get it. Estimating the cost of healthcare interventions and programs presents an opportunity to improve efficiency and save costs that may provide resources for other necessary health interventions. This is particularly true for medicines. The WHO reports that 25-70% of overall health expenditure in developing countries is spent on medicines, compared to about 10% in high-income countries (Concepts, 2016). Irrational prescriptions contribute to this high proportion of healthcare costs spent on medicines.

Further, delays in seeking care for uncomplicated malaria contribute to mortality and morbidity from malaria. Financial costs have been mentioned as part of factors constituting barriers to seeking care. Aspects of healthcare interventions for malaria, apart from supply of medicines to treat malaria would benefit from the resources saved by improved efficiency in financing purchasing of medicines for malaria. Knowing what institutional costs accrue from irrational prescriptions for uncomplicated malaria provides information that would lead to reducing cost of financing purchasing of medicines for malaria and lead to improved financial management of malaria.
1.5 OBJECTIVES

1.5.1 GENERAL OBJECTIVE

The general objective was to determine the cost of irrational prescriptions for uncomplicated malaria at the Madina Polyclinic.

1.5.2 SPECIFIC OBJECTIVES

The specific objectives were:

1. To determine the proportion of uncomplicated malaria cases.
2. To determine the proportion of irrational prescriptions for uncomplicated malaria.
3. To estimate the cost of irrational prescriptions for uncomplicated malaria.
4. To find other issues such as knowledge of standard treatment guideline recommendation for treating uncomplicated malaria and reasons for irrational prescriptions for uncomplicated malaria that underlie the cost of irrational prescriptions.
CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Irrational prescriptions in general

The WHO in 1985, documented that, “rational use of drugs 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 drugs deviates from these specifications.

The level of availability and rational use of drugs in 21 primary healthcare facilities that had benefited from the Bamako Initiative drug revolving fund program was compared with other 12 other centres that had not benefited from it in Enugu, Nigeria. The study reported that there was an average of 35.4 essential drugs, adequate for 6.3 weeks in the Bamako Initiative centres whereas the others had an average of 15.3, adequate for 1.1 weeks only.

The Bamako Initiative centres also had an average of 5.3 drugs per prescription as against 2.1 in the other centres. The study concluded that even though availability of drugs was supposed to enhance rational use of medicines, there was a chance that it had rather given rise to irrational use that needed to be further investigated (Uzochukwu, Onwujekwe, & Akpala, 2002).

In 2013 it was reported that 42.7% of antibiotics that had been prescribed for various infections in Teaching Hospitals in Tehran were ‘unjustified’. They had reviewed prescriptions, doctors’ notes on patient complaints and major antibiotic guidelines in a study that was to assess the outpatient usage of antibiotics in teaching hospitals and their association with resistance (Hashemi, Nasrollah, & Rajabi, 2013). A prospective study was conducted ‘to evaluate the current usage of the antimicrobial agents in medicine department of a teaching hospital’ and reported in 2013 that only
77.7% of prescribed antimicrobials for various reasons were rational. 1.61 antibiotics on average were prescribed per patient per course. There was an average of 2.74 drugs per prescription. The average cost of prescription per day was Rs. 115 and the average cost of prescribed antibiotics per encounter was Rs. 85. The findings heighten the need for antimicrobials to be viewed as a finite resource that needs to be managed rationally (Khan, Singh, Sharma, & Singh, 2013). Generally, it is estimated that, ‘more than half of all medicines are prescribed, dispensed or sold inappropriately, and that half of all patients fail to take them correctly” (World Health Organization, 2015).

2.2 Reasons for irrational prescriptions in general

A qualitative study to find the effective factors in irrational prescriptions of corticosteroids in Iran and design suitable interventions to decrease prescription rates conducted a thematic analysis published in 2012. They found that the effective factors in irrational prescription of corticosteroids are lack of knowledge, patient-physician relationship in terms of monetary cost, poor availability of proper alternative medicines and weak supervision of regulatory bodies (Yousef, Majdzadeh, Valadkhani, Nedjat, & Mohammadi, 2012). The finding provides factors that should be considered in any approach to address irrational prescriptions.

In a cross sectional study to survey knowledge, attitude and practice among medical doctors in the Democratic Republic of Congo, 184 self-administered questionnaires were used. Knowledge about antibiotic prescribing and local resistance of selected organisms were low. Sources of antibiotic prescribing information included pharmaceutical companies, antibiotic guidelines, university courses, internet sites and WHO guidelines. 16.3% perceived antibiotics procured through the central procurement and local pharmacies as of good quality. 73.4% welcomed local antibiotic guidelines. The data suggests that there is a need for interventions that support rational antibiotic prescribing (Thriemer et al., 2013).
A systematic review on both published and grey literature in China and Vietnam based on the WHO framework used key indicators to compare irrational use of medicines in both countries. The study reported that there generally was little focus on factors that influenced irrational use of drugs. However, lack of proper knowledge from both healthcare providers and patients, economic incentives from pharmaceutical companies and weak regulation over prescriptions were the main factors contributing to irrational use of medicines (Mao, Vu, Xie, Chen, & Tang, 2015).

The recurring issues that influence irrational use of medicines are: (1) poor knowledge on the part of healthcare providers and patients, (2) reduced availability of essential medicines, (3) poorly functioning regulatory bodies and (4) incentives for irrational prescriptions.

2.3 Effects of irrational prescriptions in general

Irrational prescriptions has been reported to reduce drug therapy standards, increase adverse effects of drugs and lead to drug resistance. These directly or indirectly increase morbidity and mortality. Irrational prescriptions also lead to increased costs and less efficient use of scarce resources, depriving other health interventions and programs resources that would otherwise have been available for their execution (Guide, n.d.).

A cross-sectional study in Nigeria that investigated the effect of barriers to healthcare on under-5 mortality reported that risk of dying before age 5 was higher in children whose mothers had reported cultural, resource and physical barriers to accessing healthcare relative to those whose mothers had reported no barriers. This was done with the Cox proportional hazard models used to estimate the risk of death in children before age 5 years and the results presented as hazard ratios. The publication suggests that there is the need for improved access to adequate healthcare to reduce the risk of dying before age 5 years (Adedini, Odimegwu, Bamiwuye, Fadeyibi, & De Wet, 2014).
2.4 Cost of irrational prescriptions

In 2013, a study that had been done to investigate whether physicians’ prescribing patterns showed any differences at the level of the health care institutions, reported that the average number of medicines per prescription was 2.83 and that the highest average was noted in primary healthcare centres (2.96). The researchers had reviewed 3,201 prescriptions from primary healthcare centres, public hospitals, private hospitals and university hospitals in Turkey. Average cost per prescription was $51.57. University hospitals had the highest average cost: $166.10. About 39% of all prescriptions included antibiotics. There were significant differences in the contents of the prescriptions according their respective institutions, even though prescriptions of antibiotics and other medication for “cold and cough” were high across board. The findings suggest that institutional differences would need to be considered when rational pharmacotherapy programs are being put together (Mollahaliloglu, Alkan, Donertas, Ozgulcu, & Akici, 2013).

Drug dispensing practices and patients’ knowledge on drug use among outpatients at a teaching hospital in Nepal were evaluated in a prospective cross-sectional study. The average number of drugs per prescription was 2.5. Only 21.7%, 32.8% and 42.3% of drugs were prescribed from WHO model list of essential drugs, essential drug list of Nepal and Nepalese national formulary respectively. The average cost per prescription was found to be 285.99 Nepalese Rupees ($ 3.73). While not conclusive on their own, the findings in the study showed a trend toward irrational prescribing and dispensing (Ghimire, Nepal, Bhandari, Nepal, & Palaian, 2009).

Another study done in rural Nepal to estimate the cost of irrational prescribing and compare three different kinds of user fees on prescribing costs compared prescriptions from 33 public rural primary healthcare facilities. The study reported that 20-52% of total drug costs were due to inappropriate drug prescription with an average cost per prescription of 5.7 Nepali rupees. The
study concluded that, “the economic consequences of irrational prescriptions are severe, particularly in association with charging a fee per prescription. Item fees in the public sector reduce irrational prescribing and associated costs” (Holloway, Gautam, & Reeves, 2001).

Irrational prescriptions increase the cost of healthcare for providers, patients and the entire community. The increased cost of healthcare then constitutes a barrier that keeps healthcare away from those who need it.

2.5 Irrational prescriptions for malaria

Effective and efficient diagnostic tests have been shown to reduce irrational prescriptions. In a study aimed at assessing the effect of rapid diagnostic tests for malaria on antimalarial prescriptions in Tanzania, routine statistics from ledger books and cross-sectional surveys were collected. The results showed a 68% drop in antimalarial prescriptions in the facilities that had the intervention of the rapid diagnostic tests compared to a 32% drop in facilities that were used as control. Before-and-after cross-sectional surveys also showed a drop of 75% in the experimental group compared to a 20% drop in the control group. However, antibiotic prescriptions were reported to have increased from 49% to 72% in the facilities that had the intervention. The study did not report on whether those antibiotics were rationally prescribed. Effective diagnostic tools for malaria reduce irrational prescriptions and may save costs to the facilities and patients (D’Acremont et al., 2011).

A qualitative study that explored medical practitioner’s perceptions towards irrational malaria treatment practices in Pakistan reported that unavailability of drugs, lack of awareness and adherence of prescribers to standard treatment guidelines are major factors contributing to irrational drug use in malaria in Pakistan (Malik, Hassali, Shafie, & Hussain, 2012). For a long
time, any case of fever in a malaria endemic region was presumed to be due to malaria until proven otherwise. This led to a rather high number of presumptive malaria cases, leading to many wrongly prescribed antimalarial medication with its attendant consequences. To address this, the WHO launched the “test, treat, track” treatise in 2012 to address this issue. The policy prescribes compulsory testing for evidence of parasitaemia prior to a diagnosis of malaria. The only exemptions being in very remote places and resource poor settings where testing is not possible. This has been expected to improve rational use of antimalarial medication (World Health Organization, 2012).

A descriptive-retrospective-cross-sectional study done to assess irrational antimalarial drug dispensing and prescribing practices in public health facilities in Tanzania reviewed 4320 prescriptions and interviewed 32 dispensers. The study reported that 84% of dispensers had poor knowledge of basic details required for dispensing medication. 17 out of 32 dispensers didn’t know critical instructions that had to be passed on to patients concerning the use of the drugs that were dispensed. 26.9% of prescriptions for malaria had at least one antibiotic and a ‘substantial number’ of prescriptions had antimalarials that had been declared ineffective (Kamuhabwa, Silumbe, Press, Kamuhabwa, & Silumbe, 2013). This study suggests that there is the need for continued engagement with prescribers and dispensers for increased adherence to treatment guidelines.

In a study to assess prevailing antimalarial drug prescribing practices, availability of antimalarials and the acceptability of a new policy of using ACTs for malaria treatment were investigated in Jharkhand, India. It was reported that though the policy had changed in all 12 districts, ACTs were available in only 5 districts. Antimalarial prescriptions were prevalent among the undiagnosed, patients who tested negative for malaria and patients with unknown test results at 8.4%, 64.3%
and 1.2% respectively. Together, they constitute prescriptions for antimalarials that were considered irrational (Mishra et al., 2013).

2.6 Impact of irrational prescriptions for malaria

Bedford and Sharkey (2014) studied barriers to accessing care for children with pneumonia, diarrhoea and malaria in a qualitative study. Care-givers of children who did not frequently interact with the healthcare system were purposively sampled for focused group discussions. They reported that the main barriers to accessing healthcare are financial barriers, distance barriers, socio-cultural barriers and gender dynamics, knowledge and information barriers and health facility deterrents (Bedford & Sharkey, 2014). Their findings suggest that community participation in problem identification and resolution would result in significant improvements in improving child health and survival among those who suffer from pneumonia, diarrhoea and malaria.

In a systematic review of articles from various databases on malaria control in Uganda published in 2015, six areas of malaria control were reviewed; global and local priorities, malaria pathology, disease burden, malaria control treatment guidelines for uncomplicated malaria and role of health systems in accessing antimalarial medicines. It was reported that *Plasmodium falciparum* remained the most common cause of malaria in Uganda and that children under 5 years were the most vulnerable. Removal of user fees, training of frontline workers, providing free antimalarials or subsidized antimalarials and introduction of ‘integrated community case management program’ had set Uganda on her way to substantiating gains in malaria control like had been produced in other parts of sub-Saharan Africa. They reported that Uganda had not reached her own targets but the approach was instructive to consolidating gains in malaria control in sub-Saharan Africa (Kassam, Collins, Liow, & Rasool, 2015).
2.7 Cost of irrational prescriptions for malaria

A retrospective cross-sectional study that reviewed 18,781 prescriptions for malaria in Lagos State hospitals in Nigeria reported that 68% of all prescriptions for malaria were irrational and that the total cost of irrational prescriptions was $13,100.19. It would appear, from their work that encouraging rational prescriptions for malaria would help to manage cost and make money available for other aspects of malaria control or other healthcare needs (Aina et al., 2008).

A study published in 2012, from Pakistan, reported on a survey of prevalence of malaria parasites in humans and the prevalence of the malaria vector. It also investigated the use of antimalarial medication in the local people. None of 740 blood samples was positive for malaria parasites and no vector capable of malaria transmission was identified in the locality. The culex mosquito was identified but the anopheles mosquito known to transmit malaria was not identified. However, consumption of antimalarial medication was at about $1,000 for that region, depicting a rather costly use of antimalarials in the absence of malaria infection. The study shows the need for accurate diagnosis of malaria prior to treatment (Khan et al., 2012).

On the whole, the literature for irrational prescriptions for malaria are not extensive. There is some understanding of why it occurs, not differing much from the reasons irrational prescriptions occur in general; insufficient knowledge, weak regulatory bodies and non-adherence to treatment guidelines. The costs of irrational prescriptions for malaria and their effects on various components and players in the healthcare system has not been studied enough. It is known that they increase costs to the providers, patients and the larger community. The overall effect on efficiency of the healthcare system has not been studied extensively and may provide some basis for further research.
2.8 Conclusion

Poor knowledge on the part of healthcare providers and patients, reduced availability of essential medicines, poorly functioning regulatory bodies and incentives for irrational prescriptions have been identified as the main reasons for irrational prescriptions generally. They may well be the reasons for irrational prescriptions in malaria as well, although the literature is not quite conclusive on that. Irrational prescriptions have been shown to increase healthcare costs for patients. Although irrational prescriptions lead to inefficiency in management of healthcare costs, not many studies have examined it from the healthcare system’s perspective, as this study did.
CHAPTER THREE

3.0 METHODS

3.1.0 Study Design

The study was a retrospective cross-sectional study.

3.1.1 Study area

The La Nkwantanang-Madina Municipality in the Greater Accra Region has a population size of 123,820 according to the 2015 annual medical report of the Madina Polyclinic. The population is predominantly urban and is mainly engaged in services for economic activity. The municipality has two polyclinics, one at Kekele and a smaller one at Rawling's Circle. The Madina Polyclinic recorded 15,987 (41% of OPD cases) cases of malaria in 2013, 4,127 (18.7%) in 2014 and 1,408 (8.7%) in 2015, according to the acting facility head. Laboratory confirmed cases were 1,524 in 2013, 1,979 in 2014 and 1,402 in 2015. A total of 51,535 cases accessed the OPD in 2015.

The facility had 4 doctors, 3 physician assistants, 2 pharmacists and 1 dispensing technician at post at the time of the study.
Figure 2: Study design

Retrospective Cross-sectional study

Review of medical records of malaria cases

Qualitative study

Quantitative study

Study approval

Ethics

Informed consent

Quality control:
- Review of records conducted by Principal Investigator (PI)

Data processing:
- Daily and weekly verification by PI

Data analysis:
- Proportion of rational and irrational prescriptions
- Triangulation would be used to estimate total cost

No scientific Fraud/Falsification

All prescribers and dispensers

Key informant interviews

Extraction of uncomplicated malaria cases

Random sampling of all malaria cases

Review of all records

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3.1.2 Study Variables

The outcome variable in this study was the institutional cost of irrational prescriptions. Independent variables were:

- number of uncomplicated malaria cases
- proportion of irrational prescription for uncomplicated malaria
- number of drugs per uncomplicated malaria prescription
- types of antimalarial prescribed and other prescribed medication for uncomplicated malaria
- age and sex distribution of uncomplicated malaria
- unit cost of prescribed antimalarial
- gross monthly salaries of prescribers and dispensers
- consultation time
- dispensing time

3.1.3 Sample Size

The formula for calculating sample size in determining prevalence was used to determine sample size. This was used, first to estimate the proportion of prescriptions for uncomplicated malaria that were irrational and secondly, place monetary value on the estimated proportion. The formula was

\[ n = \frac{z^2p(1-p)}{d^2}; \]

where \( z \) = standard normal variate, taken to be 1.96 for type 1 error at 5%; \( p \) = expected proportion of malaria cases at Madina Polyclinic (recorded as 8.7% in 2015 report); and \( d \) = absolute error set at \( p \) value of 0.05. Minimum sample size calculated with the formula came to 122.06. An additional 10% of this number was factored in for incomplete records. The study required a minimum of 135
patient records. All prescribers, pharmacists and dispensing technicians at the Madina Polyclinic were interviewed during the key informant interviews.

3.1.4 Sampling method

Patient Records: The records of all cases of uncomplicated malaria from 1st January, 2016 to 31st December, 2016 were reviewed. Altogether, 1128 cases of uncomplicated malaria were identified from the out-patient records. Those records were assigned consecutive numbers in a list. The random integer set generator software from www.random.org was used to randomly select 140 numbers. The folders of the selected 140 cases were then retrieved. The medical record corresponding to the date of the visit in the out-patient record was consulted for the prescription that was issued for the diagnosis of uncomplicated malaria. The selected patient records that were incomplete or did not have the variables required were excluded. A new set of randomly generated numbers were generated from the remaining list and then those records retrieved to replace the expunged ones. This was be done until 140 completed records were obtained.

Key Informant Interviews: All prescribers at the facility were selected for interviewing. Four doctors and three physician assistants were available for the interviews. The two other physicians were on study leave and the other physician assistants was on annual leave. Key informant interviews were conducted for the two pharmacists and the dispensing technician. The interviews discussed the average consultation time, average dispensing time for prescribed medication, the cost of the various drugs, the reasons for irrational prescriptions and estimates of the gross salaries of the prescribers and dispensers.
3.1.5 Data collection technique

*Patient records:* An excel spreadsheet data extraction form was created with the afore-listed variables as columns. The age and sex of the patient, in addition to whether the patient had a malaria test and what the results were, were recorded. The prescription was recorded as rational if it contained an oral artemisinin-based combined antimalarial and an analgesic and irrational if it contained anything other than that. The number of extra irrationally prescribed medicines and their types were noted as well. The data were entered into this excel spreadsheet directly from the patient records by the principal investigator.

*Key Informant Interview:* The key informant interviews were conducted by the principal investigator in person. The interviews lasted 30 minutes each and were held at a place selected by the interviewee on the facility’s premises. The responses were manually recorded into a notebook and then analysed manually by recurring themes.

3.1.6 Data collection tools

*Patient records:* No questionnaire was used in this study. An excel spreadsheet data extraction form was used to collect data directly from patient records

*Key Informant Interviews:* An interview guide was used in the key informant interviews. The key components were as follows:

1. prescriber’s (or dispenser’s) understanding of uncomplicated malaria;
2. categories of drugs required to manage uncomplicated malaria;
3. scenarios that may have led to prescription of drugs not directly related to managing uncomplicated malaria;
4. drugs that get prescribed;
5. factors that led to prescription of these other drugs for uncomplicated malaria;
6. Standard Treatment Guideline;
7. consultation time (average);
8. communication from the Malaria Control Program on malaria treatment in the past year;
9. incentives towards producing an irrational prescription in the past year;
10. dispensing time (average);

3.1.7 Data processing

*Patient records:* The data from the excel data extraction form were edited at the end of each day of data collection. Cross tabulations were used to process the data for each variable.

*Key Informant Interview:* Qualitative data from the key informant interview were grouped under recurring themes for analysis.

3.1.8 Quality control

*Patient records:* No field assistants were used. Outpatient attendance records and medical records used were made available by staff of the records section of Madina Polyclinic, Kekele. The data were collected from the medical records by the Principal Investigator using an excel spreadsheet data extraction form. Patient records were verified for completeness at the end of each day of data collection. Records with incomplete data were expunged and replaced by other randomly selected records on the initial list of uncomplicated malaria cases. The entered data were verified for completeness at the end of each week of data collection and then finally after the full two weeks of data collection.
**Key Informant Interviews:** The data from the interviews were recorded and reviewed on the same day that the interview was conducted. The informants were contacted a day after the interview, for clarification if there were any issues that required clarification after the review of the data.

### 3.1.9 Data Analysis

Descriptive statistics of the malaria cases sampled for the study were provided. The total number of cases selected, the age distribution and sex distribution were reported.

* Determination of proportion of uncomplicated malaria cases: The number of uncomplicated malaria cases was obtained as the absolute number of recorded cases in the medical records from 2016 which were reviewed in the study. The total number of attendants at the Out-Patient Department (OPD) was also obtained from the Patient Register at the Records department. The proportion of uncomplicated malaria cases was calculated by dividing the total number of uncomplicated cases by the total OPD attendance.

* Determination of proportion of rational prescriptions: A rational prescription for uncomplicated malaria is one that meets the Standard Treatment Guideline’s recommendation. It includes an oral artemisinin-based combination antimalarial taken over a 3-day period, alone or with an analgesic. The proportion of rational prescriptions was calculated by determining what percentage of prescriptions were judged rational and multiplying that by the total number of uncomplicated malaria cases.

* Determination of proportion of irrational prescriptions: An irrational prescription for uncomplicated malaria is one that differs from the specification of the Standard Treatment Guidelines. This was reported as a percentage of the prescriptions reviewed that were judged to be irrational multiplied by the total number of uncomplicated malaria cases.
Estimation of cost of irrational prescription (Institutional cost): The institutional cost of irrational prescriptions for uncomplicated malaria is comprised of medication cost and personnel cost. The unit cost of every irrationally prescribed medicine was obtained from the dispensing technician. The average cost of the irrationally prescribed medicines in the sampled prescriptions was determined. The medication cost was estimated by multiplying the average cost of irrationally prescribed medicines by the percentage of irrational prescriptions and the total number of uncomplicated malaria cases. Personnel costs were calculated from prescriber costs and dispensing costs. Prescriber costs comprised physician costs and physician assistant costs. Dispensing costs comprised pharmacist costs and dispensing technician costs. Physician costs included costs from Senior Medical Officers and Medical Officers. Monthly salaries of the physicians were converted into daily, 8-working-hours salaries. This was then converted into salary per minute of the Physician’s consulting time. The average consulting time, in minutes, was multiplied by the cost per minute to obtain the average physician cost. The physician assistant cost was also calculated by reducing their salaries to daily 8-hour salaries, converting them to salary per minute and multiplying it by the number of minutes spent in a consultation for uncomplicated malaria. Weighted averages were used to combine the physician costs and the physician assistant cost to compute the prescriber cost. This was then multiplied by the proportion of irrational prescriptions and the total number of uncomplicated malaria cases recorded from the OPD register to obtain the total prescriber cost. The salary of the pharmacists were reduced to daily 8-hour salaries and then further converted into salary per minute. This was then multiplied by the amount of time spent in dispensing medication for uncomplicated malaria. The same was done for dispensing technician and dispensing assistants. Weighted averages were used to combine the dispensing costs of pharmacists, dispensing technician and dispensing assistants to obtain the dispensing cost. This
was then multiplied by the proportion of irrational prescriptions for uncomplicated malaria and the total number of uncomplicated malaria cases obtained from the OPD register to obtain the total dispensing cost. The medication cost, the prescriber cost and the dispensing cost were then summed up to estimate the cost of irrational prescriptions for uncomplicated malaria. The total estimated cost was then divided by the product of the proportion of irrational prescriptions and the total number of uncomplicated malaria cases obtained from the OPD register to determine the cost per irrational prescription.

### 3.2.0 Study Limitation

The study limitations were:

1. Incomplete patient records in terms of absence of clearly stated final diagnosis after a number of presumptive diagnoses had been stated earlier, absence of a record of laboratory test and treatment plan from the folder.

2. Multiple diagnoses for uncomplicated malaria cases per patient visit such as respiratory tract infections and urinary tract infections limited the total number of uncomplicated malaria cases listed from the OPD register.

3. Other costs such as overheads and utilities were not available on a per-patient and a per-diagnosis basis at the time of the study and so were not used in the estimation of the cost. The overhead costs could have been estimated if there was more time and resources available to the researcher.
3.3 Ethical Consideration

Ethical approval was sought from the Ghana Health Service Ethical Review Committee. Permission was also sought from the Greater Accra Regional Directorate of the Ghana Health Service and the La Nkwantanang District Director of Health Services before data collection. Permission was also sought from the administration of the Madina Polyclinic prior to data collection. The polyclinic administration was assured, in writing, of the confidentiality, safety and appropriate usage of data. The study was a review of medical records. Patients were not contacted directly for consent or assent. The hospital administration was asked for written permission to use the medical records. Written informed consent was sought from the key informants who were interviewed. The informants were assured in writing of the intended use of the information they provided purely for the purposes of this student dissertation. Confidentiality and safety of data were assured in a written undertaking. The informants were informed of their right to voluntarily withdraw from the interview at any time that they may have decided to, with no consequence to them.

The data were indicated to be kept by the principal investigator for 5 years and then destroyed. The electronic data set from the desk review would have been deleted from the computer used and the external memory device used as back up. The notebook for recording the responses during the key informant interview would also have been incinerated after those 5 years.

Risks of using the data may have included a discovery of a proportion of irrational prescriptions that the management of Madina Polyclinic may not have found complimentary. This risk was assuaged by an assurance, in the form of a written undertaking, that this work was not meant to be used as an appraisal of prescribing patterns at the facility. In addition to that, it was communicated to the management of the facility that the potential benefit of the information that would have been
produced would be useful in reducing the cost of financing medicines purchases for uncomplicated malaria and financial management of uncomplicated malaria.

There was no conflict of interest to be declared. The funding for this work was provided by the researcher.
CHAPTER FOUR

4.0 RESULTS

4.1 Background characteristics of uncomplicated malaria cases

Out of the sampled 140 uncomplicated malaria prescriptions, 49% (68) of them were female and 51% (72) were males. Their ages ranged from 0 to 68 years with a median age of 22.5 years. However, about 24% (34) of them did not have record of a malaria test done. Out of those who were tested, about 67% of them tested positive and 9% tested negative for malaria. The background characteristics of the cases sampled for the study are represented in Table 3.

Table 3: Background Characteristics of uncomplicated malaria Cases

<table>
<thead>
<tr>
<th>Age</th>
<th>Number</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-9</td>
<td>30</td>
<td>21.4</td>
</tr>
<tr>
<td>10-19</td>
<td>32</td>
<td>22.9</td>
</tr>
<tr>
<td>20-29</td>
<td>33</td>
<td>23.6</td>
</tr>
<tr>
<td>30-39</td>
<td>16</td>
<td>11.4</td>
</tr>
<tr>
<td>40-49</td>
<td>10</td>
<td>7.1</td>
</tr>
<tr>
<td>50+</td>
<td>19</td>
<td>13.6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sex</th>
<th>Number</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>72</td>
<td>51.4</td>
</tr>
<tr>
<td>Female</td>
<td>68</td>
<td>48.6</td>
</tr>
</tbody>
</table>
### Test Results

<table>
<thead>
<tr>
<th>Test Status</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>93</td>
<td>66.4</td>
</tr>
<tr>
<td>Negative</td>
<td>13</td>
<td>9.3</td>
</tr>
<tr>
<td>Not done</td>
<td>34</td>
<td>24.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>140</td>
<td>100</td>
</tr>
</tbody>
</table>

#### 4.2 Uncomplicated Malaria Cases

**4.2.1 Understanding of uncomplicated malaria**

The interviewees reported that uncomplicated malaria had symptoms known to be characteristic of malaria, a positive test result and no complications.

“*Malaria cases that would not lead to the patient being detained. The care is ambulatory and there is no use of injections*” – (Pharmacist)

“*...Malaria with no signs of complications. Refers to simple malaria with parasites described as one plus or two pluses and has no vomiting, haemolysis or prostration. Temperature may be normal or a bit on the high side. Symptoms may be headache, fever, chills, ‘bitter mouth’. Malaria test (we do RDT) must be positive. Presence of any of those complications makes for complicated malaria.*” – (Senior Medical Officer)

“*...Refers to patients who have malaria and are not very ill looking, can tolerate oral medication, do not have high fever, anaemia or convulsion*” – (Physician Assistant)
The respondents understanding of uncomplicated malaria included recognised symptoms of malaria, a positive test, no recognised clinical complications, patient not being very ill looking and use of oral medication for treatment.

4.2.2 Drugs prescribed for uncomplicated malaria

The interviewees quoted Artemisinin-based combination oral antimalarials as the main stay of treatment for uncomplicated malaria. They singled out Arthemeter/Lumefantrine as the most often used ACT in their experience.

“Arthemeter/Lumefantrine and antipyretics or analgesics such as paracetamol” – (Senior Medical Officer)

“Artemisinin based drugs. Arthemeter/Lumefantrine or Artesunate Amodiaquine. Then there is supportive care in the form of antipyretics like paracetamol, ORS and sometimes IV fluids for those who need some resuscitation” – (Medical Officer)

“Arthemeter/Lumefantrine, Dihydroartemisinin/Piperaquin. Quinine usually used for complicated malaria. There are also some prescriptions with Injection Artesunate, paracetamol, diclofenac, multivitamins and haematinics” – (Pharmacist)

Although most descriptions of drugs prescribed for uncomplicated malaria contained an ACT antimalarial and an analgesic, there were also mentions of injections and multivitamins.
4.2.3 Awareness of STG recommendation on treating uncomplicated malaria

All interviewees were aware of the Standard Treatment Guidelines of the Ministry of Health. Their responses detailed conducting a test and using an oral ACT antimalarial and pain relief medication.

“...Says oral medication such as Arthemeter/Lumefantrine, Artesunate/Amodiaquine or Dihydroartemisinin/ Piperaquin should be used” – (Medical Officer)

4.2.4 Proportion of uncomplicated malaria cases

There were a total of 1128 cases of uncomplicated malaria in the out-patients records from 1st January, 2016 to 31st December, 2016. The OPD patients’ register for the same period registered 50,580 attendants. The proportion of uncomplicated malaria cases was 2.2% (1128/50580).

4.3 Irrational Prescriptions for uncomplicated malaria

4.3.1 Proportion of irrational prescriptions for uncomplicated malaria

Out of the 140 prescriptions sampled, about 67% (94) were rational prescriptions. They included an oral Artemisinin-based combination antimalarial alone or with an analgesic. About 33% (46) of them were irrational prescriptions. Figure 3, shows the proportion of irrational prescriptions.

4.3.2 Irrationally prescribed medicines

The most irrationally prescribed medicines were multivitamin tablets (63%), followed by injections (20%), antibiotics (13%) and other medication such as sedatives (Diazepam) and Oral Rehydration Salts. Figure 4 shows the proportion of the various irrationally prescribed medicines.
Almost all (99.3%) of the prescriptions for uncomplicated malaria had Arthemeter/Lumefantrine for treatment. Only 1 of the sampled prescriptions used Artesunate Amodiaquine.
4.3.3 Reasons for Irrational Prescriptions

The respondents listed treatment failure, prescriber preferences, presence of symptoms attributed to conditions other than malaria and patient preferences as reasons for irrational prescriptions for uncomplicated malaria.

“...Patients may have other symptoms. Some prescribers may prefer particular brands of medication for their patients, based on their experiences” – (Medical Officer)

“...Can’t follow the guidelines all the time. The needs of individual patients may be different. Some of them do not have money to have lab tests and the recommended medication. Some patients also have preferences, like preferring injections. Patients say to me that if they do not get injections, they don’t feel well” – (Medical Officer)

“...There may be suspicions of other medical conditions after symptoms may not have resolved following the use of antimalarials. There may be suspicion of typhoid for example, that may lead to antibiotics (ciprofloxacin) being added to the prescription” – (Physician Assistant)

Generally, prescribers seemed to use medicines outside of the recommendation of the STG if patients reported that symptoms had not resolved at review, after treatment with ACT antimalarials. There was a tendency for some prescribers to rely on previous experience rather than recommendations from guidelines and to acquiesce to requests from patients, even if it were to induce irrational prescription practices.

4.4 Estimated Cost of Irrational Prescriptions

The estimated irrational prescription cost is made up of medication costs, personnel costs and dispensing costs.
4.4.1 Medication costs

Medication costs consist of the cost of the medicines that were irrationally prescribed to the cases of uncomplicated malaria. The total medication costs of irrationally prescribed medicines was GHS 1,978.54. The average cost of irrationally prescribed medicines in the sample was GHS 5.32. Table 5 shows the total medication costs for irrational prescriptions for uncomplicated malaria.

Table 4: Total medication costs for irrational prescriptions for uncomplicated malaria

<table>
<thead>
<tr>
<th>Medication</th>
<th>Cost (GHS)</th>
<th>Frequency</th>
<th>Total Number of Irrational Prescriptions</th>
<th>Total Irrational Medicines Cost (GHS)</th>
<th>Average Cost (GHS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antibiotic</td>
<td>20.00</td>
<td>6</td>
<td>372.24</td>
<td>7,444.80</td>
<td>20.00</td>
</tr>
<tr>
<td>Multivitamin</td>
<td>2.50</td>
<td>29</td>
<td>372.24</td>
<td>930.60</td>
<td>2.50</td>
</tr>
<tr>
<td>Injection</td>
<td>5.00</td>
<td>9</td>
<td>372.24</td>
<td>1,861.20</td>
<td>5.00</td>
</tr>
<tr>
<td>ORS</td>
<td>2.00</td>
<td>1</td>
<td>372.24</td>
<td>744.48</td>
<td>2.00</td>
</tr>
<tr>
<td>Diazepam</td>
<td>5.00</td>
<td>1</td>
<td>372.24</td>
<td>1,861.20</td>
<td>5.00</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>46</td>
<td>372.24</td>
<td>1,978.54</td>
<td>5.32</td>
</tr>
</tbody>
</table>

4.4.2 Personnel Cost

Personnel cost comprised of Prescriber cost and Dispensing cost. The total personnel cost was GHS 2,758.83.
4.4.2.1 Prescriber Cost

The total prescriber cost for irrational prescriptions for uncomplicated malaria was GHS 2,241.42. Table 5 shows the total prescriber cost for irrational prescriptions for uncomplicated malaria.

Table 5: Total prescriber cost for irrational prescriptions

<table>
<thead>
<tr>
<th>Prescriber</th>
<th>average consultation time (minutes)</th>
<th>salary per consultation time (GHS)</th>
<th>Number at Facility</th>
<th>Physician cost per irrational prescription</th>
<th>Total Prescriber Cost for Irrational Prescription (GHS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Senior Medical Officer</td>
<td>12.5</td>
<td>5.67</td>
<td>2</td>
<td>2.43</td>
<td>904.54</td>
</tr>
<tr>
<td>Medical Officer</td>
<td>12.5</td>
<td>5.12</td>
<td>2</td>
<td>2.19</td>
<td>816.80</td>
</tr>
<tr>
<td>Physician Assistant</td>
<td>12.5</td>
<td>3.26</td>
<td>3</td>
<td>1.40</td>
<td>520.07</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>6.02</strong></td>
<td></td>
<td></td>
<td><strong>2,241.42</strong></td>
<td></td>
</tr>
</tbody>
</table>

4.4.2.2 Dispensing Cost

The total dispensing cost was GHS 517.41. Table 6 has the cost of dispensing irrational prescriptions for uncomplicated malaria.
Table 6: Total dispensing cost of irrational prescriptions for uncomplicated malaria

<table>
<thead>
<tr>
<th>Dispensers</th>
<th>Average Dispensing Time (minutes)</th>
<th>Salary per dispense (GHS)</th>
<th>Cost of Dispensing Irrational medicines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pharmacist</td>
<td>3</td>
<td>0.75</td>
<td>279.18</td>
</tr>
<tr>
<td>Dispensing Technician</td>
<td>3</td>
<td>0.54</td>
<td>201.01</td>
</tr>
<tr>
<td>Medicine Counter Assistant</td>
<td>3</td>
<td>0.10</td>
<td>37.22</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>517.41</td>
</tr>
</tbody>
</table>

4.4.3 Total Estimated Cost of Irrational Prescriptions for Uncomplicated Malaria

The total estimated cost of irrational prescriptions was comprised of medication cost, prescriber cost and dispensing cost. The total estimated cost of irrational prescriptions for uncomplicated malaria was GHS 4,737.37 ($1,091.56) (“Daily Interbank FX Rates,” 2017.). This is an estimated cost of GHS 12.73 ($2.93) per irrational prescription. Table 7 shows the total estimated cost from the components.

Table 7: Total Estimated Cost of Irrational Prescriptions for Uncomplicated Malaria

<table>
<thead>
<tr>
<th>Cost Components</th>
<th>Total Estimated Cost (GHS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medication</td>
<td>1,978.54</td>
</tr>
<tr>
<td>Prescribers</td>
<td>2,241.42</td>
</tr>
<tr>
<td>Dispensing</td>
<td>517.41</td>
</tr>
<tr>
<td>Total</td>
<td>4,737.37</td>
</tr>
</tbody>
</table>
4.5 Summary of Results

The conceptual framework of the study posited that rational prescriptions do not lead to other costs to the healthcare system, whereas irrational prescriptions lead to medication costs, prescriber costs and dispenser costs. About 33% of all prescriptions for uncomplicated malaria in the study period were irrational. The costs accruing to the healthcare system were GHS 1,978.54, 2,241.42 and 517.41 for medication cost, prescriber cost and dispensing cost respectively. The total cost of irrational prescriptions for uncomplicated malaria was GHS 4,737.37 ($ 1,091.56). The cost is at GHS 12.73 ($ 2.93) per irrational prescription.
CHAPTER FIVE

5.0 DISCUSSION

5.1 Summary of Findings

There were 1,128 cases of uncomplicated malaria identified from the Out-patient Department (OPD) records of the Madina Polyclinic, Kekele in 2016. This represented a proportion of 2.2% of all cases reporting at the OPD. Out of 140 prescriptions for uncomplicated malaria that were sampled, 49% were issued to females and 51% of them were to males. The ages of the patients ranged from 0-68, with a median age of 22.5 years. About 67% of them tested positive for malaria, 9% of them tested negative and 24% of them had no record of a malaria test.

About 67% of the prescriptions were rational and 33% of them were irrational. The most irrationally prescribed medicines were multivitamins (63%), injections (20%), antibiotics (13%) and others (4%). Almost all prescriptions (99%) had Arthemeter/Lumefantrine as the prescribed ACT antimalarial. Prescribers cited treatment failure, prescriber preferences, presence of symptoms attributed to conditions other than malaria and patient preferences as reasons for irrational prescriptions for uncomplicated malaria.

The estimated medication costs from irrational prescriptions was GHS 1978.54. The estimated prescriber cost was GHS 2,241.42. The estimated dispensing cost for irrational prescriptions was GHS 517.41. The total estimated cost for irrational prescriptions for uncomplicated malaria at the Madina Polyclinic, Kekele in 2016 was GHS 4,737.37 ($1,091.56). The cost per irrational prescription was GHS 12.73 ($2.93).
5.2 Proportion of uncomplicated malaria cases

The proportion of uncomplicated malaria cases among all cases presenting at the facility was 2.2%. Over the past three years the proportion of malaria cases at the OPD at Madina Polyclinic has dropped from 41% in 2013 to 18.7% in 2014 to 8.7% in 2015 and 8.5% in 2016, according to the annual reports available at the records department of the facility. This included both uncomplicated and complicated malaria cases. This was consistent with reported national trends by the National Malaria Control Program. The proportion in the Greater Accra Region was 11% (National Malaria Control Bulletin - Issue 3, 2015). The drop in the numbers was attributed to increased strict adherence to the test, treat and track strategy of malaria control. The insistence on testing before final diagnosis and treatment has led to a reduction in the number of febrile conditions diagnosed and treated as malaria cases. A study at the Nnamdi Azikiwe University Medical Centre, published in April 2017, shows that 45% of patients who reported to the OPD were managed for uncomplicated malaria. The researchers note, however, that this was accompanied by, ‘a high incidence of presumptive diagnosis’ and treatment without testing for malaria, leading to a cost that was equivalent to about 25% of the facility’s budget (Ezenduka, Resende, & Brian, 2017). Consequently, a lower proportion of uncomplicated malaria cases could mean a reduction in the financial burden of managing malaria. This notwithstanding the 2.2% realized is rather small compared to the 8.5% documented by the facility, which is the combined figure for both uncomplicated and complicated malaria cases. Even though the OPD is the main entry point for patients into the facility, there is an emergency bay at which patients are received as well. The OPD records obtained may not have been an accurate record of all cases that were seen at the OPD. There may have been some cases of uncomplicated malaria that were managed at the facility and captured in the total patient attendance books at the records.
department but were not entered into the OPD books. There also were malaria cases presenting with complications that were excluded from this study.

5.3 Proportion of irrational prescriptions for uncomplicated malaria

Out of 140 prescriptions reviewed, about 66% of them were issued following a positive malaria test, 9% for patients with a record of a negative malaria test and about 24% had no record of a malaria test. This was not too different from about a 62% test positivity rate reported by the National Malaria Control Program in 2015 (National Malaria Control Bulletin - Issue 3, 2015). Though one would have expected a higher rate among cases that had been diagnosed as uncomplicated malaria in a facility that had had a decline in proportion of malaria cases seen at OPD attributed to increasing adherence to the ‘test treat and track’ policy. It must however, be of some concern that all-together, about a third of all cases of uncomplicated malaria issued antimalarial prescriptions either have a negative test result of have no record of a malaria test done. There still is the need for increased adherence to the ‘test treat track’ policy, even in a facility that has had significant reduction in the proportion of malaria cases seen at the OPD because of routine testing before diagnosis.

About 67% of prescriptions for uncomplicated malaria were rational prescriptions. They adhered to the STG recommendation of an oral ACT antimalarial alone or with an analgesic. In a study by Ishola et al in Northwest Nigeria in 2011, about 72% of children presenting with malaria received ACTs (Ishola & Oreagba, 2011). Ezenduka et al also reported in 2014 that 93% of patients with malaria received ACTs, mostly (50.5%) Arthemeter/Lumefantrine (Ezenduka, Okonta, & Esimone, 2014). ACTs have become the main stay of treatment or uncomplicated malaria infections. The results of this study suggest that two-thirds of all consultations for
uncomplicated malaria do not incur other costs to the healthcare system apart from the cost of managing malaria.

The proportion of irrational prescriptions reported in this study was about 33%. One third of all prescriptions issued to patients presenting with uncomplicated malaria contains at least, one drug that is outside of the STG recommendation for the management of uncomplicated malaria. The most irrationally prescribed drugs were multivitamins (63%), injections (20%), antibiotics (13%) and others (4%). Aina et al reported that 68% of prescriptions for malaria that had been reviewed in State hospitals in Lagos were irrational (Aina et al., 2008). They defined irrational prescriptions to include prescriptions that had been issued on a presumptive diagnosis of malaria with no testing, prescriptions that included medication not indicated in the management of malaria and antimalarials that had been declared ineffective. This study did not consider prescriptions issued for presumptive diagnosis of malaria with no test or a negative test result as irrational. Aina et al also studied irrational prescriptions for malaria at a time when there was no policy to test before treatment. Thus, the likelihood of many febrile conditions misdiagnosed as malaria was high.

Khan et al, reported in 2013 that about 78% of all antimicrobials used were rational. That leaves about 22% of all antimicrobials usage as irrational (Khan et al., 2013). Kamuhabwa et al also reported that about 27% of prescriptions for malaria contained either an antibiotic or antimalarials that had been declared ineffective. It has been shown that prescriptions for other medication such as antibiotics and multivitamins have been noted to have increased in facilities that have had increased adherence to malaria treatment protocols that insist on a positive test prior to treatment. Indeed, a study that assessed the effect of rapid diagnostic test kits on prescriptions for malaria in Tanzania showed a 68% drop in antimalarial prescriptions in the
facilities that had the intervention, compared to a 32% drop in facilities that did not. However, antibiotic prescriptions increased from 49% to 72% in the facilities that had the intervention (D’Acremont et al., 2011).

The reasons prescribers and dispensers proffered for prescriptions that differed from the recommendations of the STG were failure of symptoms to resolve after treatment with recommended medication, prescriber preferences, presence of symptoms attributed to conditions other than malaria and patient preferences. The prescribers and dispensers knew what the STG recommendation for treating uncomplicated malaria was. These reason were somewhat different from the general reasons shared in the literature on reasons for irrational prescriptions, which have been poor knowledge on the part of providers and patients, reduced availability of essential medicines, poor functioning regulatory bodies and incentives for irrational prescribing (Mao et al., 2015). This study brings to the fore, prescriber experiences and preferences, symptoms that are difficult to characterize and patient preferences as threats to rational prescriptions. It would be necessary to investigate the extent to which these issues are incorporated into crafting treatment guidelines. Those soft issues may be the reasons treatment guidelines may not be adhered to appropriately if there are preferences and concerns of both health care providers and patients that the guidelines do not reflect.

5.4 Estimated cost of irrational prescriptions for Uncomplicated Malaria

The estimated cost of irrational prescriptions was GHS 4,737.37 ($1,091.56). The cost per irrational prescription was GHS 12.73 ($2.93). Aina et al estimated the cost of irrational prescriptions for uncomplicated malaria as $13,100.19 for 68% of irrational prescriptions for malaria (Aina et al., 2008). The estimate in this study was restricted to uncomplicated malaria and so was not as high as what was reported in 2008. However, it was significantly high.
compared to Ghana’s GDP per capita at about $1,500 in 2016, as recorded by the International Monetary Fund (IMF) (“GDP per capita (current US$) _ Data,” 2017) with a minimum wage of GHS 8.80 ($2.03) (“Minimum Wage, Minimum Wage Per Day at Ghana - Mywage,” 2017). The cost per irrational prescription was higher than the minimum wage of Ghana.

5.5 Results and Conceptual Framework

The conceptual framework of this study theorized that patients with uncomplicated malaria get diagnosed at the OPD and receive a prescription. The prescription has no added cost if it is rational. Irrational prescriptions lead to medication costs, prescriber costs and dispensing costs. The results of this study show that about 33% of all patients diagnosed with uncomplicated malaria received an irrational prescription. The 67% of patients who received rational prescriptions had no extra costs that accrued to the healthcare system. The irrational prescriptions led to medication and personnel costs. The personnel costs were prescriber and dispensing costs that would have found use serving other aspects of the healthcare system. There were also overhead costs that would fit into the conceptual framework. Unfortunately, these were not available on a per-patient and per-diagnosis basis for inclusion in this study.

The hypothesis of this study was that irrational prescriptions lead to extra costs accrued to the healthcare system. That cost was found to be a total of GHS 4,737.37 ($1,091.56) and GHS 12.73 ($2.93) per irrational prescription for uncomplicated malaria.

The model was appropriate for studying the estimated Institutional cost of irrational prescriptions for uncomplicated malaria.
5.6 Limitations

There was no estimate of what proportion of prescriptions for uncomplicated malaria were irrational in a similar context. There were estimates of what proportion of prescriptions for both complicated and uncomplicated malaria prescriptions were irrational. The proportion of malaria cases seen at the OPD of the facility was available and was used in the sample size calculation for uncomplicated malaria prescriptions. The study is limited by that assumption.

There were other costs such as overheads and utilities that were not available on a per-patient and per-diagnosis basis and so were not used in the estimation of the cost. The estimate of the total cost is also limited by that.
CHAPTER SIX

6.0 CONCLUSION

About a third of all prescriptions issued at the OPD for uncomplicated malaria are irrational. These irrational prescriptions cost about one and half times the minimum wage in Ghana, per irrational prescription. This is in spite of awareness of STG recommendation for managing uncomplicated malaria. Co-infection, prescriber preferences and patient preferences are the reasons for irrational prescriptions for uncomplicated malaria. All-together, these represent significant inefficiencies in the cost management of uncomplicated malaria and provide grounding for evidence-based advocacy for improved financial management of uncomplicated malaria.

6.1 RECOMMENDATIONS

The recommendations are:

1. Increased engagement of prescribers by the National Malaria Control Program (NMCP) and the Ghana Health Service (GHS) on recommended treatment for uncomplicated malaria must be done to ensure improved adherence to the STG guidelines. The engagement would also provide an avenue for prescribers to share those reasons that lead to prescriptions outside of what is recommended by the STG, leading to questions that may be researched for further policy action.

2. There must be increased advocacy for prescribers to adhere to recommended treatment guidelines. This may be done through regular communication with prescribers by the NMCP and MOH.
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My name is BRIGHT SASU BAABU, a post-graduate student from the school of Public Health, University of Ghana. I am carrying out a study in this polyclinic to find out the institutional cost of irrational prescriptions for uncomplicated malaria. I would be glad if you would participate in it. Your participation would comprise a 30-minute interview to answer questions about your work at the polyclinic and what your gross salary for that job is.

You may not have any immediate or direct benefits from my interview but your responses would provide information that might lead to reducing the cost of financing purchasing of medicines for malaria and improved financial management for malaria.

The only inconvenience, if any, that you may suffer by accepting to take part in this study would be the time and effort used up by the interview. If you indeed decide to take part, you are allowed to withdraw whenever you wish to, and are also allowed to skip answering any of the questions that you may not be comfortable with.

The information you would provide is going to be treated with strict confidentiality. Apart from my research team and members of the Ethics Committee of this polyclinic, nobody would have access to the information. Also, be rest assured that your name would not be mentioned in any report that would come out of this study.
Before taking Consent

Do you have any question(s) you wish to ask about the study? Yes [___] No [___]
If yes, please, indicate the question(s) below

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........................................................................................................................................

In case you have any questions later please, do not hesitate to contact BRIGHT SASU BAABU,
Department of Health Policy, Planning and Management, School of Public Health, University of
Ghana, Legon. Telephone 0242337203/0202016816. Email: bsbaabu@gmail.com or
bsbaabu@stu.ug.edu.gh
You may also contact the Administrator of the Ghana Health Service Ethical Review Committee
at this address; Hannah Frimpong, GHS-ERC Administrator, Office: +233 302 681109, Mobile:
233 (0) 243235225 or 0507041223. Email: Hannah.Frimpong@ghsmail.org

PARTICIPANT’S CONSENT

I have read or I have let somebody read or translated all the necessary information that I need to
know concerning this study and have fully understood it. I have decided on my own accord
without any coercion to take part in this study. However by deciding to participate in this
study, I am not waiving any of my personal rights by signing or thumb printing this consent form.

Signature:                                                                 Signature of Translator:
........................................................................................................................................
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Interviewers Statement

I, the undersigned, have explained this consent to the subject in English language/Ga/Twi, and that she/he understands the purpose of the study, procedures to be followed, as well as the risks and benefits of the study.

The participant has fully agreed to participate in the study.

Signature of Interviewer…………………………………………………………………………………

Date……………………………………………………………………………………………………

Address…………………………………………………………………………………………
APPENDIX 2

INTERVIEW GUIDE

1. How long have you worked at this polyclinic?
2. What is your understanding of uncomplicated malaria?
3. What drugs would usually be prescribed for uncomplicated malaria, in your experience?
4. What reasons may lead to prescription of drugs that may not be directly related to managing uncomplicated malaria?
5. Are you aware of the Standard Treatment Guidelines of the Ministry of Health?
6. Do you know what it says about treating uncomplicated malaria?
7. What are some of the reasons that would account for prescriptions that are different from what is contained in the Standard Treatment Guidelines?
8. Have you received any communication from the Malaria Control Program on treatment of uncomplicated malaria in the past year?
9. Have you received any incentive to engage in irrational prescription for uncomplicated malaria in the past year?
10. About how much time does it take to conduct one consultation?
11. About how much time does it take to dispense medication to one patient?
12. About how much is your estimated gross salary?