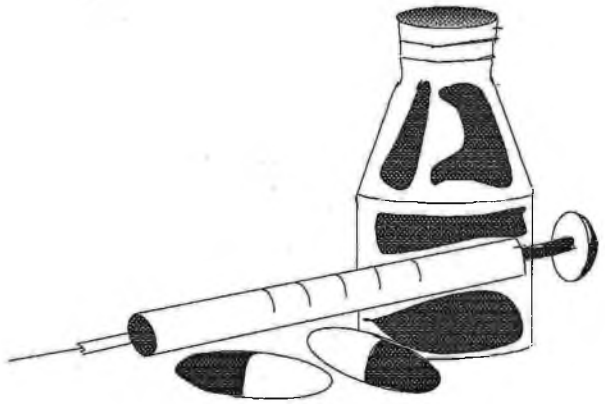
UNIVERSITY OF GHANA

A Survey of Prescribing Patterns in the Wassa West District of Ghana with Special Reference to Antibiotics



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A dissertation presented to the School of Public Health in partial fulfilment of the requirements for the award of the Master of Public Health degree

Legon

January 1996

TO ROSEMARY, BERRIL AND DARY

DECLARATION

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person nor material which to a substantial extent has been accepted for the award of any other degree or diploma of a university or other institute of higher learning, except where due acknowledgement is made in the text.

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ABSTRACT

Study title: A survey of prescribing patterns in the Wassa West district of Ghana with special reference to antibiotics.

Statement of the problem: The availability, affordability and rational use of drugs constitute a fundamental indicator of quality of health care delivery. Ghana has spent up to 40% of its recurrent budget to ensure the availability of drugs in the health system. However, irrational prescribing has led to a wastage in drugs supply.

In the Wassa West district, several obstacles to rational prescribing exist. These include the lack of an active programme to promote rational prescribing, the lack of objective information to guide prescribers in their practice in the face of an increasing array of new drugs and the aggressive promotional activities of drug companies.

A previous rapid qualitative assessment of the pharmaceutical system in the district indicated that there were inappropriate prescribing practices. The absence of relevant, objective and measurable indicators limited the usefulness of the findings of the study as a basis for the evaluation of any interventions instituted to improve the prescribing practices. This study provides the requisite baseline measures of prescribing patterns in the district and identifies areas for targeted interventions.

Main objective: To describe and compare the patterns of drug prescribing in government health facilities in the Wassa West district with a view to developing strategies to improve prescribing practices.

Place of study: Seven government health facilities located at Tarkwa, Nsuaem, Simpa, Dompim, Bogoso, Huni Valley and Prestea Himan.

Study type: The study was cross-sectional comparative in type.

Methodology: Retrospective prescribing data covering a one year period from June 1994 to June 1995 were obtained from 700 outpatients' clinical record cards, 100 from each of 7 government health facilities in the district. At the district hospital, prospective data from 100 outpatient prescriptions were also collected because of a relatively large number of incomplete data from the retrospective records.

A one-day prevalence survey of prescribing patterns for 45 inpatients at the district hospital was also undertaken. Finally, the type of prescribers and the availability of the national Essential Drugs List (EDL) manual and some common drugs in all 7 health facilities were determined.

Findings and conclusions:

- irrational prescribing is both serious and widespread in the Wassa West district
- prescribing patterns differed significantly between the health facilities. Bogoso and Himan had the worst prescribing indicators
- prescribing patterns in the health centres were worse than those in the district hospital perhaps a reflection of the lower cadre of prescribers and a relative lack of diagnostic facilities
- treatment records were poorly kept at the district hospital as a result of a heavy workload
- there was an average of 4 prescribers comprising combinations of medical officers, medical assistants, nurses and technical officers in each facility
- the number of drugs prescribed per patient ranged from 0-13 with a mean of 4.6
- 80.0% and 57.9% of patients were treated with one or more injectable drugs and antibiotics respectively. The preference for injections was influenced by patient demand as well as by clinical and financial considerations. Antibiotics were commonly prescribed for malaria, respiratory infections and soft tissue infections

- 64.6% of all drugs were prescribed by their generic names; 97.1% were on the national Essential Drugs List. The use of essential drugs was favoured by procurement from a central Regional Medical Store. Prescription by non-generic names was due to a concern that chemical sellers were not familiar with the generic names and may therefore not be able to dispense the right drugs
- there were inappropriate treatment practices. About 87% and 41% of patients with malaria were treated with an injection chloroquine and antibiotics respectively. This was attributed to the lack of refresher training for prescribers in management of some common conditions
- the national EDL manual was not available at any of the facilities surveyed owing to a general national shortage of the manuals
- except for drugs for skin diseases, drugs for the treatment of common diseases were generally available in the facilities
- in relation to the severity of illness, drugs for inpatients of the district hospital were greater in number, more expensive and more frequently administered parenterally than those for outpatients.

Recommendations:

Policy makers: The urgent development, proclamation and promotion of a national drugs policy backed by the relevant legislation should provide a framework for the improvement of prescribing practices and for the entire pharmaceutical sector.

The national Essential Drugs Programme should be reactivated and given the necessary legal backing. Funding should be provided for the regular revision and widespread marketing of the EDL manual.

Training institutions: Training institutions should prepare medical officers and medical assistants for the "real-world" practice of prescribing under negative pressures by adopting a problem-based teaching of therapeutics in place of the traditional approach

of merely transferring knowledge about the action of drugs in the treatment of diseases.

Regional Health Administration: The regional health authorities should obtain copies of the EDL manual for distribution to the districts, ensure availability of essential drugs in the Regional Medical Store, organise training as well as assist districts to prepare appropriate treatment guidelines for common diseases.

District Health Administration:

- The district health authorities should establish a District Medical Store to supply drugs to and monitor the consumption patterns of all health facilities.
- a District Drugs and Therapeutics Committee should be formed to promote rational prescribing in the district
- there should be regular in-service training for prescribers in which the management of common diseases, polypharmacy and the over-use of injections and antibiotics will be discouraged. Funding for training could be obtained from the district's quarterly financial allocation and donor agencies
- training should be followed up with a programme of regular supervision of medical assistants and nurses by the medical officers at the district hospital
- training of chemical sellers to correctly interpret prescriptions should favour generic prescribing
- the district should undertake further studies on the nature and extent of prevailing prescribing influences. Regular assessment of prescribing practices for government as well as mines and private clinics will be necessary.

Patients and communities: Posters on the walls of clinics should be provided to educate public on the effects of patients' demands for certain drugs as well as educate the public on the dangers of self-medication. The appropriate use of drugs should be incorporated into the district's intersectoral social mobilisation programme.

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LIST OF ABBREVIATIONS

ATS	Antitetanus serum
BHC	Bogoso Health Centre
DANIDA	Danish International Development Agency
DHC	Dompim Health Centre
DHMT	District Health Management Team
EDL	Essential Drugs List
EDLIZ	Essential Drugs List of Zimbabwe
EDL/NF	Essential Drugs List and National Formulary
EDP	Essential Drugs Programme
HHC	Himan Health Centre
HVHC	Huni Valley Health Centre
IM	Intramuscular
INRUD	International Network for Rational use of Drugs
MA	Medical Assistant
MOH	Ministry of Health
MOH & CW	Ministry of Health and Child Welfare
MSH	Management Sciences for Health
NHC	Nsuaem Health Centre
NRCD	National Redemption Council Decree
OPD	Outpatients' Department
RMS	Regional Medical Store
RPM	Rational Pharmaceutical Management
SHC	Simpa Health Centre
TGH	Tarkwa Government Hospital
UK	United Kingdom
URI	Upper Respiratory Infections
USA	United States of America

USAID	United States Agency for International Development
UST	University of Science and Technology
UTI	Urinary Tract Infection
WHO	World Health Organisation
WWD	Wassa West District
ZEDAP	Zimbabwe Essential Drugs Action Programme

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background information

Drug management forms a vital component of any health system. While drugs alone are not sufficient to provide adequate health care, they do play an important role in the diagnosis, prevention, alleviation and cure of diseases as well as for the maintenance of health. The provision of essential drugs is one of the pillars of the Primary Health Care concept which was adopted by Ghana in 1978. Public satisfaction with health services depends on among other factors, the maintenance of a regular, affordable and accessible supply of appropriate drugs (Waddington & Enyimayew, 1989). Poorly managed drug systems also affect the morale and satisfaction of service providers who may be frustrated by chronic shortages of needed drugs. The analysis of drug supplies and consumption patterns therefore, can be used to monitor the quality of health care (WHO, 1994). Until 1992, about 30-40% of the total recurrent budget for health in Ghana was spent on drug procurement (Fofie, 1994).

In spite of the immense value of drugs to the public health system, many developing countries have problems ensuring a regular supply of drugs. Further, even when drugs are available, a large proportion of it is wasted through irrational prescribing, pilferage and inefficient management (Foster, 1991). In its assessment of the pharmaceutical sector of Ghana, the National Drugs Committee (1994) stated that "the real blow to health finances comes at the end of the line, where overprescribing reaches a level almost unequalled in Africa and wastes a large proportion of scarce funds".

Recent efforts in Ghana to rationalise drug management and to ensure the availability of drugs have included the introduction of an Essential Drugs List (EDL) in 1988 and

the Cash and Carry full-cost recovery system in 1992. These have still met with various managerial problems and have done little to address the problem of irrational drug prescribing.

The district level is the most appropriate level for implementing primary health care (WHO, 1994). Accordingly, Ghana has directed its efforts at improving the functioning of the district health system with the implementation of the Primary Health Care strategy and the Strengthening District Health Systems initiative (MOH, 1992). In furtherance of its decentralisation policy, the central government now allocates funds for health development directly to the districts. The introduction of the Cash and Carry system has enabled districts to exercise a greater control over their drugs supply problems. With these elements, district health systems are increasingly directing their efforts at improving their drug management systems and the quality of health care delivery to their populations. It is suggested that the investigation of drug prescribing practices at the district level is one important strategy that will contribute to meeting these objectives.

1.2 Statement of the problem

Irrational prescribing remains a problem in many developing countries (Isenalumhe & Oviawe, 1988; Mnyika & Killewo, 1991). A recent Rational Pharmaceutical Management (RPM) Project assessment of the pharmaceutical sector of Ghana identified irrational prescribing as a major problem in the public health system. The study covered 20 health facilities in 5 regions, namely Brong-Ahafo, Greater Accra, Northern, Volta and Western regions. The health facilities in each region comprised the Regional Hospital, a District Hospital and within the district, two health centres (Rankin *et al.*, 1993). These facilities were selected out of 10 Regional Hospitals, 36 District Hospitals and 252 Health Centres/Posts in the country (MOH Annual Report,

1993) using a WHO/INRUD methodology for investigating drug use in health facilities (WHO, 1993).

The study was intended to provide a national picture of drug use and so did not assess prescribing practices in the different types of facilities. Different facilities have varying influences such as drug availability, type of prescribers and available diagnostic facilities on prescribing behaviour . Therefore, they are best studied separately for the purpose of designing appropriate remedial interventions to improve prescribing. The drug prescribing practices of a district health system have not previously been studied.

In the Wassa West district, prescribers in peripheral health facilities often are isolated and lack objective information on rational prescribing. Their main sources of information are drug representatives and commercially-oriented publications. The Cash and Carry system is a potential obstacle to rational prescribing. The system permits health institutions to buy their own drugs according to their own perceived needs which are likely to be dictated by existing prescribing habits. Drugs including those that are not on the EDL may be purchased from the private sector. There is also the problem of the prescriber having to select from an increasingly large number of drugs on the market. The district has no defined programme to improve the prescribing practices of clinicians. Further, the availability of the Essential Drug List and National Formulary in the district health facilities has not been assessed.

A 3-member ad hoc District Formulary Committee comprising the District Pharmacist, a Senior Nursing Officer and a Medical Assistant was formed in 1994 to rapidly assess the drug management system in the district with regards to procurement procedures, storage and use of drugs in government health facilities. Prescribing practices were not systematically studied. Prescriptions were analysed only to determine whether prescribed drugs were appropriate for stated diagnoses.

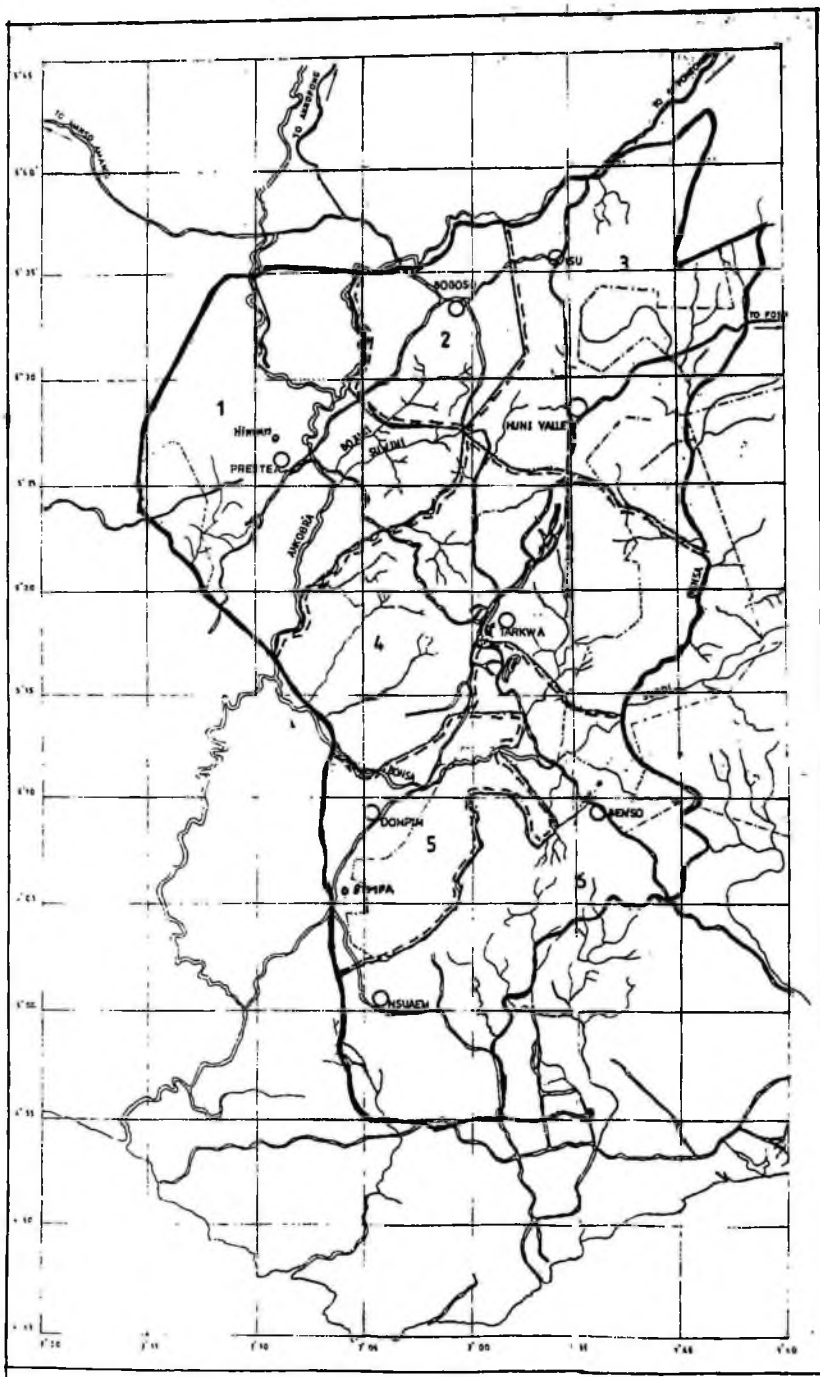
The committee's major findings were that stock levels of essential drugs at the health institutions were inadequate; there was significant wastage due to inappropriate prescribing and drug purchases; there was irregular supply of drugs and drug requisitioning was not related to disease patterns (Report of Wassa West District Formulary Committee, 1994). Unfortunately, these findings were not quantified and therefore provide insufficient basis on which to evaluate any remedial measures to improve the situation.

It is expected that the present study will provide baseline measures of prescribing patterns and identify areas for targeted interventions. These measures will enable any interventions to be evaluated. They may also provide baseline information upon which the impact of drug use may be assessed. For example, antimicrobial susceptibility patterns may be related to the extent and pattern of antibiotic use. Finally, the findings may provide useful information for the development of treatment guidelines.

1.3 Description of study area

The Wassa West district is one of eleven districts in the Western Region of Ghana. It is located in the central south of the region and covers an area of about 2,450 square kilometres. It has a population of about 208,000 and a growth rate of about 3.1%. The district is made up of 209 communities of which about 88% is rural. It is administered by the Wassa West District Assembly which is headed by a District Chief Executive. Tarkwa is the administrative capital. The principal occupations are farming, mining and trading.

Health services in the district are managed by the Wassa West District Health Management Team. All manner of health services are available in the district. They include services provided by traditional and spiritual healers as well the private, missionary and governmental practitioners. The health district is divided into 6 sub-



KEY

1 PRESTEA
2 BOGOSO
3 INSU / HUNI VALLEY
4 TARKWA
5 DOMPIM
6 BENSO / NSUAEM

WASSAW WEST SUB DISTRICTS

Fig. 1

districts, namely Nsuaem, Dompim, Tarkwa, Bogoso, Huni Valley and Prestea Himan (fig.1). The District Hospital is located in the Tarkwa sub-district. The other sub-districts are subserved by Health Centres corresponding to their names. Additionally, the Dompim sub-district has one other health centre at Simpa.

The major health institutions in the district include the following:

- 1 District Hospital at Tarkwa
- 3 Mines Hospitals at Tarkwa, Nsuta and Prestea
- 6 Health Centres at Nsuaem, Simpa, Dompim, Bogoso, Huni Valley and Himan
- 3 Mines Clinics at Tarkwa (2) and Bogoso
- 2 Industrial Company Clinics at Bonsa (rubber) and Aboso (glass)
- 6 Community Clinics at Aboso, Awudua, Amantin, Huni Ano, Nyarso and Iduapriem
- 4 Private Clinics

The district hospital and health centres are the main government health institutions in the district and are therefore under the direct control of the DHMT. Apart from two quasi-government Mines Hospitals at Nsuta and Prestea, all the remaining health institutions are privately-owned and are therefore responsible for selecting their own staff and procuring their own supplies. The two quasi-government hospitals are managed independently of the DHMT. The Mines and Industrial Clinics generally cater for the company staff and in some cases their dependants.

The health centres are in the charge of medical assistants as is one community clinic at Aboso. The medical officers at the district hospital and the medical assistants at the health centres are the major prescribers in the government health facilities. The medical assistants at the health centres are frequently assisted by some of their nursing staff. The district also has two pharmacists who both work at the district hospital. Most of their drug supplies for the health facilities are obtained from the Regional

Medical Store at Sekondi. The DHMT is currently in the process of establishing a District Medical Store to cater for the district hospital and health centres. There are also 43 Licensed Chemical Shops in the district from which patients may purchase drugs.

Some characteristics of the government health facilities for 1994 are presented in table 1.1. Only the district hospital has facilities for admissions as well as for laboratory and radiographic diagnosis. Additionally, the district hospital has 4 main wards namely the Female, Children's, Male Medical and Male Surgical Wards. Other units of the hospital include a Dental Clinic and two theatres.

Table 1.1 Characteristics of government health facililities in the Wassa West District

Characteristic	Tarkwa Gov. Hosp.	Nsuaem H/C	Simpa H/C	Dompim H/C	Bogoso H/C	Huni Valley H/C	Himan H/C
Location	Tarkwa	Nsuaem	Simpa	Dompim	Bogoso	Huni Valley	Himan
Year Commissioned	>100yrs ago	1990	1991	1990	1987	1990	1984
Catchment Pop.	81755	11401	21210	21210	21210	21210	31344
Staff Strength	103	30	8	3	10	11	18
Staff:Pop. Ratio	1:794	1:380	1:2651	1:7070	1:2121	1:1928	1:1741
No. of beds	69	18	10	12	19	9	6
No.of Outreach Pts	13	10	nil	3	7	8	13
OPD Attdce 1994	23500	3074	3185	2055	7018	2674	8948

The top 5 diseases in the government health facilities in 1993 are shown in Table 1.2. Malaria accounts for about 45% of all cases seen.

Table 1.2 Ranks of top 5 diseases from MOH institutions in WWD in 1993

Disease	Tarkwa Gov.Hosp.	Nsuaem H/C	Simpa H/C	Dompim H/C	Bogoso H/C	Huni Valley H/C	Himan H/C
Malaria	1	1	1	1	1	1	1
Diarrhoea Dis.	2	4	2	4	5	3	4
Upper Respiratory Infections	3	2	4	2	4	5	2
Diseases of Skin	4	5	5	5		4	5
Eye Infections	5	-	-				
Accidents		3	3	3	3	2	
Pregnancy-related Disorders					2		
Intestinal Worms	-		-		-	-	3

1.4 Study assumptions

The following assumptions have been made to guide the study:

- there is irrational drug prescribing in the Wassa West District
- irrational prescribing is more prevalent in health centres than in the district hospital
- many drugs are prescribed for each patient
- there is over-use of antibiotics and injections
- drugs are frequently prescribed by their brand names rather than by their generic names
- drugs not on the national Essential Drugs List are frequently prescribed
- inappropriate treatment prescriptions are common
- prescribers have little access to the Essential Drugs List and National Formulary to guide their treatment decisions

1.5 Objectives

1.5.1 General Objective

The general objective of the study was to describe and compare patterns of drug prescribing in government health facilities in the Wassa West district with a view to developing appropriate strategies to improve prescribing practices and ultimately, the quality of health care delivery.

1.5.2 Specific objectives

The specific objectives of the study were as follows:

1. To compare the outpatient drug prescribing patterns between different government health facilities in the Wassa West district
2. To describe the prescribing patterns for inpatients of the district hospital

3. To estimate the following measures:
   - average number of drugs prescribed per patient
   - the proportion of patients receiving antibiotics
   - the frequency of specific antibiotics prescribed
   - the cost of prescribed antibiotics in relation to the total cost of all drugs
   - the proportion of patients receiving injectable drugs
   - the frequency of specific injectable drugs prescribed
   - the number of injection episodes prescribed per patient
   - the proportion of drugs prescribed which are on the Essential Drugs List
   - the proportion of drugs prescribed by their generic names
   - the frequency of specific drugs prescribed as generics
4. To describe the route of administration of prescribed drugs
5. To list the indications for antibiotic use in the district
6. To assess the appropriateness of prescriptions
7. To describe the type of prescribers working in each health facility
8. To assess the availability of the Essential Drugs List and National Formulary at the health facilities
9. To investigate the availability of drugs used to treat common conditions at each health facility
10. To make recommendations to improve prescribing practices

CHAPTER TWO

2.0 LITERATURE REVIEW

The management of pharmaceuticals, particularly to ensure the availability of drugs is an essential component of any health system. This is because of the vital role drugs play in the management of health problems. Public confidence in health workers and satisfaction with health services depend upon the maintenance of a reliable and affordable supply of drugs. The availability, accessibility, affordability and appropriate use of drugs therefore constitute a fundamental indicator of the quality of care in health facilities (WHO, 1994).

In a qualitative study among various community groups in the Ashanti-Akim district of Ghana on the utilisation of health services, Waddington and Enyimayew (1989) found that quality of health care was a more important determinant than its cost. The quality of care was seen in terms of the perceived quality of medical care, staff attitudes and the availability of drugs. Many patients expressed their resentment at being charged a consultation fee and receiving a prescription at the government health facility but no drugs. Unfortunately, even when drugs are available, many of them are wasted because of inappropriate prescriptions and use.

The judicious management of drugs is particularly important in Africa and the developing world where various human experiences are medicalized i.e. defined as medical problems (Haaijer-Ruskamp & Hemminki, 1993). For instance, ageing is viewed as a medical problem for which analgesics and multivitamins are believed to be essential. In Ghana, indomethacin is popularly known as *aberewa bebo ball* meaning the "old lady will play football" reflecting the belief that taking the drug will make the elderly strong enough to play the game of football. Drug use has increased as a

consequence of medicalization whilst at the same time the production of effective drugs has itself contributed to the process of medicalization (Bell, 1987).

2.1 Economics of drug consumption

At both private and public health facilities in Africa, pharmaceutical expenditures typically make up 20% to 30% of total recurrent costs, ranking second only to personnel costs (World Bank, 1994). The World Health Organisation (WHO) reckons a much higher expenditure by developing countries; it estimates that up to 40% of the total health care budget may be spent on drugs (WHO, 1977).

In Ghana, a sum of ¢32.4 million (cedis) representing about a third of the total recurrent budget for 1976-1977 was allocated to supplies. The corresponding allocation for wages and salaries was ¢43.5 million. The proportion of recurrent budget allocated to drugs for the same period was estimated to be about 24% (Barnett *et al.*, 1980). Until 1992, drugs were estimated to account for about 40% of the total health budget of Ghana with more than 80% of this expenditure being in foreign currency. In addition, drugs accounted for more than 60% of the recurrent expenditure of the health budget apart from wages and salaries (MOH, 1989). Since the introduction of the Cash and Carry system in 1992 however, there has been no public sector budget for pharmaceuticals (Fofie, 1994; National Drugs Committee, 1994). In 1993, MOH was able to finance 70% of its drug requirements from Cash and Carry operations (MOH Annual Report, 1993).

2.2 Problems in drug supply

The major problems facing pharmaceutical systems in developing countries include limited economic resources, lack of organised drug policies, shortage of trained health personnel and inefficiency and waste in drug supply. Patients attending public sector

facilities in Sub-Saharan Africa may be receiving the benefits of only $12 worth of quality drugs for each $100 spent because of widespread inefficiencies in drug management (Foster, 1991; WHO, 1977; World Bank, 1994).

The factors that contribute to waste in drug supply in Sub-Saharan Africa include the following:

- inadequate buying policies and practices - a WHO study of buying practices in Nigeria found that by shifting from brand name to generic drugs, costs could be reduced by another 25% (WHO, 1988a)
- poor quantification of drug needs - estimate of needs are not related to morbidity data and appropriate treatment schedules. In Ghana, when quantification of drug needs of the public sector based on morbidity was carried out by the Ministry of Health (MOH), the overall estimated needs came to approximately $4 million - only half of what actually had been spent on drugs (cited by Foster, 1991)
- excessive purchase of low priority drugs ties up the already meagre funds with a potential risk of their expiry unused. In Ghana, a nation-wide audit of drug stocks in 1988 showed that 45% of the drugs were either expired (33%) or due to expire within the next 6 months (12%) (MOH, 1988)
- inefficient procurement - procurement is rarely based on competitive bidding for generic drugs. Bulk purchasing of carefully selected essential drugs was estimated to be able to lead to a saving of nearly 40% of the annual drug bill for church health institutions in Kenya in 1985 (Hogerzeil & Moore, 1987)
- inefficient storage and distribution - drugs are wasted due to poor storage conditions, poor needs estimation or inventory control and pilferage by employees or theft by outsiders
- irrational prescriptions have been estimated to lead to about 50% waste in drug supply to patients. Irrational prescribing practices are further discussed below
- non-compliance by patients - the incorrect use of drugs by patients reduces the proportion of drugs that are used effectively by 20% (World Bank, 1994)

In response to the above problems, many countries have implemented Essential Drugs Programmes (EDPs) in order to improve the management, availability and the rational use of drugs.

2.3 Rational prescribing of drugs

Rational prescribing requires the basic tools of right drugs, right information and advice. It must be set in the wider context of the rational use of drugs which extends beyond rational prescribing practices and patients' attitudes to include policy issues such as selection, legislation and procurement, all of which influence the availability, source, quality and use of drugs (van der Geest, 1987; WHO, 1992b).

The Director-General of WHO has said that "the rational use of medicinal drugs is critical to the most important primary and preventive health care measures; ... unless, there is a regular supply of safe and effective drugs, public trust and interest in primary health care will rapidly deteriorate" (Nakajima, 1992). This statement clearly emphasises the importance of the rational use of drugs in national health systems.

Interestingly, the pattern of drug prescription is similar in developing countries in spite of varying cultures, health systems and economies. There are reports of polypharmacy, prescription of brand-name drugs, frequent use of injections and antibiotics and inappropriate treatment practices in Ghana, India, Nigeria, Tanzania, Kenya and Ethiopia (Barnett *et al.*, 1980; Greenhalgh, 1987; Isenalumhe & Oviawe, 1988; Mnyika & Killewo, 1991; Nabiswa & Godfrey, 1994; Sekhar *et al.*, 1981). These examples of irrational prescription of drugs and their consequences are discussed separately below.

2.3.1 Polypharmacy

The problem of polypharmacy in developing countries betrays how little progress, if any, has been made in the rational use of drugs. A study of outpatient consultation data at the Achiase Health Centre in the Birim District of Ghana's Eastern Region in 1976 indicated an average of 3.9 items per prescription (Barnett *et al.*, 1980). More recently, the USAID-supported Management Sciences for Health (MSH) study on Rational Pharmaceutical Management (RPM) in Ghana reported an average of 4.3 drugs per curative encounter in 20 health facilities in 5 regions in Ghana (Rankin *et al.*, 1993).

In Nigeria, the average number of drug items prescribed for 1450 paediatric outpatients at the University of Benin Teaching Hospital in 1985 was 4.7. Over 76% of the prescription orders contained 4 or more drug items. The average number of drug items for 299 children with diarrhoea was 5.6 (Isenalumhe & Oviawe, 1988).

The worst example of overprescription has been reported from Mali where the average prescription contained 10 drugs. These drugs sometimes included a duplication of an antibiotic under different brand names. No other details of the survey such as the study location or type of facility in which the prescriptions were made were provided (cited by Foster, 1991).

Another report indicated that 44% of outpatient prescriptions at the national teaching hospital in Nairobi contained 3 or more drugs (Maitai & Watkins, 1980). Many years later, a study covering 4 urban health facilities in Eldoret in the north-western highlands reported the mean number of drugs per encounter as 2.02 (Nabiswa & Godfrey, 1994). Clearly, any comparisons of prescribing data should take account of the different types of health facilities (which determines the type of prescribers,

availability of diagnostic facilities *etc.*), the number of facilities covered and whether the study unit includes reattendants or new patients only.

The higher the number of drugs prescribed per patient, the higher the costs of drug therapy and the greater the chance for adverse drug reaction or interaction. Isenalumhe & Oviawe (1988) observed that the greater the number of drugs per patient, the greater the likelihood of his failure to procure them as a result of economic implications of such prescriptions. While 85% of patients for whom 2 or 3 drugs had been prescribed collected their drugs, only 55% of those with 4-5 drugs and 31% of those with 6-7 drugs collected theirs.

Isenalumhe & Oviawe (1988) also observed that many physicians who prescribed multiple drugs hardly allowed patients to relate their complaints before they wrote out prescriptions. Such physicians did not take time to explain anything, including the treatment process to their patients. Their hasty practice had obvious implications for patient compliance. Polypharmacy could lead also to poor compliance because patients get confused about having to take many drugs at different times (Boyd *et al.*, 1974). Finally, the use of several unnecessary drugs could deprive patients who genuinely need the drugs from getting them.

2.3.2 Generic name prescribing

Prescribing by generic names ensures that the lowest cost generic product available can be dispensed. Accordingly, it is mandatory for all government and government-aided institutions in Zimbabwe to prescribe by generic name only (WHO, 1988c). Brand name drugs are about 5 times more expensive than their generic equivalents (Foster, 1991). In a large health centre in Mali, the price paid for a brand name ampicillin was 2.5-3 times the international generic price. A change in the

procurement strategy for this one drug alone would have led to a 15-20% in the drugs budget (Foster, 1991).

Similarly, Mariko (1991) reported that the price of drugs at the Bankass and Koro health centres where drugs are purchased as generics from a non-profit European wholesaler was a third to a quarter of that of comparable drugs at the State-owned People's Pharmacy of Mali which procures its supplies (mostly specialities) by direct contract from local and external markets. A change in procurement policy would have led to a 40% saving on drug expenditures.

In the RPM study in Ghana, 59.4% of drugs were prescribed by generic names. Similar studies conducted by the International Network for Rational use of Drugs (INRUD) in ten countries, namely Yemen, Uganda, Sudan, Malawi, Indonesia, Bangladesh, Zimbabwe, Tanzania, Nigeria and Nepal showed an average of 66.7% generic prescribing (Rankin *et al.*, 1993).

In Tanzania which has an Essential Drugs Programme (EDP), the proportion of drugs prescribed by their generic names in 20 dispensaries in the Dar es Salaam region was 83.9% (Massele *et al.*, 1993). Interestingly, within the Mbeya region of the same country, Mnyika and Killewo (1991) found that almost all health workers prescribed drugs by their brand names although the drug list in their EDP kit used generic names. Similarly, Greenhalgh (1987) also found in a study of the prescriptions of private general practitioners in India that about 96% of all drugs were prescribed by brand names.

2.3.3 Prescribing of injections

The frequent, often unwarranted use of injections has been described in several reports from developing countries. In the Achiase Health Centre study in Ghana described

above, 96% of 305 visits were treated with at least one injection, and the average number of injections per consultation was 0.99. The commonest injections were an antimalarial and a penicillin (Barnett *et al.*, 1980).

The over-use of injections appears to be a particular problem for Ghana. In the RPM study, 55.7% of patients received injections compared with an average of 24.7% (range 0.2-48%) for the 10 INRUD study countries (Rankin *et al.*, 1993; WHO, 1993). In Tanzania, only 24.6% of cases received injections (Massele *et al.*, 1993). In Yemen, the proportion of cases with injections in an EDP area and a non-EDP area was 24.8% and 57.8% respectively (Hogerzeil *et al.*, 1989).

It has to be noted that apart from the frequent use of injectable drugs, the number of injection episodes for each injectable drug is also believed to be high judging from the prescribing patterns of such common drugs as chloroquine and the penicillins (Marfo *et al.*, 1995; Ofori-Adjei, 1989). Unfortunately, there are hardly any reports on the frequency of injection episodes.

The over-use of injections not only leads to higher cost for the patient, but also makes extra demands on health institution in terms of trained staff, staff time, sterilisation equipment *etc*. The potential risk of adverse reaction is much higher with injections than with other routes of administration. Other problems associated with injections include injection abscesses, thrombophlebitis, poliomyelitis, hepatitis B and C and AIDS.

2.3.4 Misuse of antibiotics

In Ghana, as in other developing countries, infectious diseases of bacterial origin constitute a major cause of morbidity and mortality. Whereas many of them can be prevented through improved nutrition, immunisation, sanitation and water supply,

many still have to be combated with antibacterial drugs. The use of antibiotics must be based on sound scientific policies for a successful and sustainable fight against infectious diseases. Unfortunately, this is often not the case; the rampant misuse of these drugs has been well documented.

The proportion of hospital inpatients who receive antibiotic therapy has been variously reported as 21-28% in Britain (Cooke *et al.*, 1983; Moss *et al.*, 1981); 25-36% in Australia (Raymond *et al.*, 1989); 28% in South Africa (Till *et al.*, 1991) and 57% in Bangladesh (Hossain *et al.*, 1982). For outpatients, the proportion has been 38.6% in Tanzania (Massele *et al.*, 1993); 46.6% in Ghana; 43.2% for 10 INRUD study countries (Rankin *et al.*, 1993) and 54.3% in Zimbabwe (Stein *et al.*, 1984). The antibiotics were reported to have been used inappropriately in 12.3% of therapeutic prescriptions in Zimbabwe, 2.5-19.0% in Britain, 38.8% in South Africa, 24-39% in Australia and 50% in Bangladesh depending on authors' own criteria for assessment. The proportion of inappropriate prophylactic prescriptions was generally higher than that of therapeutic prescriptions.

In an earlier review, Buckwold and Ronald (1979) reported that antibiotics had been used inappropriately or irrationally in 38-66% of cases. Up to 80% of irrational use was given as prophylaxis particularly for surgical cases. Roberts and Visconti (1972) found that 77% of their hospital's antibiotic cost was spent for irrational therapy. In addition, this therapy was responsible for 92% of all patients who experienced adverse drug effects.

Other examples of irrational prescribing have been personally observed by the author in his clinical practice in Ghana. These include the use of antibiotics in upper respiratory infections (URI), asthma, malaria, abrasions and clean operations (e.g. breast and groin hernia operations). Unfortunately, there are only few published reports that document such misuse.

In one survey in USA, nearly 60% of physicians used antibiotics to treat common cold (Stolley *et al.*, 1972). Williams (1986) observed that the community practitioner in UK used antibiotics to treat viral upper respiratory infections and terminal phases of malignant disease. At first level health facilities in the Central Region of Ghana, 80.6% of health providers prescribed antibiotics to children with acute URI (Afari *et al.*, 1995). Marfo *et al.*, (1995) in a study on the management of malaria in health facilities in the Cape Coast municipality found that prescribers frequently added drugs such as antibiotics to their antimalarial therapy. In developing countries, chloramphenicol has been widely used for the treatment of diarrhoea, which is often attributed to typhoid fever without bacteriological evidence (WHO, 1983).

Loefler (1989) observed that in his travels through Africa, he often encountered hospitals where everyone with a wound was given courses of antibiotics and yet infection rates there were still about 30% or higher. He dismissed such arguments as perceived high infection rates due to lack of sophisticated facilities in theatres, presence of flies and unhygienic habits of patients put forward to justify the misuse of antibiotics. Other examples of 'bad practice' have included the use of topical gentamicin and the use of fusidic acid alone (Davey, 1993).

The considerable resources spent on antibiotics further justify the need for appropriate use of these drugs. Antibiotics often account for 15-30% of drug expenditures, the largest share of any therapeutic group of drugs (Col & O'Connor, 1987; WHO, 1988c). In developing countries, the lack of adequate resources and the lack of restrictions on antibiotic use coupled with self-prescribing of over-the-counter drugs has led to a situation of sub-optimal use and poor utilisation. On the other hand, in the developed countries, the major issues in antibiotic utilisation have involved the selection of the most efficacious drug and the dose and duration of therapy (Levy *et al.*, 1987).

The over-use of antibiotics has led to the development of resistance, increase in nosocomial infections and increase in the use of expensive antibiotics. Apart from the increased risk of side-effects, the use of antibiotics could also lead to a reduction in the amount or balance of normal flora in the bowel and other sites. The consequences could be the development of gastrointestinal disturbance, supercolonisation with resistant bacteria or yeast and perhaps in reduced host resistance to infection as normal symbiotic protective flora are removed.

The selection of resistant strains is favoured by the widespread use of an antibiotic. This resistance may be lost when the antibiotic is discontinued. In one dramatic report, a severe outbreak of *Klebsiella aerogenes* infection in a regional neurosurgical intensive care unit in Scotland resulted in 8 deaths from meningitis and 3 from pneumonia. Isolation of infected cases and the use of massive doses of colistin failed to control the outbreak. Only when all antibiotics were stopped both therapeutically and prophylactically was the outbreak brought under control (Price & Sleigh, 1970). Similarly, carbenicillin-resistant strains of *Pseudomonas aeruginosa* in a burns unit were eradicated by stopping the prescribing of carbenicillin and restricting the use of other antibiotics (Lowbury *et al.*, 1972).

Recent reports in Ghana indicate disturbing antimicrobial susceptibility patterns of urinary pathogens and *Neisseria gonorrhoeae*. More than 75 % of urinary isolates were resistant to the commonly prescribed ampicillin, tetracycline and cotrimoxazole. In contrast, more than 80% of all isolates were sensitive to the more expensive cefuroxime (Newman, 1990; Adjei, 1993). Similarly, for *N. gonorrhoeae*, up to 100% were resistant to commonly prescribed drugs such as penicillin, cotrimoxazole and tetracycline. Here too, over 90% of isolates were sensitive to norfloxacin, cefuroxime and ceftriaxone (Addy, 1994; Adu-Sarkodie, 1993/94). Similar results have been reported from Nigeria (Ako-Nai *et al.*, 1993). The authors blamed the observed high levels of resistance on the lack of restriction on availability and use of antibiotics

especially in relation to self-prescribing and over-the-counter sales as well as the lack of appropriate standardised treatment regimens.

2.3.5 Inappropriate treatment

While the widespread practice of polypharmacy, paucity of generic prescribing and over-use of injections and antibiotics in themselves are examples of inappropriate treatment, in this section more specific clinical examples which bring together these practices are discussed. In broad terms, inappropriate treatment includes the prescription of a drug when not indicated, selection of an inappropriate drug, over- or under-prescribing, incorrect duration of treatment, route of administration or dosing frequency and polypharmacy.

In the Achiase Health Centre study in Ghana, antimalarials were used even for cases other than fever or malaria (Barnett *et al.*, 1980). Similarly, in Kenya, antimalarials were used in 396 patients in the non-endemic region of Eldoret without any record of fever or positive blood smear. Twenty-four of 39 (61.5%) children with short attacks of diarrhoea received antibiotics (Nabiswa & Godfrey, 1994).

Isenalumhe & Oviawe, (1988) observed a tendency to prescribe expensive drugs in place of cheaper alternatives in Nigeria. Suprapen (a trade name for a combination of amoxycillin and penicillin V), costing three times more, was prescribed in place of penicillin V in 77.5% of 196 cases. Sixty-eight percent of the prescriptions were judged to have been used unnecessarily. Furthermore, 7 out of 11 physicians who knew that the brand name antibiotic was more expensive than the cheaper available alternative prescribed it all the same. In prescriptions for 299 children with frequent stools, it was common for each one to contain an intestinal antibiotic, a systemic antibiotic, intestinal sedatives, an antipyretic, an antimalarial, some rehydration therapy, and some other drugs, all at the same time.

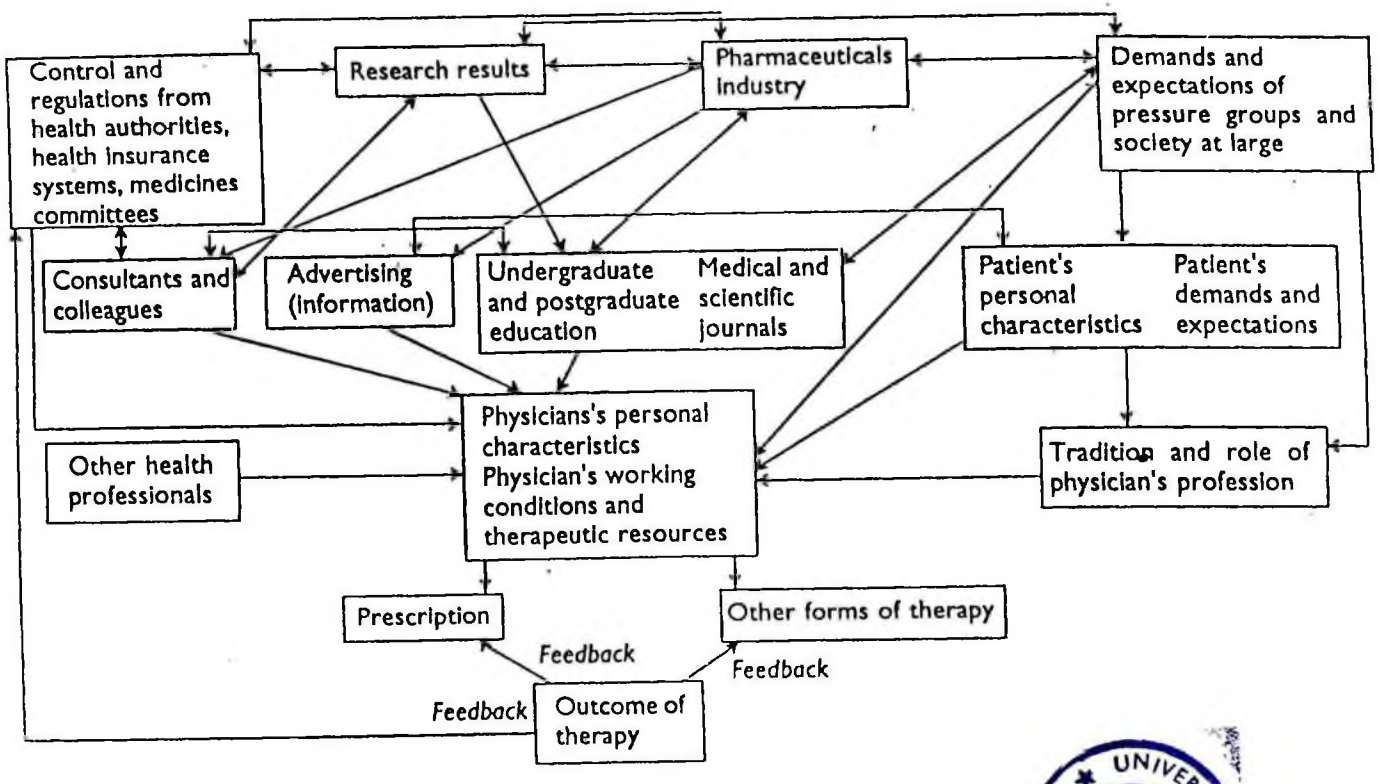
The practice of inappropriate prescription of drugs is not limited to developing countries. In a District General Hospital in London in 1978, the choice of antibiotics in 19% of 309 courses prescribed therapeutically was considered to be inappropriate. Of 55 antibiotic courses for conventional surgical prophylaxis, only 7% fulfilled all four criteria for appropriate use; 22% fulfilled none (Moss *et al.*, 1981). Similarly, in a Bristol hospital, 28% of 287 prescriptions for antibiotics in 1979 and 35% of 150 prescriptions in 1980 were judged to be unnecessary (Swindell *et al.*, 1983). In a third example, tetracyclines were inappropriately used in children under 8 years of age in the USA. Of 58,639 such children involved in a Medicaid program during a 2-year period, 4,026 (7%) received 7,046 tetracycline prescriptions (Ray *et al.*, 1977).

2.4 Factors influencing drug prescribing

Hemminki (1988) distinguishes between factors that affect prescribing at the macro-level (conditioning factors) and factors that affect individual clinicians. The main conditioning factors are the traditions and education of the population, which may mould both the expectations of the patients and the views of the physicians; medical teaching and professional thinking which determine therapeutic skills; the level and distribution of wealth as well as the political system of the country which affect the importation, regulation and availability of both professional care and drug supply; and the power of the pharmaceuticals industry.

The major factors which influence individual prescribers at the micro-level are the demands and expectations of pressure groups and society; the influence of the pharmaceutical industry and research results; and the control measures and regulations imposed by the health authorities. The interrelationships between these factors are illustrated in Fig. 2. Various factors come together to influence the prescribing style of a prescriber making it difficult to assess the role of individual factors.

Fig. 2 Factors influencing prescribing behaviour



Source: Haaijer-Ruskamp & Hemminki (1993)

The factors that influence prescribing behaviour can also be categorised into four major groups - clinical (prescriber-related), pharmaceutical, laboratory and sociocultural factors. The prescriber-related factors include the prescribing authority given to physicians, which being the hallmark of the profession, sometimes causes them to resist changing their prescribing behaviour even in the face of compelling evidence; a resistance which is fuelled by the fact that patients may be cured from immune response even when drugs are used in a sub-optimal manner (Williams, 1986); the influence from medical colleagues (Linn & Davis, 1972); the training received by the prescriber which may be deficient in practical therapeutics (Hemminki, 1975; Vries de *et al.*, 1995), basic microbiology (Kunin *et al.*, 1987) or the use of therapeutic guidelines, antibiotic guidelines and essential drug lists (Williams, 1986); the availability of objective therapeutic information available to the prescriber (Rainhorn & Sangare, 1992); and the heavy workload which means prescribers have only a few minutes to make clinical decisions (Kunin *et al.*, 1987).

Mnyika and Killewo (1991) found that recently qualified clinicians, better trained personnel like medical assistants (compared with rural medical aides) and clinicians with access to EDP treatment schedules prescribed more rationally. Health workers who had attended a refresher course were nine times more likely to make an accurate diagnosis and prescribe correctly than those who had not attended.

The major pharmaceutical factors which influence prescribing behaviour are the promotional campaigns of the pharmaceutical industry who exert pressure directly through their travelling drug representatives, provision of journals or other printed material, drug samples, drug discounts, organisation or sponsorship of scientific meetings and parties and the largesse in the dispensing of free gifts in the form of pens, diaries, calendars, notepads, clocks *etc.* (Haaijer-Ruskamp & Hemminki, 1993); the policies and legislation influencing the import, regulation, efficacy, quality, prescription and sale of drugs; the existence of a national drug programme; the availability of drugs

drugs in health facility dispensaries or local chemists and the existence of fake and expired drugs.

Prescribers are also influenced by the availability, cost and quality of services of a laboratory, radiography or other diagnostic facilities. Drug companies may supply free antibiotic discs to laboratories for sensitivity testing and thereby promote their own products. In the absence of diagnostic facilities, clinicians have to resort to empirical ("best guess") treatment which may not be appropriate or prescribe multiple drugs to cover all possible ailments (Isenalumhe & Oviawe, 1988).

The influence of sociocultural factors on prescribing behaviour is widely recognised. The prescriber may be influenced by both his own cultural preferences and experiences with certain drugs and the prevailing local beliefs about medications. These cultural beliefs include the notion that there is a pill for every ill, the perception that antibiotics are "wonder drugs" which are capable of healing a wide variety of illnesses, the equation of drug effectiveness with the rapidity of response; the perception that expensive drugs are more effective than cheaper alternatives and the superiority of injections over pills or syrup (Kunin *et al.*, 1987). The following excerpts from focus group discussions in the Ashanti-Akim district of Ghana illustrate these beliefs (Waddington & Enyimayew, 1989):

"The doctor gave me 6 small pills. I told the doctor that the medicine was too small." (farmer)

"One day, a certain man came and asked me where the nurse who gave injections was. I asked him if it was an injection he wanted He answered 'yes' and said, 'you don't give us injections here at all. We don't like taking drugs. What we like are injections.'" (nurse)

In Tanzania, it is not uncommon for health workers to be asked by patients to prescribe an injection even if it is not indicated. In fact, some patients walk into clinics

with their own supply of injectables (usually chloroquine or procaine penicillin forte) and with syringe and needles and ask for these to be prescribed (Massele *et al.*, 1993; Mnyika & Killewo, 1991).

2.5 Strategies to improve prescribing behaviour: The Essential Drugs Programme

The current strategies employed by countries to promote the rational use of drugs include the formulation of policies and legislation covering all aspects of drug development, manufacture, import, procurement, registration, licensing, prescription, sale, distribution and use of drugs; improvement of educational programmes and research. A number of central bodies are usually formed to act as the regulatory authority for pharmaceuticals and to be responsible for executing the national drug policy.

Many countries are increasingly embracing WHO's essential drugs concept and are establishing their own Essential Drug Programmes. WHO (1988c) estimates that up to half of the world's population have little or no regular access to most needed medicines. It therefore behoves developing countries particularly, to use their limited financial resources optimally to ensure available drugs are restricted to those of proven therapeutic effectiveness, acceptable safety and ability to satisfy the health needs of the population. Hence, the selected drugs, called "essential" drugs are those priority drugs that are able to satisfy the health care needs of the majority of the population and should therefore be available at all times in adequate amounts and in appropriate dosage forms (WHO, 1977).

In 1977, a WHO committee of experts recommended its first model list of some 200 essential drugs and vaccines to serve as a basis for the development of national drug lists (WHO, 1977). Countries were encouraged to establish their own lists of essential

drugs based on the best available scientific information and relevant to local needs and requirements. These lists were to be regularly updated in the light of advances in drug therapy and other clinical experiences. It was emphasised that exclusion from the list did not imply rejection or that no other drugs were useful but simply that in a given situation the selected drugs were the most needed for the health care of the majority of the population. The WHO Expert Committee recommended that the selection of essential drugs should be accompanied by a concomitant effort in education, training and information of health personnel in the proper use of drugs.

The WHO Action Programme on Essential Drugs established in 1981 has provided technical and financial support to developing countries seeking to improve the availability and rational use of drugs. There are now over 120 countries who have national lists of essential drugs and another 60 are developing and implementing comprehensive national drug policies (Anonymous, 1995). The WHO model list of essential drugs is now in its eighth revision and includes some 280 drugs (WHO, 1995).

The importance of EDPs in improving rational prescribing is seen in the report of a study in Yemen where a combination of training and provision of an essential drug list (EDL) led to a lower proportion of patients receiving injectables or antibiotics, and a lower average number of drugs per prescription in an EDP area compared with a control area which lacked an EDP (Hogerzeil *et al.*, 1989).

The Essential Drugs List for Zimbabwe (EDLIZ), which is one of the most well-established in Africa was first published in 1985 after a revision of an earlier list of 1981. Although Zimbabwe had about 2000 registered drugs, EDLIZ contained only 375 of them. A Zimbabwe Essential Drugs Action Programme (ZEDAP), set up in 1987 with the joint collaboration of the government, WHO and the Danish International Development Agency (DANIDA) drew up a holistic programme to

incorporate the list in a national policy which addressed crucial issues relating to all the stages of the drug supply chain.

EDLIZ is now in its third edition and includes 592 drugs; 307 of these drugs are used in specialist facilities and are therefore not normally stocked at the government medical stores (MOH & CW, Zimbabwe, 1994). Other successes of ZEDAP have been the accurate quantification of drug needs, improved availability of essential drugs, the monitoring of the programme indicators using a modified list of WHO indicators and the development and extensive use of training materials with which 160 workshops trained over 6000 health workers. ZEDAP hopes to achieve its target of 85% essential drug availability having already achieved a 73% availability in 1993 and to have efficient government medical stores and a sustainable drug supply management system by 1996 (Chidarikire, 1995; WHO, 1988c).

2.5.1 Essential Drugs Programme Activities in Ghana

Ghana has no officially formulated National Drugs Policy although most of the elements inherent in such policy are already present in some form. Some of these elements in existence are the registration system entrusted to a Food and Drugs Board, an Essential Drugs philosophy, a system for regulating the pharmaceutical profession by the Pharmacy Council, and a Cash and Carry cost recovery scheme designed to improve drug financing.

The Essential Drugs Programme of Ghana has not yet been established although here too, elements of the programme already exist. For example, a committee responsible for preparing and revising the EDL has been in place for a number of years. Various consultants from the WHO and Netherlands in collaboration with the National Drugs Committee and the Policy, Planning, Monitoring and Evaluation Division of MOH have been involved in drawing up Ghana's EDP and the draft document has reached an

advanced stage. Donors including the Overseas Development Agency and DANIDA have expressed interest in supporting the programme (D Asiama, personal communication).

With regard to the history of the EDL, a national formulary was first issued in 1968; later in 1973, an approved list of drugs was prepared. A list of non-essential drugs on the Ghana market was also produced at the time. However, the first Provisional Essential Drugs List and National Formulary (EDL/NF) based on the WHO model was formally launched in 1988. A National Drugs Committee, composed of 11 members was set up by MOH and charged with the regular revision of the EDL/NF. The adoption of the EDL was part of a national policy to ensure that all Ghanaians have access to effective, safe and affordable drugs of good quality, in both the public and private sectors and that these are rationally used.

It was expected that the initiative would reduce or even eliminate the problem of chronic shortage of drugs within the public sector. The problem had been one of ineffective drug management from MOH headquarters downwards and irrational prescribing. Having defined the most essential drugs needed, efforts were made to ensure their regular supply. A physical inventory of all pharmacies and dispensaries in the public sector was undertaken by the Faculty of Pharmacy of the University of Science and Technology, Kumasi with World Bank support.

Following the inventory, a task force was set up by MOH to estimate annually the drug requirements of the public health system, using morbidity data and allowing for contingencies. Although it was intended that the EDL/NF be revised every two years, it was not until 1993 that the next edition was released (MOH, 1993). There have been a number of problems associated with the revised manual. Financial problems have delayed the printing of sufficient copies of the manual. In fact, it is only with a recent USAID-support that copies of the manual are now being printed.

In 1994, the National Drug Committee, with assistance from some consultants from the Netherlands was charged to study the pharmaceutical sector and to draw up a plan of action to improve its functions. They reported that despite its substantial impact on procurement in the public sector, the revised EDL/NF was little known in the country and did not appear to have had much impact on prescribing (National Drugs Committee, 1994). This was also the case with the 1988 manual where a partial assessment by the RPM study indicated its availability in only 45% of public health facilities (Rankin *et al.*, 1993).

The revised manual has not been actively marketed; neither has there been a national programme to promote rational drug prescribing (or to enforce compliance with the EDL) as recommended by the WHO Expert Committee on the Selection of Essential Drugs (WHO, 1977). Interestingly, the EDL has no legal backing.

The manual provides guidelines in the management of a number of clinical conditions and a few selected infectious diseases. Commonly encountered diseases such as enteric fever, septicaemia, pelvic inflammatory diseases and cellulitis are not included.

Reserve antimicrobial drugs for common infections are not mentioned. Whereas the manual recommends cotrimoxazole or amoxycillin for lower urinary tract infections (UTI) and procaine penicillin or amoxycillin for gonorrhoea, recent studies indicate that over 75% of common urinary isolates and over 90% of *Neisseria gonorrhoeae* are resistant to these drugs. In contrast, the same studies report a 90-98% sensitivity to such reserve antimicrobials as norfloxacin, cefuroxime and ceftriaxone (Adu-Sarkodie, 1993/94; Newman, 1990). It has been suggested that the latter agents be included in the EDL/NF and efforts made to guard their indiscriminate use to prevent the early development of resistance (Adu-Sarkodie, 1995).

In comparison, the treatment protocol for gonorrhoea in the EDLIZ provides for first , second and third line drugs which include such reserve antimicrobials as kanamycin, norfloxacin, spectinomycin and ciprofloxacin (MOH & CW Zimbabwe, 1994). The WHO model list also provides for the inclusion of reserve antimicrobials in view of the increasing prevalence of resistant bacteria (WHO, 1992a).

Fortunately, in preparation for the next revision of the EDL/NF, a circular inviting comments and suggestions on the list has been issued to health providers throughout the country (National Drugs Committee, 1995). It is hoped that these recommendations will be examined in the preparation of the next manual.

The national strategies to promote rational use of drugs within the framework of an EDP have only just been published (MOH, 1995). The strategies are listed as follows:

- standard treatment protocols will be developed and both the public and private sector prescribers will be trained in their proper use
- regulations will be made to limit the range of drugs to be prescribed according to category of worker and level of operation
- measures will be taken to encourage the private pharmaceutical sector and the medical profession to utilise the EDL through wide distribution of the document and a combination of education campaigns and enforcement as required.

It would appear the MOH has recognised some of the weaknesses of the EDL and has identified appropriate strategies to address them. However, the details of the plan for strategy implementation were not provided e.g. how enforcement of prescribing regulations or compliance with the EDL will be achieved.

It is commendable that apart from the national EDL/NF, some hospitals have produced their own manuals to guide medical students, medical assistants, nursing staff and doctors in the management of common medical problems. The Komfo

Anokye Teaching Hospital has two such manuals for use in the Paediatric and Medical wards (Fleming, 1991; Mackie & Asafo-Agyei, 1990).

2.6 Methodological review

There are two major types of research employed in investigating prescribing patterns: qualitative research (sometimes also called anthropological) and quantitative or biomedical research.

In the qualitative approach, the individual perspective is emphasised and there is therefore an extensive interaction with the study population e.g. physicians or pharmacists in health facilities. This approach is especially suitable for studying the meaning of drug use, such as the psychosocial and cultural basis for prescribing behaviour. It could be used to compare prescribing practices in different institutions for example, in terms of staff attitudes, patient demands and the quality of interaction between prescribers and patients. The most frequently used methods of data collection are participant observation and in-depth, open-ended interviews. These techniques are often time-consuming and not appropriate for evaluating the extent of irrational prescribing in different situations, for which the quantitative approach is needed.

In the quantitative approach, the investigator is able to measure various prescribing indicators which can be subjected to statistical analysis. These indicators may be analysed for different types of prescribers or facilities and compared with results of other studies. The measurement of the indicators can also provide the basis for evaluating any interventions to improve prescribing. The quantitative approach has the disadvantage of being oversimplified; it ignores the sociocultural aspects of drug prescribing. Clearly then, the quantitative methodology and the qualitative one

compliment each other. The most widely used data collection method in the quantitative approach is the structured interview.

Studies on prescribing patterns may be based on either prospective (data from current patients as they present for consultation) or retrospective data (i.e. past medical records). The former method has the advantage of presenting complete data but suffers from the bias of a change in prescribing practices when prescribers are aware that their behaviour is being observed. Other disadvantages pertain to seasonal variations in morbidity patterns, peculiarities in staffing and inconsistencies in drugs supply, all of which influence prescribing patterns. Collection of retrospective data eliminates most of these biases but has the disadvantage of presenting incomplete data where records are not available or well-kept.

One of the most popular methods of investigating prescribing patterns has been described by INRUD and WHO. A basic core of prescribing indicators (e.g. average percentage of drugs prescribed at each visit and percentage of patients receiving an injection) which can be studied in a standard way in different areas at different times is presented. Complementary indicators to some specific indicators are also presented. Various studies have generally not found any significant differences in prescribing indicators (with the exception of the percentage of patients receiving injection) obtained from retrospective and prospective data (Massele *et al.*, 1993; WHO, 1993).

The WHO drug use indicators have been used to identify priority areas for action. In Zimbabwe where 94% of drugs are prescribed by their generic names, this feature is not a priority for its EDP whereas in Ecuador, where only 37% generic prescribing, there is a clear need to allocate resources to this area (WHO, 1993; Hogerzeil *et al.*, 1993). The indicators have also been used to quantify the impact of the EDP on rational prescribing in Yemen (Hogerzeil *et al.*, 1989). A number of the WHO drug use indicators are investigated in the present study.

The WHO/INRUD methodology was used in the RPM assessment of drug utilisation in Ghana (Rankin *et al.*, 1993). Twenty health facilities comprising were selected by multi-stage sampling (see section 1.2). Although, the study was originally intended to cover all 10 regions in the country, only 5 were covered owing to managerial problems that prevented the training of all the regional Cash and Carry Coordinators who were to be involved in the study. Within a selected region, a district was randomly selected. Then 2 health centres were selected randomly from all health centres located within the selected district.

This selection procedure was followed for logisitical reasons as the assessment team also assessed the stock management, procurement and pricing practices in the Cash and Carry system at the various levels. However, this procedure carried with it, a potential selection bias in that the prescribing practices in health centres within the one district may have differed systematically (with regard to such influences as availability of drugs, recent training of prescribers in treatment guidelines *etc.*) from those of the other health centres in the region. A random selection of the 2 health centres from a list of all the health centres within each selected region would have eliminated the bias and made a generalisation of the findings more justifiable.

2.7 Conclusion

The irrational prescribing of drugs is a problem in many developing countries. The situation is compounded by the fact that most of these countries lack effective policies relating to all aspects of drug supply. Many countries have adopted an Essential Drugs Programme in an effort to improve both the availability and the rational prescribing of drugs. Such programmes have to be accompanied by educational and training programmes if they are to achieve their objectives.

CHAPTER THREE

3.0 METHODOLOGY

3.1 Study type

The study was cross-sectional comparative in type. Data on the prescribing patterns in different health facilities in the Wassa West district were collected over a short period of time. The prescribing patterns in the different health facilities were also compared with one another.

3.2 Study period

Data on prescribing indicators were collected over a four week period from October to November, 1995.

3.3 Operational definition of terms

Prescribing refers to a formal practice in which authorised clinicians write a list of selected drugs to be used for the cure, alleviation or prevention of a clinical condition. The Medical and Dental Decree, 1972 (NRCD 91) limits prescribing of drugs to doctors, medical assistants and midwives.

Antibiotics refer to antibacterial drugs, irrespective of whether they are naturally occurring or synthetically produced that are used for the treatment or prevention of a bacterial infection. In conformity with the classification in the latest WHO Model List (WHO, 1995), topical antibiotics and metronidazole (which is also antiprotozoal) were counted as antibiotics. Antituberculous and antileprosy drugs were not included in the

definition except when they were used singly for non-tuberculous or non-leprosy conditions e.g. rifampicin for meningococcal meningitis.

Generic names refer to the non-proprietary names rather than the brand names by which drugs are prescribed. Names of drugs were considered generic if they corresponded to those in the EDL/NF (MOH, 1993).

Injectable drugs refer to those drugs that are administered by the intramuscular, intravenous, intradermal, subcutaneous, subconjunctival or intrathecal routes.

Essential drugs list is a list of drugs that are most needed to satisfy the health needs of the majority of the population and should therefore be available at all times in adequate amounts and in appropriate dosage forms (WHO, 1977).

Retrospective data describe prescribing patterns during patient encounters that took place in the past.

Prospective data describe prescribing patterns during patient encounters that take place on the day of the survey.

3.4 Definition and measurement of variables studied

The definition and indicators of the variables studied are shown in table 3.1.

3.5 Study population

The study population comprised:

- all government health institutions in the Wassa West district
- all outpatient clinical record cards between June 1994 and June 1995

- all outpatient prescription forms
- all inpatient treatment records on a specific day of the week
- all Heads of government health institutions in the district

Table 3.1 Definition and measurement of selected variables

Variable	Definition	Indicator
Average number of drugs	The number of drugs prescribed for each patient. Sequential regimen e.g. Inj. Chloroquine followed by oral Chloroquine was counted as one drug	The total number of drug items prescribed divided by the total number of patients for whom they were prescribed
Percentage of drugs prescribed from the essential drugs list	The proportion of drugs prescribed which are listed on the 1993 Essential Drugs List of Ghana	The total number of drugs prescribed which are on the EDL divided by the total number of drugs prescribed, multiplied by 100
Percentage of drugs prescribed by generic name	The proportion of drugs prescribed by generic names as contained in the EDL of Ghana	The number of drugs prescribed by generic name divided by the total number of drugs prescribed, multiplied by 100
Percentage of patients receiving an injectable drug	The proportion of patients for whom injectable drugs are prescribed	The total number of patients for whom at least one injectable drug is prescribed divided by the total number of patients surveyed, multiplied by 100
Average number of injectable drugs	The number of different injectable drugs prescribed per patient	The total number of injectable drugs prescribed divided by number of patients receiving at least one injectable drug
Average number of injection episodes	The number of times each patient is required to receive an administered injectable drug	The total number of times an injectable drug is prescribed to be administered divided by the total number of patients receiving at least one injectable drug
Percentage of patients receiving an antibiotic	The proportion of patients for whom antibiotics are prescribed	The total number of patients receiving at least one antibiotic divided by total number of patients surveyed, multiplied by 100
Average number of antibiotics	The number of different antibiotics prescribed per patient	The total number of antibiotics prescribed divided by the total number of patients receiving at least one antibiotic
Percentage of total drug cost due to antibiotics	Average cost of drugs as obtained from the district hospital or two private chemical shops in Tarkwa	The total cost of antibiotics divided by total cost of all drugs multiplied by 100
Appropriateness of prescriptions	For a given clinical condition, the choice of prescribed drug, dose, regimen, route of administration, duration of treatment, to the extent possible are considered inappropriate	The observer certifies that all criteria have been met after analysis of prescriptions
Type of prescriber	The rank of prescribers at the health facility on the day of visit	The Head of the facility mentions the rank of prescribers in her facity
Availability of EDL	A copy of the1993 edition of the manual "Essential Drugs List and National Formulary of Ghana with Therapeutic Guidelines" is available at the health institution	The manual is made available for inspection
Availability of drugs	Drugs used for the treatment of common conditions are available at the health facility visited	The drugs for treatment of conditions are seen on inspection on the day of visit to health facility

3.6 Sampling

3.6.1 Sampling method

Government health facilities

A census of all government health facilities in the Wassa West district was taken. All the facilities were included in the study.

Outpatient clinical records (retrospective data)

The Outpatients' Department (OPD) Register contains a chronological listing of all patients attending the health facility for daily consultations with their unique identity numbers. Separate registers are kept for new patients and reattendants. Using the OPD register, a sampling frame of new outpatients attending the health facility between June 1, 1994 and June 30, 1995 was obtained.

The patient encounters to be studied were selected by systematic sampling. The first patient encounter was selected randomly using a random digital table from the list of all patients between the first patient recorded in the register and the patient with a serial number corresponding to the sampling interval. The identity numbers of selected patients were recorded from the register and their OPD clinical record cards retrieved.

Prescription forms (prospective data)

Prospective data from prescription forms were collected by systematic sampling of all prescriptions that were presented at the dispensary of the District Hospital. The

collection of prospective data at this facility was necessitated by a relatively large proportion of incomplete data obtained from the retrospective records.

Inpatient treatment records

The treatment records of all patients on admission at the District Hospital on a randomly selected day of the week were studied.

Heads of health facilities

All the Heads of the government health facilities were identified and interviewed.

3.6.2 Sample size

Government health facilities

The study of prescribing patterns covered all 7 government health facilities in the Wassa West district namely:

1. Tarkwa Government Hospital (TGH)
2. Nsuaem Health Centre (NHC)
3. Bogoso Health Centre (BHC)
4. Himan Health Centre (HHC)
5. Huni Valley Health Centre (HVHC)
6. Dompim Health Centre (DHC)
7. Simpa Health Centre (SHC)

Retrospective patient encounters

The determination of sample size was in accordance with the recommendations of the WHO/INRUD methodology which has been well tested in over 14 countries (Hogerzeil *et al.*, 1993; WHO, 1993). The guiding principles for the sample size determination were as follows:

- individual prescribers tend to exhibit consistent practices over time, so that a sample drawn at one point in time will provide basically the same results as a sample that covers a longer period;
- above a certain number of encounters, adding additional encounters to a sample within a facility adds very little new information. For comparing prescribing practices between individual health facilities, the minimum number per facility is 100. For a study in which prescribing encounters from several (commonly 20) health facilities are collected and studied as a whole, the minimum number is 30 per facility (See Annex 1);
- the above sample size of 100 measures facility-specific percentage indicators with a 95% confidence interval of plus or minus 10%.

On the basis of these guidelines, one hundred retrospective encounters at each of the seven health facilities in the district were selected for study. A total of 700 outpatient client cards were thus obtained for study. The sample size agrees with that obtained by calculation on the STATCALC Epi Info computer software (Table 3.2).

Table 3.2 Sample size calculation for a single facility

Largest study population in a single facility	17,500
Expected prevalence of antibiotic prescribing	50.0%
Worst acceptable frequency	60.0%
Confidence Level	
80%	41
90%	67
95%	96
99%	164

The sample size for a single facility at the 95% confidence interval of 10% from the above calculation is 96. If prescribing practices of a prescriber in a single facility were independent of each other, multiplying 96 by 7 will give a total of 672 encounters to be selected from all the health facilities covered in the study. A smaller sample size than that suggested by calculation is actually needed as prescribing practices tend to be consistent within a facility. Even so, a sample size of 700 was selected after rounding off and also to accommodate any encounters that may need to be rejected.

Prescription forms

Prospective data from 100 prescription forms were obtained by systematic sampling from a daily average of 60 prescriptions presented at the dispensary of the Tarkwa Government Hospital over a 5-day period in November, 1995.

Inpatient treatment records

The treatment records of 45 inpatients (representing about 65.2% bed occupancy) at the Tarkwa Government Hospital on a randomly selected day of the week were examined.

Heads of government health facilities

All 7 Heads of the government health facilities covered in the study were interviewed about selected health facility indicators e.g. the availability of the national EDL manual and the availability of drugs for treating common diseases.

3.7 Data collection

3.7.1 Permission to proceed

Permission to undertake the study was obtained from the following:

- School of Public Health (Director and Academic Supervisors)
- The Regional Director of Health Services, Western Region
- The District Chief Executive, Wassa West District
- The Director of Health Services, Wassa West District (also the Field Supervisor for the study)
- The Heads of health facilities covered in the study

The School of Public Health had previously obtained the approval of the relevant authorities for the district to be used as a Field Site for a 17-week field residency programme for residents of the school. Part of the field programme was used for data collection for resident's dissertation.

3.7.2 Data collection tools and techniques

The tools and techniques employed for the study are shown in table 3.3:

Table 3.3 Data collection tools and techniques

Variable/Indicator	Data collection tool	Data collection technique	Source of data
Prescribing indicators e.g. % generic drugs, % patients receiving antibiotics etc.	Questionnaire	Using available information	OPD clinical records; Prescription forms; Inpatient treatment records
Availability of EDL; drugs for treatment of common diseases	Questionnaire; Checklist	Interview; Inspection	Health facility Heads; Consulting room; dispensary
Type of prescribers	Questionnaire	Interview	Health facility Heads

Consultation data at the health facilities are recorded on the OPD clinical record card. The card provides data on the patient's name, age, sex, address and identity number; name of facility; date of visit; clinical history and findings; diagnosis, treatment and prescription. With the exception of the history and examination findings, all the other data were collected and entered directly on a questionnaire form (Annex 2) designed on the Epi Info 6.03 computer programme (Center for Disease Control and Prevention, Atlanta; World Health Organisation, Geneva). Some of the key data with multiple responses e.g. names of drugs, names of antibiotics *etc.* were entered again in related files, thereby allowing consistency checks to be made to improve the quality of data. Individual cards were coded both manually and electronically for their serial numbers and name of facility. Data from prescription forms and inpatient records were similarly collected. Data on non-drug items in the treatment plan such as blood transfusion or suturing were excluded.

Information on the availability of the EDL manual and drugs for the treatment of common diseases was supplied by the Heads of the health facilities. Their responses were ascertained by inspection of the available manual and drugs.

The results of the study were presented to prescribers and district health authorities at a meeting at the end of the study. Some reasons for the observed prescribing patterns were obtained from the prescribers at this meeting.

3.7.3 Pre-test

Pre-testing of the data collection questionnaire forms was undertaken at the Cape Coast Central Hospital. Data relating to the prescribing indicators were analysed and summarised in order to assess the suitability of the questionnaire design. The pre-test enabled a few changes to be made; for example the list of possible diagnoses was expanded and the variable on the number of injection episodes was added to the

original form. Pre-testing also served to improve the data entry skills of the investigator.

At the Tarkwa District Hospital, the availability of the study population was determined. While it was originally intended to collect retrospective data from prescription forms, it became clear that these were not available as patients demanded them to facilitate their drug expenditure refund claims.

3.8 Data processing and analysis

The data were analysed separately for individual health facilities and then collectively for all of them using the Epi Info version 6.03 computer software. Data were summarised by tables and graphs; relevant statistical tests were performed where applicable. Data on indications of antibiotic use were analysed manually as this could not be done with the computer software used in the study.

3.9 Advantages and limitations of methodology

1. The selection of health facilities was limited to the government facilities for logistical reasons and also for the more direct control over the activities of these facilities by the DHMT. Recommendations could be more easily implemented and monitored. However, because prescribing patterns and influences at the selected facilities may differ from those of the other health facilities e.g. Mines Hospital or private clinics, findings from the study may not generalised to the latter.

2. The time frame for the retrospective study was limited to one year in order to accommodate any seasonal variations in prescribing patterns or other influences such as inconsistencies in drug supply. In order to overcome the

problem of incomplete data encountered from retrospective records at the District Hospital, prescribing indicators were also determined from prospective data.

3. The collection of prospective data from prescription forms is subject to weaknesses such as a change in prescribing practices arising from prescribers' awareness of the study, poor random selection because of the lack of a sampling frame and a selection bias whereby the data collector favours the selection of certain prescriptions. In order to overcome some of these weaknesses, prescribers were not made aware of the study. Also, the dispensing officer who collected the data was given clear instructions on how to systematically collect them; he was also not informed of the parameters under investigation and was supervised intermittently.

4. The prescribing patterns were not analysed in relation to the specific ranks of prescribers. Being a preliminary study, it was considered more appropriate to first measure prescribing patterns at the macro-level (i.e. health facility). Follow-up investigations could then be dictated by observed patterns.

5. The appropriateness of treatment was assessed with respect to the prescribing indicators and to a lesser extent, the actual drugs selected. However, given the common practice of poor documentation, it is possible that treatment may have been given for a genuinely diagnosed medical condition that had not been recorded. Naturally, assessment of appropriateness could only be based on what had been recorded on the outpatient card.

6. The study recognised that merely issuing a prescription was no guarantee that the patient will obtain all the prescribed drugs or that even when he obtained them, he will comply with the treatment.

3.10 Ethical considerations

In spite of a probable notion that an "external auditor" had come into their district to as it were point out faults in their prescribing practices, the prescribers in the Wassa West district were most cooperative. This was evident in the assistance they provided with the data collection. Their enthusiasm was again in evidence when they attended and actively participated in a meeting at which findings of the study were presented. The explanation that the study did not intend to pass a professional or moral judgement on individual prescribers helped to secure their cooperation.

CHAPTER FOUR

4.0 RESULTS

4.1 Demographic data

The age and sex distribution of 700 OPD patients from the retrospective encounters is presented in table 4.1.

Table 4.1 Age and sex distribution of patients attending government health facilities

Age (Years)	Female	Male	Total	Percent
< 1	40	41	81	11.6%
1 - 4	84	77	161	23.0%
5 -14	46	54	100	14.3%
15 - 44	170	126	296	42.3%
45 - 59	25	21	46	6.6%
60+	11	5	16	2.3%
Total	376	324	700	100.0%

The ages of the patients ranged from 1 week to 80 years with a mean of 17.9 years. About 51.2% of patients were aged 15 years or older and 53.7% were female.

For the one day prescribing practices survey at the Tarkwa Government Hospital, the ages of the in-patients ranged from 1 month to 68 years with a mean of 25.1 years. Twenty-six (57.8%) of the 45 patients on admission were females.

4.2 Diseases encountered

Table 4.2 lists the frequency of diseases encountered at the OPD of the government health facilities. The total number of diseases in excess of the number of patients reflects patients with multiple diagnosis.

Table 4.2 Diseases encountered in 700 OPD clinical records				
Disease	**District Hospital**	**6 Health Centres**	**Total**	**Percent**
Accidents	3	7	10	1.2
Acute eye infection	3	4	7	0.8
Anaemia	1	6	7	0.8
Bites and minor trauma	6	35	41	5.0
Boils and wound infections	1	23	24	2.9
Chickenpox	-	5	5	0.6
Diarrhoeal diseases	6	56	62	7.5
Dysentery	2	6	8	1.0
Ear infection	1	5	6	0.7
Gastrointestinal disorders	4	8	12	1.5
Gynaecological disorders	1	4	5	0.6
Hypertension	-	6	6	0.7
Intestinal worms	2	25	27	3.3
Jaundice and viral hepatitis	1	4	5	0.6
Liver abscess	1	-	1	0.1
Malaria	66	341	407	49.3
Malnutrition	-	4	4	0.5
Measles	-	9	9	1.1
Medically fit	2	-	2	0.2
Mental disorder		1	1	0.1
Pelvic inflammatory disease	1	3	4	0.5
Pneumonia	-	2	2	0.2
Pregnancy complications	2	6	8	1.0
Pyrexia of undetermined origin	-	2	2	0.2
Rheumatism and joint pains	2	13	15	1.8
Schistosomiasis	-	1	1	0.1
Sickle cell disease	2	-	2	0.2
Skin diseases	2	33	35	4.2
STDs exclg. AIDS, gonorrhoea	1	-	1	0.1
Throat infections	-	2	2	0.2
Upper respiratory infections	22	66	88	10.7
Urinary tract infections	2	1	3	0.4
Unspecified diagnosis	-	9	9	1.1
Yaws		5	5	0.6
Total	134	692	826	100

The most common diagnoses were malaria, upper respiratory infections (URI), diarrhoeal diseases, soft tissue infections (boils, wounds, bites *etc.*) and diseases of the skin and together these constituted nearly 80% of all diagnoses. The pattern of diseases was generally similar to the district's most common OPD disease problems, confirming the representativeness of the sample.

Interestingly, malaria was a common problem for both the district hospital (49.3%) and the health centres (49.2%). While the most frequent diseases were similar in both

types of facilities, soft tissue infections and injuries, diarrhoeal diseases and skin diseases appeared to be more common in the health centres. In contrast, URI was commoner at the district hospital.

4.3 Prescribing indicators

The prescribing indicators in the 7 government health facilities are shown in table 4.3.

Table 4.3 Distribution of prescribing indicators

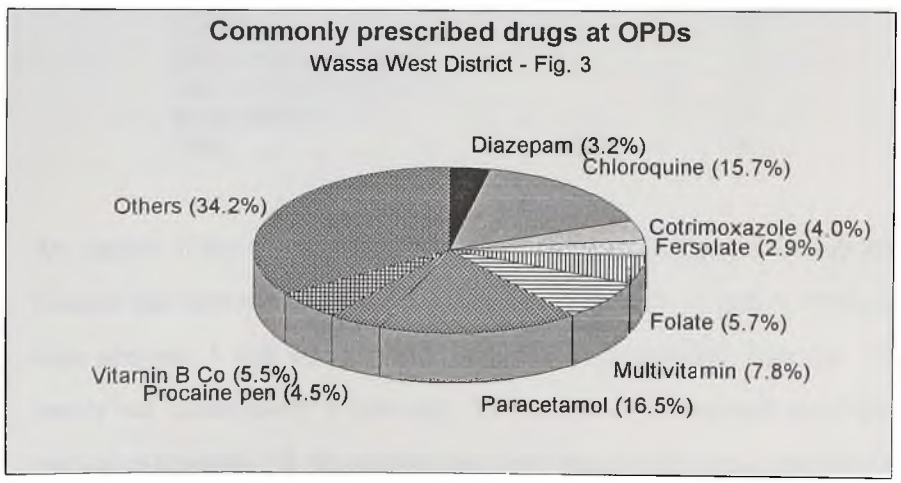
Indicator	TGH	NHC	BHC	HHC	HVHC	DHC	SHC	Total
Total no. of drugs prescribed	264	376	511	910	428	306	428	3,223
Mean no. of drugs per patient	2.64	3.76	5.11	9.10	4.28	3.06	4.28	4.60
Range of drugs	0 - 6	0 - 8	2 - 8	6 - 13	1 - 8	0 - 8	0 - 8	0 - 13
% with no drugs	17.0%	5.0%	0.0%	0.0%	0.0%	9.0%	1.0%	4.6%
% of drugs on EDL	96.6%	97.3%	94.3%	96.4%	99.3%	97.4%	98.8%	97.1%
% of drugs as generic	68.9%	68.1%	73.6%	55.5%	71.0%	64.4%	61.7%	64.6%
% of cases with injections	12/36 (33.3%)	70/95 (73.7%)	97/100 (97.0%)	85/100 (85.0%)	72/100 (72.0%)	71/91 (78.0%)	90/99 (90.9%)	497/621 (80.0%)
Mean no. of injectable drugs	1.2	1.2	2.0	2.0	1.4	1.2	1.1	1.5
Mean no. of injection episodes per patient			3.9				1.6	2.8
% of cases with antibiotics	41.0%	45.0%	79.0%	98.0%	59.0%	42.0%	41.0%	57.9%
Mean no. of antibiotics	1.1	1.1	1.4	2.0	1.1	1.1	1.1	1.4

4.3.1 Number of drugs prescribed per encounter

A comparison of the distribution of total number of drugs prescribed per patient at the district hospital and at the health centres is presented in table 4.4. The total number of drugs prescribed per encounter in all facilities ranged from 0-13 drugs with a mean of 4.6 and standard deviation of 2.5. There were significant differences ($F=208.4$; $p<0.001$) in the mean number of drugs prescribed within facilities. While the mean numbers of drugs per patient at the district hospital (TGH) and the Nsuaem, Huni Valley, Dompim and Simpa Health Centres were essentially comparable, those at Bogoso and Himan Health Centres were excessive.

Table 4.4 Number of drugs per prescribing encounter				
No. of drugs	TGH	6 H/Cs	Total no. of encounters	Total no. of drugs
0	17	15	32	0
1	11	12	23	23
2	8	36	44	88
3	26	106	132	396
4	32	139	171	684
5	5	106	111	555
6	1	57	58	348
7	0	25	25	175
8	0	44	44	352
9	0	24	24	216
10	0	17	17	170
11	0	13	13	143
12	0	5	5	60
13	0	1	1	13
Total	100	600	700	3223

The number of drugs prescribed per encounter at Himan H/C ranged from 6 to 13 drugs with a mean of 9.1 and standard deviation of 1.4. The typical prescription contained an antimalarial, an analgesic, an antibiotic, several haematinics and an antihelminthic (Annex 6b). Although the diagnosis was almost always stated, treatment appeared to be for symptomatic relief rather than against the underlying cause. The mean number of drugs per encounter at the district hospital (2.64) differed significantly ($F=81.7$; $p<0.001$) from that in the health centres (4.93).



Eighty different drugs were prescribed for outpatients of the district's health facilities. The commonest drugs (n=3223) were paracetamol (16.5%), chloroquine (15.7%), multivitamin preparation (7.8%), folic acid (5.7%) and vitamin B complex (5.5%). These together accounted for more than half of all the prescribed drugs (Fig. 3). In descending order, the top 5 drugs at the district hospital were chloroquine, paracetamol, vitamin B complex, cough mixture and amoxycillin. The corresponding drugs for the health centres were paracetamol, chloroquine, multivitamin, folic acid and vitamin B complex (Annex 4).

Patients with no drugs

About 5% of the total number of OPD clinical record cards surveyed contained no drugs. The highest proportion of cases (17.0%) with no drugs was observed from the district hospital compared with only 2.5% from the health centres (Table 4.3).

Table 4.5 Encounters in which no drugs were prescribed at the Tarkwa Government Hospital

Disease	Freq	Percent
Minor trauma (assault)	1	5.9
Conjunctivitis	1	5.9
Diarrhoeal disease	1	5.9
Accident and diarrhoeal dis.	1	5.9
Intestinal worms and malaria	1	5.9
Malaria	6	35.3
Medically fit	2	11.8
Sickle cell disease and cellulitis	1	5.9
Upper respiratory infections	2	11.8
No diagnosis stated	1	5.9
Total	17	100

An analysis of the diagnoses of patients with no drugs suggested that all but 2 had diseases that were normally treated with drugs (Table 4.5). In fact, 4 of these patients were admitted: 3 with severe malaria and one with no specified diagnosis. The latter merely had "please admit" on her card. Two patients were declared medically fit after medical examination. It was evident that prescribers at the district hospital frequently

failed to document patients' clinical notes properly. Even where drug treatment was recorded, it was incomplete with the route, dosage , frequency and duration being omitted.

4.3.2 Prescription of drugs on the Essential Drugs List

About 97.1% of all drugs prescribed in the 7 government health facilities in the district were listed on the national EDL. For the 668 patients for whom drugs were prescribed, an average of 4.7 essential drugs were prescribed at each encounter. There was no statistically significant difference in the frequency of prescription of essential drugs between the district hospital (96.6%) and the health centres (97.2%).

Over 70% of the 93 prescribed drugs not on the EDL was made up of dipyrone (Analgin) (28.0%), levamisole (Ketrax/Katrex) (23.7%) and hyoscine butylbromide (Buscopan) (10.8%) and kaolin (9.7%).

4.3.3 Generic name prescribing

About 65% of all drugs were prescribed by their generic names (Table 4.3). There was no significant difference in the prescribing by generic names between the district hospital (68.9%) and the health centres (64.2%). The frequencies with which the 12 most common drugs in the district's health facilities were prescribed by their generic names are shown in table 4.6.

Whereas chloroquine, folic acid, vitamin B complex, intravenous infusions and the penicillins were always prescribed by their generic names, diazepam (Valium), metronidazole (Flagyl), cotrimoxazole (Septrin), piperazine (Antepar; Nematex), chlorpheniramine (Piriton), hyoscine butylbromide (Buscopan) and multivitamin preparation (Multivite) were never prescribed as such. There was a greater tendency

to prescribe branded blood tonics and combination multivitamin preparations e.g. Durol, Vitafol, Dynavite, Folex in the district hospital than in the health centres.

Table 4.6 Frequency of generic prescribing of common drugs

Drug	Freq. as generic	Percent
Paracetamol	521/532	97.9%
Chloroquine	505/505	100.0%
Multivitamin	0/250	0.0%
Folic acid	184/184	100.0%
Vitamin B Complex	176/176	100.0%
Procaine penicillin	146/146	100.0%
Cotrimoxazole	0/128	0.0%
Diazepam	3/104	2.9%
Ferrous sulphate	14/95	14.7%
Piperazine	0/94	0.0%
Benzylpenicillin	83/83	100.0%
Metronidazole	0/73	0.0%

4.3.4 Prescription of injectable drugs

Out of 621 encounters at which the routes of administration were recorded, 497 (80.0%) contained one or more injectable drugs (Table 4.3; Fig. 4). The use of injectable drugs among encounters at the health centres (82.7%) was significantly different (χ^2=51.5; p<0.001) from that at the district hospital (33.3%). For those receiving injectables, an average of 1.5 injectable drugs (1.5 at the health centres and 1.2 at the district hospital) were prescribed per patient.

At the Bogoso and Simpa Health Centres where more than 90% of patients were treated with injectable drugs, treatment regimens were well-recorded making it possible to assess the number of injection episodes. Injectable drugs were prescribed to be given between 1 and 14 times per patient with a mean of 2.8. One patient with a

urinary tract infection received a prescription for 7 injection episodes each of streptomycin and benzylpenicillin (Annex 7b)!

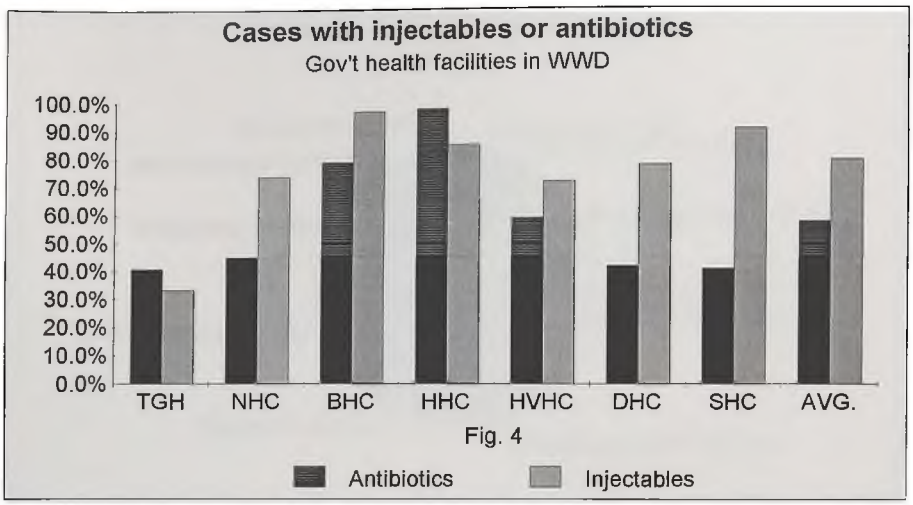
Table 4.7 Top 5 injectable drugs prescribed		
TGH (n=14)	6 H/Ctrs. (n=727)	Total (n=741)
Chloroquine (57.1%)	Chloroquine (51.4%)	Chloroquine (51.6%)
Dextrose saline (21.4%)	Procaine penicillin (20.1%)	Procaine penicillin (19.7%)
ATS (14.3%)	Benzylpenicillin (11.4%)	Benzylpenicillin (11.2%)
Dextrose (7.1%)	Analgin (3.4%)	Analgin (3.4%)
-	Vitamin B Complex (2.5%)	ATS (2.7%)

Of the 741 injectable drugs prescribed in all seven health facilities, nearly 90% was made up of only five drugs: chloroquine, procaine penicillin, benzylpenicillin, Analgin and antitetanus serum (ATS) (Table 4.7). The types of injectable drugs differed with the type of facility. The district hospital prescribed more intravenous infusions and the health centres more antibiotics. Owing to the small numbers of injectable drugs prescribed at the district hospital, the comparison may not be wholly valid.

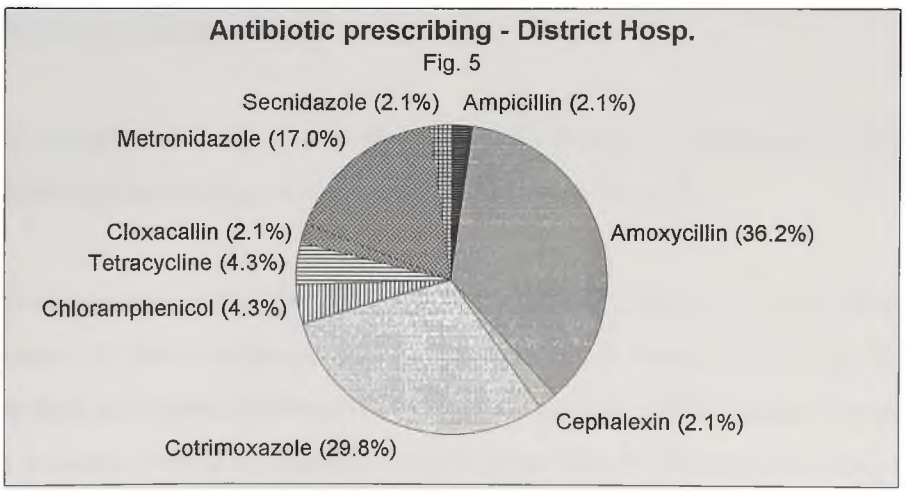
4.3.5 Antibiotic prescribing

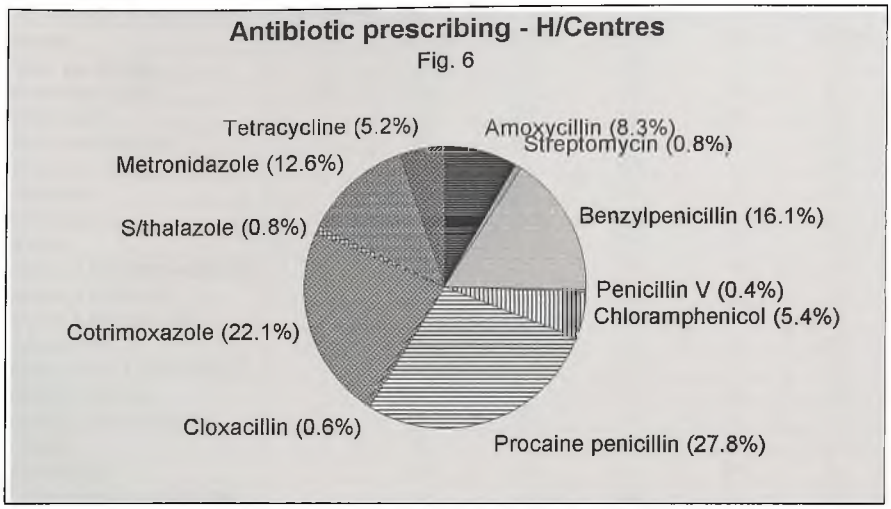
Nearly 58% of all prescribing encounters contained at least one antibiotic. The percentage of encounters at all seven health facilities in which antibiotics were prescribed is shown in table 4.3 and fig. 4.

Antibiotics were prescribed significantly more frequently in the health centres (60.7%) than in the district hospital (41.0%) (χ^2=13.6; p<0.001). The number of antibiotics prescribed per patient ranged from one to three with a mean of 1.4 (health centres - 1.4; district hospital - 1.1).



The frequencies with which the specific antibiotics were prescribed in both types of facilities are illustrated in figs. 5 and 6. Whereas amoxycillin, cotrimoxazole and metronidazole were the predominant antibiotics prescribed at the district hospital, procaine penicillin, cotrimoxazole and benzylpenicillin were the commonest antibiotics at the health centres.





With regard to the route of administration of antibiotics, 45 (95.7%) of the 47 antibiotics prescribed at the district hospital were oral drugs and the remaining 2 (4.3%) were topical (eye) drugs. In comparison, parenteral (intramuscular) antibiotics accounted for 44.7% of the 517 antibiotics prescribed at the health centres; the remaining routes were oral (54.4%) and topical: ear (0.4%) and eye (0.6%).

Indications for antibiotic use

The conditions for which antibiotics were prescribed for 405 patients in the district hospital and health centres are presented in table 4.8 and Annex 8.

The most common indications for antibiotic prescriptions were also the most common diseases (or their combinations) in the district namely malaria, URI, soft tissue infections and injuries, diarrhoeal diseases and skin diseases. These diseases accounted for more than 70% of all antibiotic use with malaria and/or URI alone accounting for about 47% of them.

Table 4.8 Indications for antibiotic use in the district hospital and health centres

Disease	TGH	H/Ctrs.	%TGH	%H/Ctrs.	Total	%Total
Acute eye infection	1	3	2.4	0.8	4	1.0
Bites/Minor trauma	2	31	4.9	8.5	33	8.1
Boils/cellulitis	1	19	2.4	5.2	20	4.9
Diarrhoeal diseases	1	20	2.4	5.5	21	5.2
Diarrhoea & Worms	-	1	-	0.3	1	0.2
Dysentery	1	2	2.4	0.5	3	0.7
Ear infection	1	4	2.4	1.1	5	1.2
Malaria	4	112	9.8	30.8	116	28.6
Malaria & Diarrhoeal diseases	3	12	7.3	3.3	15	3.7
Malaria & Dysentery	1	3	2.4	0.8	4	1.0
Malaria & Skin diseases	-	2	-	0.5	2	0.5
Malaria & URI	15	28	36.6	7.7	43	10.6
Malaria & URI & Diarrhoeal dis.	-	1	-	0.3	1	0.2
Malaria & Worms	-	12	-	3.3	12	3.0
Malaria & Other diseases	2	5	4.9	1.4	7	1.7
Measles	-	8	-	2.2	8	2.0
Miscellaneous	4	33	9.8	9.1	37	9.1
Pelvic Inflammatory Diseases	1	2	2.4	0.5	3	0.7
Pneumonia	-	2	-	0.5	2	0.5
Pregnancy and complications	-	4	-	1.1	4	1.0
Skin diseases	-	20	-	5.5	20	4.9
Skin diseases & Dysentery	-	1	-	0.3	1	0.2
Unspecified diagnoses	-	3	-	0.8	3	0.7
Upper Respiratory Infect. (URI)	2	29	4.9	8.0	31	7.7
URI & Pregnancy	-	1	-	0.3	1	0.2
URI & Skin diseases	-	1	-	0.3	1	0.2
Urinary tract infection	2	1	4.9	0.3	3	0.7
Yaws	-	4	-	1.1	4	1.0
Total	41	364	100	100	405	100

The indications for antibiotic use varied between the two types of facilities. Antibiotics were more frequently used for malaria and URI, and urinary tract infections in the hospital than in the health centres. In contrast, malaria, soft tissue injuries and infections and skin diseases were more important indications for antibiotic use at the health centres than at the hospital.

Cost of antibiotic treatment

The cost of antibiotics in relation to the other drugs at the Bogoso and Simpa Health Centres (where complete treatment regimens were documented) is presented in table 4.9. The price list for antibiotics and other drugs is presented in Annex 9.

Table 4.9 Cost of antibiotic use in relation to other drugs				
Cost in cedis	**Bogoso H/C**	**Simpa H/C**	**Total H/Cs**	**TGH Prosp.**
Total cost of all drugs prescribed	241,606.00	143,720.00	385,326.00	329,308.00
Average cost per patient	2,416.06	1,437.20	1,926.63	3,293.08
Total cost of antibiotics prescribed	81,160.00	27,170.00	108,330.00	118,640.00
Average cost of antibiotics per patient for patients receiving antibiotics	1,027.34	1,709.51	902.75	2,636.44
Cost of antibiotics as % of all drug cost	33.6%	18.9%	28.1%	36.0%
Cost of antibiotics as % of drugs cost among patients receiving antibiotics	39.2%	38.8%	39.1%	59.4%

The cost of antibiotics accounted for almost two-fifths of the total drug bill among patients receiving antibiotics in the two health centres. The analysis of cost of antibiotics from the OPD prospective data at the district hospital is presented in section 4.5.

4.3.6 Appropriateness of treatment

Of 407 patients diagnosed with malaria either singly or in combination with other diseases in all the health facilities, 306 (75.2%) were prescribed intramuscular injection of chloroquine. The use of parenteral chloroquine could be assessed for only 351 patients for whom drugs and their routes of administration were stated. For this group therefore, injection use was about 87.2%. Further, injection chloroquine was prescribed for 76 patients who were diagnosed with illnesses other than malaria.

Several regimes for chloroquine were encountered with most of them being inappropriate but these were not quantitatively assessed. They included the following:

1. IM Chloroquine 4 or 5cc stat; then tablets, 2 daily x 3 days
2. IM Chloroquine 5cc daily x 2 days; then tablets, 2 daily x 3 days
3. IM Chloroquine 5cc stat; then tablets, 1 daily x 6 days
4. IM Chloroquine 5cc stat; then tablets, 1 twice daily x 3 days
5. IM Chloroquine 5cc stat; then tablets, 1 twice daily x 5 days

6. IM Chloroquine 5cc stat; then tablets, 2 after 6 hrs., then 2 daily x 3 days
7. IM Chloroquine 5cc stat
8. IM Chloroquine 5cc daily x 2 days
9. IM Chloroquine 5cc daily x 3 days
10. IM Chloroquine 2cc stat; repeat after 6 hrs., then tablets 1 daily x 3 days
11. Tabs Chloroquine 4:4:2 on days 1:2:3 respectively
12. Tabs Chloroquine 1 daily x 6 days
13. Tabs Chloroquine 1 twice daily x 3 days
14. IM Chloroquine 1-3cc stat; then syrup 5-10 ml 2-3 daily x 3-5 days

The commonest regime for adults was IM chloroquine 5cc stat; followed by 2 tablets chloroquine daily for 3 days. A 6 year old child attending the Dompim Health Centre received a prescription for IM chloroquine 3cc stat; then syrup 15ml. daily x 3 days; the total dose of 840mg being in excess of the recommended 475-625mg. The dosage for chloroquine was neither expressed in terms of body weight nor in terms of its strength.

Out of 291 patients for whom malaria was the sole stated diagnosis, 11 had no drugs indicated on their clinical record cards. Of the remaining 280 patients, 116 (41.4%) received one or more antibiotics.

Inappropriate therapy was also prescribed for patients with URI. Out of 34 patients whose sole diagnosis was URI, 31 (91.2%) were treated with antibiotics. Fourteen (41.2%) of the cases had two antibiotics each. The specific antibiotics used were cotrimoxazole (44.1%), amoxycillin (26.5%), benzylpenicllin (26.5%), procaine penicillin (23.5%), chloramphenicol (5.9%), cloxacillin (2.9%) and metronidazole (2.9%).

Other examples of inappropriate treatment were the use of intramuscular benzylpenicillin in single daily doses for up to one week; the concurrent use of ibuprofen and paracetamol in malaria and the widespread use of expectorants in URI.

4.4 Case reports

The following examples from outpatients' clinical record cards illustrate some of the prescribing patterns presented in the preceding sections.

Malaria in a 19-year old boy, Abass Iddrisu (Annex 6a)

Treatment:
- Inj. Chlq. 4cc x 3
- Inj. Analgin 5cc stat
- Inj. Proc. Pen 3cc x 3
- Tabs. P'mol 2 dly x 7
- Tabs Vitamin BCo 1 bd x5
- Tabs Katrex 3 stat
- Caps. Tetracycline 250 mg qid x5
- Tabs Flagyl 2 bd x5

Analysis:
- Polypharmacy (8 drugs)
- Unnecessary use and over-use of antibiotics and injectable drugs (3 antibiotics; 3 injectable drugs)
- 7 injection episodes
- Incorrect dosing frequency of chloroquine injection (normally 6 hourly)
- Use of 2 drugs not on the EDL (Analgin and Katrex)
- 3 drugs prescribed by brand names (Analgin, Katrex and Flagyl)

Malaria with Helminthiasis in a 24 year old girl, Janet Appiah (Annex 6b)

Treatment: Inj. Chloroq. followed by Tabs Chloroq.
Inj. Proc. Penicillin
Tabs. Paracetamol
Tabs. Vit. B Co
Tabs. Fersolate
Tabs Folic Acid
Tabs. Flagyl
Tabs. Buscopan
Tabs. Nematex
Tabs. Septrin
Tabs Valium
Tabs Piriton

Analysis: Polypharmacy (12 drugs!)
Unnecessary use of injections (2 injectable drugs)
Unnecessary and over-use of antibiotics (3 antibiotics)
Incomplete record of treatment regimen

Fever in a 2-month old baby girl, Stephanie Quansah (Annex 7a)

Treatment: Inj. Chq. 1/2cc dly x 2; repeat in 6hrs.; then 1/2cc dly x 2
Inj. X'pen 1/2cc dly x 2 (i.e. benzylpenicillin)
Syr. Chq.
Syr. Paracetamol 100ml
Syr. Multivite 100ml
Syr. Amoxicillin 1 bt. (bottle)

Analysis: Incomplete record (unspecified diagnosis; incomplete drug regimen)

6 injection episodes in a 2-month old baby!

Incorrect dosing interval for X'pen (normally 4-6hrly.)

Urinary tract infection following Hysterectomy in a 40 year old woman (Annex 7b)

Treatment: IM Streptomycin 1gm dly x 7

IM X'pen 2cc dly x 7

Tabs. Flagyl 200mg dlyx 7

Tabs. Valium 5mg dly 7

Analysis: Inappropriate choice of antibiotics

Over-use of antibiotics (3 antibiotics)

Under-dosage of X'pen and Flagyl

14 injection episodes!

4.5 Prescribing indicators from prospective data

The results of analysis of prospective prescribing data obtained from 100 OPD prescription forms and 45 in-patients at the Tarkwa Government Hospital are shown in table 4.10.

Table 4.10 Prescribing indicators from prospective data at the District Hospital

Indicator	Retrospective (n=100)	Prospective (n=100)	Inpatients (n=45)
Mean no. of drugs per patient	2.64	4.08	3.60
Range of drugs	0 - 6	1 - 7	1 - 9
% with no drugs	17.0%	0.0%	0.0%
% of drugs on EDL	96.6%	97.3%	93.2%
Generics (%)	68.9%	63.5%	61.1%
Cases with injectable drugs	12/36 (33.3%)	58.0%	62.2%
Mean no. of injectable drugs	1.2	1.1	2.0
Mean no. of injection episodes per patient			5.5
Cases with antibiotics (%)	41.0%	45.0%	57.8%
Mean no. of antibiotics	1.1	1.3	1.8

There were statistically significant differences between OPD retrospective and prospective prescribing indicators only with respect to the mean number of drugs (z=7.3; p<0.0001) and cases with injectable drugs (χ^2=6.4; p=0.01). With the exception of percentage of EDL drugs prescribed, all the indicators from the in-patient survey were significantly different from those obtained from the OPD retrospective data.

The commonest drugs (n=408) from the OPD prospective data were paracetamol (17.9%), chloroquine (17.4%), vitamin B complex (8.1%), ibuprofen (5.1%), vitamin C (4.9%) and amoxycillin (4.4%). The commonest branded drugs (n=149) were Brufen (14.1%), Septrin (12.1%), Valium (8.7%), Amoxil (7.4%) and Flagyl (6.7%). The drugs not listed on the EDL (n=11) were Chymoral (36.4%), Analgin (27.3%), artesunate (9.1%), Buscopan (9.1%), Flagentyl (9.1%) and Noroxin (9.1%).

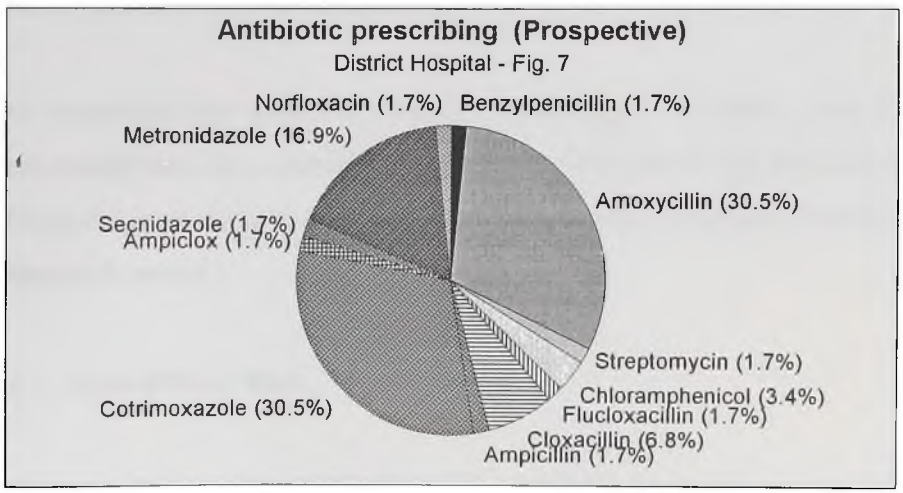
The cost of antibiotics averaged ¢2,636.44 (cedis) for each of 45 outpatients for whom they were prescribed. The high cost was contributed in no small measure by one patient whose bill for norfloxacin was ¢35,000. The cost of antibiotics among the 45 represented 59.4% of their total drug expenditure. On the whole, the total cost of antibiotics accounted for 36.0% of the total cost of all drugs prescribed (Table 4.9). The higher cost of antibiotics at the district hospital compared with the health centres was due to the use of more expensive and non-EDL drugs in the former facility (Fig. 7). Such antibiotics were often not stocked at the hospital's dispensary and had to be obtained from private pharmacies at high costs (Annex 9).

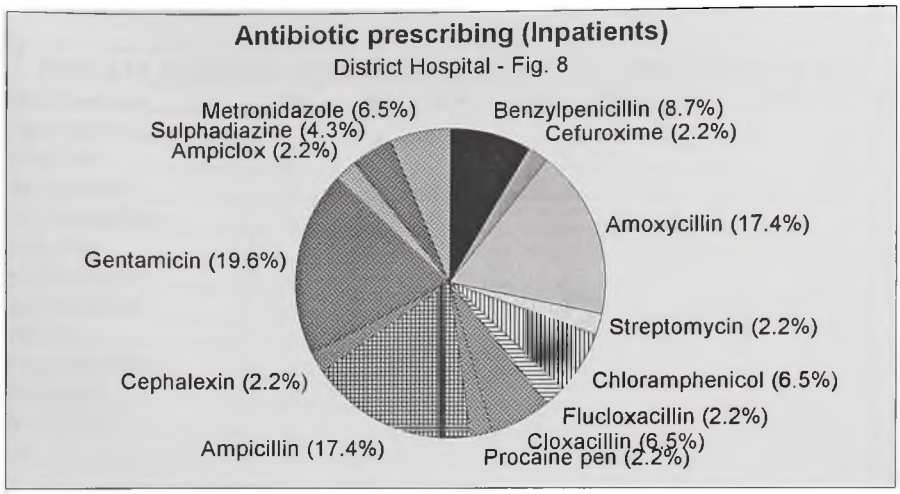
The top five drugs (n=162) encountered in the in-patient survey were paracetamol (10.5%), chloroquine (9.3%), amoxycillin (5.6%), gentamicin (5.6%) and ampicillin (4.9%) (Annex 5). Interestingly, folic acid and vitamin B complex which were frequently used at the OPD were not encountered among in-patients. The proportion of all drugs which were administered parenterally for in-patients (34.6%) was more

than 2-6 times that for outpatients (prospective = 15.2%; retrospective = 5.3%). Intravenous drugs accounted for 13.0% of all drugs used on the wards. Parenteral ampicillin and gentamicin were commonly used for post-operative or other severely ill patients. In general, the drugs prescribed for in-patients were not only more expensive, but were also used for longer duration and frequently administered by the parenteral route.

The commonest branded drugs (n=63) encountered were Amoxil (14.3%), Brufen (11.1%), Folex (7.9%), Valium (7.9%) and Durol (6.3%). Eleven (6.8%) out of the 162 drugs prescribed for in-patients were not on the EDL. They were hyoscine butylbromide (3), chemotrypsin (3), dipyrone (2), artesunate (1), cephalexin (1) and cefuroxime (1).

The patterns of specific antibiotics prescribed for the OPD patients and in-patients are shown in figs. 7 and 8.





It is interesting that cotrimoxazole which was the second commonest antibiotic prescribed at the OPD was not encountered on the wards. On the other hand, ampicillin which was hardly used at the OPD was used nine times as much on the wards. While only 3 (5.1%) of the 59 antibiotics prescribed for OPD patients were administered parenterally, 26 (56.5%) of the 46 antibiotics for the in-patients were similarly administered (intramuscular - 30.4%; intravenous - 26.1%).

The commonest indications for antibiotic use among 26 in-patients were post-Caesarean delivery (5), pneumonia (4), accidents (4), abscesses (2) and meningitis (2). Malaria was encountered in combination with anaemia, URI, pneumonia, tonsillitis or asthma in 5 patients.

4.6 Type of Prescribers

There were 26 prescribers of various ranks distributed in the government health facilities as shown in table 4.11. More than half of the district's prescribers were either medical assistants or enrolled nurses.

Table 4.11 Distribution of type of prescribers in government health facilities

Rank of Prescriber	TGH	NHC	BHC	HHC	HVHC	DHC	SHC	Total
Principal Dental Surgeon	1	-	-	-	-	-	-	1
Medical Officer	2	-	-	-	-	-	-	2
Medical Assistant	1	1	1	1	1	1	1	7
Senior Nursing Officer	1	-	-	-	1	-	1	3
Nursing Officer	-	1	-	-	-	-	-	1
Staff Nurse Midwife	-	-	1	-	-	-	-	1
Senior Staff Midwife	-	-	-	1	-	-	-	1
Staff Midwife	-	-	-	-	-	1	-	1
Senior Enrolled Nurse	-	-	-	-	1	-	1	2
Enrolled Nurse	-	1	1	4	-	-	-	6
Field Technician	-	-	-	-	-	1	-	1
Total	5	3	3	6	3	3	3	26

4.7 Health facility indicators

Availability of Essential Drugs List manual

None of the seven government health facilities had a copy of the 1993 edition of the national EDL manual. None of the Heads of these facilities had previously seen or used the manual.

Four prescribers at the District Hospital had 1993 or 1994 copies of the publication *MIMS Africa* as their source of drug information. Only 2 of the 6 Medical Assistants at the health centres had copies of MIMS (1993). The remaining 4 had no source of therapeutic information.

Availability of drugs for common conditions

The availability of drugs for treating malaria, respiratory infections, diarrhoeal diseases, worm infestations, minor trauma and skin diseases is shown in table 4.12.

Table 4.12 Availability of some common drugs in health facilities

Drug	Availability in 7 facilities	Percent
Chloroquine injection	7/7	100.0%
Chloroquine tablets	7/7	100.0%
Chloroquine syrup	6/7	85.7%
Paracetamol tablets	6/7	85.7%
Paracetamol syrup	7/7	100.0%
Cotrimoxazole tablets	4/7	57.1%
Cotrimoxazole suspension	2/7	28.6%
Amoxycillin capsules	3/7	42.8%
Amoxycillin syrup	5/7	71.4%
Tetracycline capsules	2/7	28.6%
Benzylpenicillin injection	7/7	100.0%
Procaine penicillin injection	7/7	100.0%
Oral Rehydration Salt sachet	2/7	28.6%
Ringer's lactate infusion	5/7	71.4%
Mebandazole tablets	2/7	28.6%
Piperazine elixir	6/7	85.7%
Ferrous sulphate tablets	7/7	100.0%
Folic acid tablets	6/7	85.7%
Antitetanus serum injection	0/7	0.0%
Whitfield ointment	0/7	0.0%
Benzyl benzoate lotion	0/7	0.0%
Gentian violet paint	2/7	28.6%

Whereas injectable drugs such as chloroquine and the penicillins were available in all health facilities, the dermatological drugs and antitetanus serum were not available in any of the health facilities. Of the 22 listed drugs, 14 (63.6%) were available at Nsuaem Health Centre, 17 (77.3%) at Bogoso, 12 (54.5%) each at Dompim and Huni Valley, 16 (72.7%) at Himan, 15 (68.2%) at Tarkwa and 7 (31.8%) at Simpa.

4.8 Summary of results

The prescribing results derived from the OPD retrospective data indicated the following:

- prescribing indicators differed significantly between the health facilities. Bogoso and Himan Health Centres had the worst prescribing practices
- the number of drugs prescribed per patient ranged from 0-13 with a mean of 4.6
- the commonest prescribed drugs were paracetamol, chloroquine, multivitamin, folic acid and vitamin B complex
- treatment records were poorly documented at the district hospital
- 97.1% of all drugs prescribed were listed on the national EDL
- the commonest prescribed drugs which were not listed on the EDL were Analgin, Ketrax, Buscopan and kaolin
- 64.6% of all drugs were prescribed by their generic names
- drugs that were never prescribed by their generic names included Valium, Buscopan, Piriton, Septrin, Multivite and Flagyl
- 80.0% and 57.9% of 700 patients received injectable drugs and antibiotics respectively
- the commonest injectable drugs used were chloroquine, procaine penicillin, benzylpenicillin, Analgin and ATS
- the commonest antibiotics prescribed were procaine penicillin, cotrimoxazole, benzylpenicillin, metronidazole and amoxycillin
- the commonest indications for antibiotic use were malaria, URI, diarrhoeal diseases, soft tissue infections/injuries and skin diseases
- there were significant differences in the prescription of multiple drugs and in the use of injectable drugs and antibiotics between the district hospital and the health centres
- malaria was frequently treated inappropriately. About 87% of patients received parenteral chloroquine and 42% received one or more antibiotics

The use of multiple drugs and injectable drugs as obtained from the OPD prospective data and in-patient survey at the district hospital was significantly higher than that obtained from the OPD retrospective data. More expensive antibiotics were used particularly for in-patients than for outpatients.

The national EDL manual was not available in any of the district's health facilities. Whereas injectable drugs such as chloroquine and the penicillins were available in all facilities, drugs for treatment of skin diseases were not available.

CHAPTER FIVE

5.0 DISCUSSION AND CONCLUSIONS

5.1 Number of drugs prescribed per patient

An average of 4.6 drugs were prescribed at the OPDs of the 7 government health facilities. The true situation is likely to be higher as 32 (4.6%) of the 700 clinical record cards did not indicate what drugs had been prescribed. At the district hospital which had the highest non-response rate, the average of 2.6 drugs obtained from the retrospective data was significantly lower than the 4.1 obtained from the prospective data.

The average number of drugs prescribed per patient at the health centres (4.9) was much higher than that at the district hospital. While the comparison is made difficult by the high non-response rate at the hospital, the difference could genuinely be due to the fact that patients from relatively deprived rural areas attending the health centres more frequently presented with multiple diseases. It was observed that some of the health centres routinely prescribed worm expellants and blood-giving drugs to their patients. Again, the health centres with their lower cadre of prescribers and lack of diagnostic facilities had greater problems with making differential diagnosis and therefore prescribed several drugs to cover all possible ailments.

The average number of drugs prescribed per hospital in-patient was 3.6. Any comparison with the hospital OPD or health centre figures will have to take account of the different morbidity patterns in the different settings and the differences in sampling methodology. Patients on admission tend to have more severe illnesses and multiple pathologies and therefore need more drugs than outpatients. Also, whereas the OPD study investigated prescriptions for only new patients covering a one year period of

time, the in-patient study investigated prescriptions for patients who had been on admission for varying periods on a single day. Patients on admission for 5 or more days tend to have fewer drugs (as they would have completed their initial therapy) than newly admitted ones.

The district's average number of drugs prescribed per patient compares favourably with the national average of 4.3; but then the latter is still more than twice the 2.1 average of ten developing countries (Hogerzeil *et al.*, 1993; Rankin *et al.*, 1993). The mean number of drugs prescribed per encounter in 4 urban health facilities in Kenya was 2.02 (Nabiswa & Godfrey, 1994). Multiple prescriptions imply higher drug expenditure for the patient and increased risk of adverse reaction. Further, patients are frequently unable to procure all of the prescribed drugs or comply with treatment regimes (Isenalumhe & Oviawe, 1988).

Paracetamol was the single commonest drug used in the district's health facilities. It was used in virtually all febrile illnesses. Together with chloroquine, they accounted for 32.2% of all drugs used at the OPDs of the facilities, a reflection of the high incidence of malaria in the district. They represented 42.8% of all 264 drugs prescribed at the district hospital and 31.2% of all 2959 drugs at the health centres. The lower figure for the health centre may be due to their dilution by the higher prevalence of polypharmacy. The two drugs represented only 19.8% of all the 162 drugs used for in-patients of the district hospital indicating the occurrence of other important diseases. Malaria accounted for 49.3%, 49.3% and 20% of all diseases of the district hospital OPD, health centres and hospital in-patients respectively.

Besides paracetamol and chloroquine, multivitamins, folic acid and vitamin B complex were the most popular drugs accounting for nearly one-fifth of the total number of prescribed drugs at the OPDs. Vitamins were frequently prescribed as adjunct therapy to a variety of febrile illnesses as they were considered essential for the restoration of

patients' vitality. The relatively low prescription of vitamins for in-patients has to be cautiously interpreted given the differences in the sampling procedure.

Patients with no drugs

The WHO/INRUD (1993) indicator of percentage of patients with no drugs serves to measure the degree to which non-pharmaceutical therapies are prescribed in curative encounters. For example, in Tanzania and Kenya, 1.3% and 0.1% of patients respectively were managed without prescribing drugs (Massele *et al.*, 1993; Nabiswa & Godfrey, 1994). However, as this study showed, it is important that complete data be available and analysed in this regard. At the Tarkwa Government Hospital, the poor documentation of treatment records meant that prescribed drugs were not indicated in up to 17% of the clinical records examined. Prescribers at the hospital first write out any prescribed drugs on the patient's OPD clinical card and then copy out the same prescription unto a prescription form. Whereas the former is kept at the hospital, the latter is given to the patient to take to the dispensary for collection of any prescribed drugs.

The clinicians sometimes found the repetitive write-up of prescriptions boring or even unnecessary during heavy consultations. The fact that patients did not need the OPD clinical cards to collect their drugs did not motivate them to completely document any treatment plans on these cards, preferring instead to do so on the prescription forms. The pattern was the same for patients going on admission whose clinical findings and treatment were occasionally omitted altogether on the OPD card and rather provided in the patient's admission notes.

This practice has implications for monitoring patients' response to treatment by the same or other prescribers. It could be consequential in the event of any investigations to determine the cause of any untoward reaction arising from therapy as part of legal

or insurance procedures. Although the prescribers at the hospital recognised these limitations, they did not feel inclined to change the system of prescribing which had been in operation for many years.

5.2 Drugs prescribed from the Essential Drugs List

The percentage of drugs prescribed at the OPDs which were on the national Essential Drugs List was 97.1% and uniform (standard deviation 1.6%) in all the health facilities. In-patient prescription of essential drugs was also impressive. The district's performance is better than the 89.4% reported from health centres in the Dar es Salaam region of Tanzania (Massele *et al.*, 1993).

The high conformity to the EDL is hardly surprising as all the facilities procure their drugs from the Regional Medical Store (RMS) which as a matter of national policy stocks only essential drugs. The particular drugs available at the health facilities were usually known to all the prescribers at the health centre level. At the district hospital, drug bulletins from the pharmacy indicating available drugs were regularly issued to prescribers.

However, two problems which emanate from the regional level still have to be addressed. First, the EDL/NF (MOH, 1993) in addition to the list of essential drugs also indicates what kind of drugs are to be used at the various levels of health care. The latter provision was not adhered to and so the health centres were allowed to procure and prescribe restricted drugs. Benzylpenicillin, tetracycline, metronidazole, ibuprofen *etc.* which are restricted to district hospitals and above were obtained from the RMS and used by the health centres. Other drugs such as amodiaquine and streptomycin normally reserved for referral and teaching hospitals were occasionally prescribed by the health centres. Similarly, in spite of their being restricted to a higher

level of health care, drugs such as nitrofurantoin, nalidixic acid and pethidine were used at the district hospital.

The second problem relates to stocking of a non-EDL drug such as hyoscine butylbromide (Buscopan) at the RMS which is at variance with the national/regional policy. Fortunately, this inconsistency appears to be isolated as all other drugs procured from the RMS by the health facilities were listed on the EDL.

The use of non-EDL and expensive drugs such as cefuroxime, cephalexin, secnidazole, norfloxacin and artesunate at the district hospital even if they were used appropriately gives grounds for concern owing to their cost, their aggressive promotion by drug representatives and the potential for their indiscriminate use with consequent development of resistance.

5.3 Generic name prescribing

About 65% of drugs were prescribed by their generic names at the OPDs of public health facilities in the district. This proportion is better than the national average of 59.4% but less than the corresponding figure of 83.9% in Tanzania (Massele *et al.*, 1993; Rankin *et al.*, 1993). The district's figure was contributed to by the 98-100% generic prescription rates for common drugs such as paracetamol, chloroquine, vitamin B complex, folic acid and procaine penicillin. Drugs appeared to be prescribed simply by their common names rather than consciously by their generic names although the two names sometimes coincided as was the case with drugs such as chloroquine and folic acid. Frequently prescribed drugs such as Multivite, Flagyl, Septrin and Piriton were never prescribed by their generic names.

While generic prescribing is recommended to ensure patients obtain drugs at lower costs, prescription by brand names, according to the district's prescribers, was sometimes practised to ensure that patients receive the right drugs from local Licensed

Chemical Sellers who are generally unfamiliar with generic names. Hence, any policies to encourage generic prescribing should not be directed at prescribers alone, but must also be directed at the dispensers of drugs.

5.4 Prescription of injectable drugs

The district's preference for injectable drugs was alarmingly high. In all but one health facility, more than two-thirds of prescriptions contained an injectable drug. At Bogoso Health Centre virtually all patients were given injections. The district's average of 80% could have been higher considering the relatively high number of prescriptions in which prescribed drugs were not specified. This assertion is supported by the results of analysis of prospective prescriptions at the district hospital which showed a 58.0% injection use; this percentage being significantly higher than that obtained from the retrospective data.

The over-use of injections was not only seen in the percentage of patients receiving injections, but also in the fact that each of these patients received more than one injectable drug. Worse still these injectable drugs were administered in several episodes. This excessive use of injections in the district could hardly be justified by the morbidity patterns in the district. Chloroquine, procaine penicillin and benzylpenicillin were the commonest injectable drugs prescribed. About 87% of malaria cases were treated with parenteral chloroquine even in the absence of clear indications for its use. Injection chloroquine was even prescribed for patients who did not have malaria.

The over-use of injections appears to be popular in Ghana. In 1976, 96% of all patients visiting the Achiase Health Centre in the Eastern Region received at least one injectable drug (Barnett *et al.*, 1980). Ghana's average of 55.7% use of injections compares with that of 21.6% (range 0.2-48.0%) reported from 12 developing countries (Hogerzeil *et al.*, 1993; Rankin *et al.*, 1993).

The unnecessary use of injections is expensive not only in terms of cost to patients, but also in terms of health staff time and sterilisation equipment. It also carries with it the risk of injection abscesses, hepatitis and AIDS.

At a meeting in Tarkwa at the end of the study during which findings of the study were presented, the district's prescribers themselves admitted to clinical, social and economic influences in their use of injections. They explained that they frequently prescribed injection chloroquine for patients who were vomiting or were weak. For some patients who claimed to be allergic to oral chloroquine but not to the parenteral form, injection chloroquine was often prescribed. It was apparent that both prescribers and their patients believed that the injection was superior to the oral forms.

Prescribers were seen to have "given care" when they prescribed injections which were promptly administered at the health facilities to signal a "successful" consultation. Administering injections also helped to clear any doubts about patient compliance on the oral medication or reattendances. The prescribers averred that the sustained pressure exerted on them by patients for injections was a major influence in their use of injections. At one health centre, this author encountered an old female cocoa farmer who always took advantage of her monthly visits to a nearby Rural Bank to visit the health centre for an injection to maintain her vitality!

Ofori-Adjei and Arhinful (1994) found similar reasons for the excessive use of injection as a form of malaria treatment in focus group discussions with medical assistants (MAs) from four regions in southern Ghana. The MAs affirmed that some patients had from experience come to trust injections so much that they associated malaria treatment with injections. The researchers reported that the need for prescribers to comply with patient demands stemmed from a concern to satisfy patient desires in the context of the expectation placed on them as health professionals who

could cure their ailments. Overt patient demands have also been reported from other countries (Mnyika & Killewo,1991; Nabiswa & Godfrey, 1994).

The third factor that influenced the use of injections was economic. Prescribers generated more revenue (both officially and unofficially) when they prescribed injections in preference to oral forms of the same drugs. Patients felt more inclined to pay any fees after being satisfied that they have received the desired "instant" care. It has been reported that at a rural health centre in the Greater Accra Region of Ghana, about 236.4% profit was made when prescriptions contained an injection chloroquine compared with only 61.8% when they contained oral chloroquine. The study speculated that the motivation to make profit to purchase more drugs was enhanced by the implementation of the Cash and Carry system full cost recovery system in Ghana (Biritwum, 1994).

Physicians in the United States have prescribed pharmacologically non-effective drugs for their placebo effect (Schwartz *et al.*, 1989). The district's prescribers denied that they used injections for this purpose.

5.5 Antibiotic prescribing

The unnecessary, excessive and inappropriate use of antibiotics was evident in the Wassa West district. Up to 98% of patients attending health facilities were treated with one or more antibiotics. Antibiotics were prescribed more frequently at the health centres than at the district hospital probably in relation to the lower cadre of prescribers in the former facility. Unlike the district hospital, the health centres also preferred the use of parenteral antibiotics. The excessive use of antibiotics was related to the lack of diagnostic facilities at the health centres which made differential diagnoses difficult. In the absence of these facilities, prescribers felt it safe to prescribe

antibiotics to cover any possible infections. This uncertainty was even applied to febrile illnesses of non-bacterial origin.

On the whole, 57.9% of OPD patients were treated with antibiotics in all the facilities. The commonest indications for antibiotic use were malaria, upper respiratory infections, and soft tissue injuries and infections. Over 90% and 41% of patients with URI and malaria were respectively treated with antibiotics. The majority of URI, particularly common colds and sore throat are due to viral causes and do not require antibiotic treatment (Shanson, 1989; WHO, 1988b).

The total cost of antibiotics in two health centres represented 39.1% of the total cost of all drugs prescribed for patients receiving antibiotics and 28.1% of the total cost of all prescriptions. These findings support estimates from developing countries which suggest that antibiotics account for 15-30% of all drug expenditures (Col & O'Connor, 1987). The over-use of antibiotics translates into high expenditure for patients and may be wasteful as it may lead to shortages and deprive needy patients from getting them.

The pattern of antibiotic prescribing for in-patient of the District Hospital differed from that of the OPD patients and reflected the different morbidity patterns in the two groups of patients. Whereas ampicillin was rarely used (2.1% of all antibiotics) at the OPD, it was used more frequently on the ward (17.4%) as an intravenous drug for post-operative patients. Cotrimoxazole which was one of the commonest OPD antibiotics was not encountered among in-patient prescriptions. Antibiotics used for in-patients were, as might be expected for more severe illnesses, more expensive, more frequently administered parenterally and used for longer periods than those for OPD patients. Antibiotics were also used more appropriately among in-patients of the district hospital than among outpatients in all health facilities. Malaria was less

frequently (19.2%) an indication for antibiotic use for in-patients compared with outpatients (28.6%).

Undoubtedly, the biggest problem associated with excessive or indiscriminate antibiotic use is that of bacterial resistance to the misused antibiotics. The commonest antibiotics prescribed in all health facilities were procaine penicillin, cotrimoxazole, benzylpenicillin, metronidazole and amoxycillin. At the district hospital, amoxycillin and cotrimoxazole were the most prescribed antibiotics. A discussion with the bacteriologist in charge of a private laboratory (Modern Medical Laboratory) which undertakes most of the microbiological investigations for referrals from the district hospital revealed that isolates from high vaginal and endocervical swabs were always resistant to ampicillin, benzylpenicillin and tetracycline but almost always sensitive to norfloxacin, gentamicin and cefuroxime. Similarly, urinary isolates were frequently resistant to ampicillin, cotrimoxazole, tetracycline and sulfatriad but sensitive to gentamicin, norfloxacin, cefuroxime, nitrofurantoin and nalidixic acid. It seems reasonable to conclude that bacterial resistance to the commonly used antibiotics in the district may have been related to the over-use of these drugs.

The over-use of antibiotics has been reported in other studies. Afari *et al.* (1995) found that 80.6% of prescribers in health centres in the Central Region of Ghana prescribed antibiotics to children with URI. Antibiotic prescribing rates of around 54% have been reported from Zimbabwe and Kenya (Nabiswa & Godfrey, 1994; Stein *et al.*, 1984). The commonest indications for antibiotic use in Nigeria were soft tissue infections (boils, skin lacerations, dog and human bites, infected skin lesions), URI and malaria (Obaseiki-Ebor *et al.*, 1987). In Zimbabwe, the commonest indications were soft tissue infections and URI accounting for 37.8% of all antibiotic use. In comparison, malaria and URI were the commonest indications for antibiotic use in the Wassa West district and accounted for 46.9% of all indications.

5.6 Appropriateness of treatment

The appropriateness of treatment was assessed with respect to malaria and URI. In both cases, there was ample evidence of inappropriate treatment with over-use of injections and antibiotics. For the treatment of malaria in adults, intramuscular chloroquine (200-250mg) was frequently used as a substitute for the recommended 4 tablets of chloroquine (600mg). Only one prescriber in the district, a medical officer at the Tarkwa Government Hospital had received training in the clinical management of malaria in the past five years; none had been trained in the national treatment guidelines for acute respiratory infections.

It is suggested that the inappropriate treatment practices of prescribers in the district may be attributed to their lack of refresher training. Mnyika and Killewo (1991) have observed that health workers in Tanzania who had attended recent refresher courses diagnosed more accurately and prescribed more rationally than those who had not attended. Ofori-Adjei and Arhinful (1994) however found that although training improved the knowledge of prescribers, this did not have any impact on prescribing decisions or practices.

5.7 Type of prescribers

There was an average of 4 prescribers of various ranks per MOH facility in the district. Formal prescribers are commonly considered to be medical officers and medical assistants. The study showed that nurses, midwives and in one facility, field technician were also active prescribers. All 26 prescribers present at the health facilities at the time of the study contributed to the observed prescribing patterns in the district.

5.8 Availability of Essential Drugs List manual

It is remarkable that the national EDL and formulary which also provides guidelines for the treatment of some common conditions was not available in any of the seven MOH facilities. More regrettably, none of the Heads of these institutions had ever seen a copy of the manual. It was also established the manual was also not available at the District Health Administration. This situation is perhaps not entirely surprising considering that copies of the 1993 edition of the national formulary are currently being printed after a long delay. The availability of EDL (together with educational programmes on its use) has been noted to improve prescribing practices in some countries (Hogerzeil *et al.*, 1989; MOH & CW Zimbabwe, 1994).

5.9 Availability of drugs for common conditions

Although the availability of drugs for the commonest diseases in the district was assessed on the day of visit to the health facilities and may not reflect the drug situation in these facilities over the one year period of retrospective study, it does provide a reasonable snapshot of the drug situation at any facility at any time. It is striking that popular parenteral drugs such as chloroquine, procaine penicillin and benzylpenicillin injections were available in all health facilities.

The importance of the availability of these drugs is that prescribers are more likely to prescribe (or over-prescribe!) drugs which are available at their dispensary than those that are not. Also, the non-availability of particular drugs leads to substitution with other drugs which may be inappropriate, expensive or unlisted on the EDL.

Simpa Health Centre had in stock less than one-third of the drugs for treating common diseases. This was due to a delay on the part of the District Health Administration in collecting drug requisitions from the RMS on behalf of the health centre in line with a

district policy of centralised procurement. All the other health centres had more than half of the common in stock at the time of visit. Drug availability is said to have improved since the introduction of the Cash and Carry system.

Summary of discussion

The study presents an objective and reproducible method for describing prescribing patterns in the Wassa West district. The findings suggest that irrational prescribing is a serious problem in the district. Identifiable factors contributing to the observed prescribing patterns were as follows:

- the prescribing patterns at the health centres were worse than those at the district hospital. This may be due to the lower cadre of prescribing staff and the lack of diagnostic facilities at the health centres
- in addition to the above reasons, the observed greater overprescribing at the health centres may also be related to a higher incidence of multiple ailments in patients from rural communities
- the incomplete documentation of treatment observed from retrospective data at the district hospital was due to a general poor prescribing system operating at the hospital that was made worse by persistent heavy workload
- the impressive use of essential drugs was due to that all the health facilities procured their drugs from the Regional Medical Store which as a matter of policy stocks only essential drugs
- drug prescriptions by their common names rather than by their generic names were favoured by the concern of prescribers that chemical sellers who were generally unfamiliar with the generic names would be able to dispense the right drugs to patients
- the excessive of injections was not justified by morbidity patterns but rather by patient demand, clinical factors and financial considerations

- in the absence of diagnostic facilities at the health centres, prescribers often gave antibiotics to cover any probable infections
- the over-use of antibiotics in Tarkwa may have contributed to the reported bacterial resistance to commonly prescribed antibiotics
- the use of more expensive antibiotics and parenteral antibiotics for the in-patients of the district hospital reflected observed morbidity patterns
- inappropriate treatment practices for malaria and URI were blamed on the lack of refresher training in treatment guidelines for prescribers
- the absence of the national formulary at any of the district's health facilities was attributed to the general national shortage of the manual which is currently in print
- drugs for the treatment of common diseases were generally available in the health facilities as prescribers ensured they maintained adequate stocks of such fast-moving drugs

CHAPTER SIX

6.0 RECOMMENDATIONS

Policy makers

The Ministry of Health should bring together the relevant parties such as the National Drugs Committee, Pharmacy Unit, Pharmacy Council, Food and Drugs Board *etc.* to revise, proclaim and promote the draft national drug policy. The policy is needed to provide the necessary framework backed by legislation within which the pharmaceutical sector can be developed.

National Drugs Committee

The Essential Drugs Programme of Ghana must be established and actively supported. In addition to the allocation from its regular budget, the MOH should solicit for donor funds to fully implement the EDP. In particular, the National Drugs Committee should continue to solicit comments and suggestions from relevant health and related professionals for revision of the list of essential drugs and therapeutic guidelines. The treatment guidelines should be expanded to cover common conditions such as pelvic inflammatory diseases and soft tissue infections. Wherever necessary, different lines of treatment should be provided. In the case of bacterial infections, reserve antimicrobials should be included in the list in the light of current bacterial susceptibility patterns. The inclusion of effective drugs should protect managers and prescribers from the pressures exerted by drug companies.

Most importantly, the programme should print the revised manuals in good time and widely distribute them. None of the public sector health facilities in the Wassa West district had seen or used the national formulary. Regional Drugs and Therapeutic

Committees should be set up to promote the use of the manual in all health institutions. Ultimately, the manual should be readily available and capable of solving most on-the-spot prescribing problems faced by health workers.

Training institutions

The current approach to the teaching of pharmacology and therapeutics in the medical, pharmacy, and primary health schools should be reviewed. There should be a shift from the mere transfer of knowledge about the actions of drugs to a pro-active problem-based teaching. Consideration of drug costs, influences on prescribing, rational use of drugs and patient compliance should be emphasised.

Regional Health Administration

The regional health authorities should liaise with the national authorities to obtain copies of the EDL and formulary and then distribute these to all health institutions. The region must develop programmes to promote the use of the national formulary and ensure that the essential drugs are available in its Medical Store.

The region should organise workshops, seminars and training programmes that bring together district and sub-district managers, prescribers and pharmacists to discuss rational prescribing and the management of the entire pharmaceutical sector. The provision of diagnostic facilities such as microscopes and other laboratory facilities may improve diagnosis and improve prescribing practices.

District Health Administration

The district health authorities must develop a medium-term plan to rationalise drug supply and use in the district. The following specific recommendations should be noted:

- the district should expedite its efforts to establish a District Medical Store which will be responsible for procuring essential drugs from the Regional Medical Store to meet the drug requirements of health institutions within the district. The central procurement of drugs will enable the district to monitor drug consumption in the various institutions;
- the district should establish a Drug and Therapeutics Committee to promote the rational prescribing in health institutions as well as to educate the public on the appropriate use of drugs;
- the DHMT should draw up a programme for in-service training and continuing education of health workers in the district. The initial focus should be on creating awareness on the need to improve prescribing practices as part of a general programme to improve the quality of health services delivery. Training in the clinical management of common conditions such as malaria, URI, diarrhoeal diseases and soft tissue infections should then be organised. National treatment guidelines for the treatment of most of these diseases are already available and these could be adapted to the local context;
- training programmes should specifically address the problem of polypharmacy, over-use of injectable drugs and antibiotics and not merely provide a list of treatment regimes. Health workers should be trained in the general principles of therapeutics and the art of prescribing and writing referrals. Clinical sessions should be organised as an integral part of the training as prescribers need to be convinced that suggested guidelines are effective in curing diseases. Chemical

sellers would have to be trained to correctly interpret prescriptions to ensure that the right drugs are dispensed to patients;

- funding for the training programmes may be obtained from the departmental training sub-item of the district's regular Financial Encumberances allocation. Additional funds may be obtained from faithful partners such as the District Assembly, mining companies and donor agencies such as World Vision International and UNICEF;
- training should be followed-up with supervision and monitoring. Two approaches could be adopted. First, medical officers from the District Hospital could undertake consultations for up to a few days every month at the health centres. They will inspect previous prescriptions for common diseases at the health centre to assess various indicators such as the use of multiple prescriptions, use of essential drugs, antibiotics and injections and prescription by generic names. They should also address any problems that may have been picked up from the management of referrals from the health centres to the district hospital. Secondly, the medical assistants could be invited to the district capital in batches of two to work under the supervision of the medical officers at the district hospital. Accommodation is known to be available in Tarkwa for any such medical assistants who participate in the programme;
- apart from the supervisory visits by the medical officers, the DHMT and the District Drug and Therapeutic Committee could also undertake supervision themselves as well as organise meetings, conferences that bring prescribers together to discuss common problems and find appropriate solutions to resolve them;
- the medical officers themselves at the district hospital should be encouraged to participate in the regional training programmes in the clinical management of certain diseases. They could be supervised occasionally by their senior colleagues from the Regional Hospital. Within the district hospital, the pharmacists should

cooperate with the prescribers to ensure that questionable prescriptions are revised in the interest of patients;

- the DHMT which now has two computers should solicit the assistance of their benefactors, World Vision International and Sight Savers International to be linked up on the Healthnet. This will enable the district to have access to various publications on drug information on the electronic media. Additionally, the district should set up a library where prescribers could obtain free publications such as *Medicine Digest, Postgraduate Doctor, The Prescriber, Essential Drugs Monitor, etc.* to improve their knowledge in therapeutics

Prescribers

Prescribers should continually review their prescribing habits with respect to identifiable indicators such as the use of injectable drugs and antibiotics. Clinical conferences within facilities will provide a system of peer review of prescribing habits. Prescribers should themselves subscribe to the free publications mentioned above. At the district hospital, prescribers must be encouraged to adequately document treatment plans on the OPD cards. The consulting room nurses could be employed to reduce repeated writing of the same prescriptions but legible writing and supervision may be necessary to avoid mistakes in the transfer of prescriptions.

Patients and community members

The DHMT, Sub-district Health Teams and health institutions should embark on a continued programme of public education on drugs and the role of patients in health care. These campaigns can be integrated into the regular outreach programmes in the district. Posters can be pasted on the walls of clinics that educate patients about drug compliance, self-medication and dangers associated with excessive use of injections and antibiotics. The youth and women groups such as the National Youth Organising

Commission, National Service Personnel Association and 31st December Women's Movement and church groups should be involved in the health education using story-telling, role-plays and other culture-friendly methods. The district already has a "Programme of Social Mobilisation for Sustainable Health Delivery" in place at all health care levels and their programme of activities could be expanded to cover the rational use of drugs.

Research

Further studies will be required to evaluate the impact of the above interventions using a similar set of indicators. Other indicators related to the art of prescribing such as legibility of prescriptions, percentage of signed prescriptions *etc.* could also be simultaneously assessed.

The present study was essentially designed to provide baseline information on prescribing patterns in the district. It will be important to determine the factors that have been responsible for the identified patterns if a successful programme of intervention is to be implemented. Some of the factors e.g. patient pressures were identified in the present study though it was not established to what extent they actually influenced prescribing. The influence of financial considerations and the placebo effect as motivators of irrational prescribing could be areas of further study. Similarly, potential savings that could be made from rational prescribing could also be investigated.

Finally, the prescribing patterns in other types of health facilities such as the mines and private clinics should also be studied and baseline information on the various indicators obtained. Prescribers from these other facilities would most likely also benefit from any interventions for the public health facilities.

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ANNEXES

Annex 1

Sample size determination for different types of drug use studies				
	Cross-sectional (basic)	**Cross-sectional (comparative)**	**Supervision**	**Assess impact of intervention**
Objective of the indicators study	To measure drug use indicators in a representative group of facilities	To compare between individual facilities or prescribers, or between groups	To identify whether a facility is above/below a set norm of practice	To assess the impact of an intervention in an intervention and a control group
No. of facilities included	20	At least 10 in each group, 20 for more reliable comparisons; for individual comparisons, each facility is considered separately	Each facility sampled separately	At least 20 per group
No. of prescribing encounters per facility	30	30 for comparing groups; 100 for individual facilities or prescribers	About 15 for identifying outliers with poor practices	At least 30, but depends on the need for precision
Type of prescribing data	Retrospective or prospective	Retrospective or prospective	Prospective preferred, but retrospective possible	Retrospective preferred, but depends on objectives and structure of intervention
Time frame of prescribing data	One year, if possible	One year, if possible	One day, or short period if retrospective	At least 4-6 months before and after the intervention
Type of patient care data	Prospective	Prospective	Prospective	Prospective (if necessary)

Source: WHO (1993)

Annex 2

Prescribing Patterns in Health Facilities in the Wassa West District with Special Reference to Antibiotics

Idcode <idnum>

Background Information

Name of facility ----------

Date of study <dd/mm/yy>

Name of investigator ----------

Patient Information

Name of patient ----------

Ageyears ## Agemonths ## Ageweeks ##

Sex <A>

Date of treatment <dd/mm/yy>

Drugs

Total number of drugs##

Number of generics ##

Number of injections #

Number on Essential Drugs List ##

Total cost of drugs #####.##

Antibiotics

Total number of antibiotics ##

Total cost of all antibiotics #####.##

Diseases in Health Facilities of the Wassa West District

Idcode #####

disease ----------

disease code ##

Drugs prescribed in Health Facilities of the Wassa West District

Idcode #####

Drug number #

Drug ---------- Route ----------

Generic <Y>

Essential Drugs List <Y>

Drug cost #####.##

Number of injection episodes ##

Antibiotics prescribed in Health Facilities of the Wassa West District

Idcode #####

Name of antibiotic ---------- Antibiotic code ##

Route ---------- Dosage ----------

Daily frequency #

Total duration of treatment in days ##

Cost of antibiotics #####.##

Annex 3

Selected drug-related health facility indicators - Wassa West District

Name of facility ---------- Date of visit <dd/mm/yy>

Number of prescribers#

Rank of prescribers ----------

Availability of national EDL and Formulary <Y>

Any other source of therapeutic information ----------

Top 5 diseases in 1994 ----------

Availability of drugs in dispensary for common diseases:

Chloroquine tabs	<Y>	Paracetamol tabs	<Y>
Chloroquine syr	<Y>	Paracetamol syr	<Y>
Chloroquine inj	<Y>	Ringer's lactate infusion	<Y>
ORS sachets	<Y>	Ferrous sulphate tabs'	<Y>
Procaine penicillin	<Y>	Folic acid tabs	<Y>
Benzylpenicillin	<Y>	Antitetanus serum inj	<Y>
Amoxycillin caps	<Y>	Whitfield oint	<Y>
Amoxycillin syr	<Y>	Benzyl benzoate lotion	<Y>
Cotrimoxazole tabs	<Y>	Gentian violet paint	<Y>
Cotrimoxazole susp	<Y>	Mebandazole tabs	<Y>
Tetracycline caps	<Y>	Piperazine syr	<Y>

Annex 4

Drug use at the OPDs of the District Hospital and Health Centres in the Wassa West District

Drug	TGH	H/Ctrs.	% TGH	% H/Ctrs.	Total	%Total
5:4:1	-	1	-	0.03	1	0.03
Acetylsalicylic acid	1	24	0.38	0.81	25	0.78
Albendazole	2	1	0.76	0.03	3	0.09
Aluminium hydroxide	-	39	-	1.32	39	1.21
Amodiaquine	1	1	0.38	0.03	2	0.06
Amoxycillin	17	43	6.44	1.45	60	1.86
Ampicillin	1	-	0.38	-	1	0.03
Antitetanus serum	2	18	0.76	0.61	20	0.62
Artesunate	1	-	0.38	-	1	0.03
Benzoic acid	-	2	-	0.07	2	0.06
Benzyl benzoate	2	3	0.76	0.10	5	0.16
Benzylpenicillin	-	83	-	2.81	83	2.58
Blood tonic	-	1	-	0.03	1	0.03
Calamine	-	16	-	0.54	16	0.50
Cephalexin	1	-	0.38	-	1	0.03
Chemotrypsin	2	-	0.76	-	2	0.06
Chloramphenicol	2	28	0.76	0.95	30	0.93
Chloroquine	57	448	21.59	15.14	505	15.67
Chlorpheniramine	4	50	1.52	1.69	54	1.68
Cloxacillin	1	3	0.38	0.10	4	0.12
Co-trimoxazole	14	114	5.30	3.85	128	3.97
Cough mixture	18	48	6.82	1.62	66	2.05
Dextrose	1	5	0.38	0.17	6	0.19
Dextrose saline	3	6	1.14	0.20	9	0.28
Diazepam	4	100	1.52	3.38	104	3.23
Diclofenac	3	-	1.14	-	3	0.09
Dipyrone	-	30	-	1.01	30	0.93
Dithranol	-	2	-	0.07	2	0.06
Doloneurobion	-	2	-	0.07	2	0.06
Ephedrine	-	1	-	0.03	1	0.03
Ergometrine	-	3	-	0.10	3	0.09
Etilefrine	-	1	-	0.03	1	0.03
Eusol	-	17	-	0.57	17	0.53
Ferrous Ammonium Citrate	1	13	0.38	0.44	14	0.43
Ferrous sulphate	-	95	-	3.21	95	2.95
Flavine	-	1	-	0.03	1	0.03
Folic Acid	2	182	0.76	6.15	184	5.71
Frusemide	-	13	-	0.44	13	0.40
Gentian violet	-	12	-	0.41	12	0.37
Glucose	1	4	0.38	0.14	5	0.16
Griseofulvin		1	-	0.03	1	0.03
Hydrocortisone	-	2	-	0.07	2	0.06
Hyoscine butylbromide	1	9	0.38	0.30	10	0.31
Ibuprofen	7	18	2.65	0.61	25	0.78
Kaolin	-	9	-	0.30	9	0.28
Levamisole		24	-	0.81	24	0.74
Liniment	-	6		0.20	6	0.19
Lozenges	-	1	-	0.03	1	0.03

Drug	TGH	H/Ctrs.	%TGH	%H/Ctrs.	Total	%Total
Magnesium trisilicate	2	25	0.76	0.84	27	0.84
Mebendazole	2	43	0.76	1.45	45	1.40
Methylated Spirit	-	1	-	0.03	1	0.03
Methyldopa	-	3	-	0.10	3	0.09
Metronidazole	8	65	3.03	2.20	73	2.26
Minamino	-	2	-	0.07	2	0.06
Multivitamin	10	240	3.79	8.11	250	7.76
Niridazole	-	1	-	0.03	1	0.03
Normal saline	-	6	-	0.20	6	0.19
Nystatin	1	-	0.38	-	1	0.03
Oral Rehydration Salt	5	49	1.89	1.66	54	1.68
Paracetamol	58	476	21.97	16.09	532	16.51
Penicillin V	-	2		0.07	2	0.06
Phenobarbitone	-	4	-	0.14	4	0.12
Piperazine	-	94	-	3.18	94	2.92
Polythiazide	-	1	-	0.03	1	0.03
Potassium citrate	1	1	0.38	0.03	2	0.06
Procaine penicillin	-	146	-	4.93	146	4.53
Promethazine	3	82	1.14	2.77	85	2.64
Reserpine	-	2	-	0.07	2	0.06
Salbutamol	-	2	-	0.07	2	0.06
Secnidazole	1	-	0.38	-	1	0.03
Streptomycin	-	4	-	0.14	4	0.12
Sulfathalazole	-	4	-	0.14	4	0.12
Syntocinon	-	1	-	0.03	1	0.03
Tetracycline	2	28	0.76	0.95	30	0.93
Vitamin B Complex	23	153	8.71	5.17	176	5.46
Vitamin C	1	32	0.38	1.08	33	1.02
Vitamin E	-	1	-	0.03	1	0.03
Vitamin K	-	2	-	0.07	2	0.06
Worm expeller	-	6	-	0.20	6	0.19
Zinc oxide	-	3	-	0.10	3	0.09
Total	264	2959	100	100	3223	100

Annex 5

Drugs prescribed for 45 inpatients of the Tarkwa Government Hospital

Drug	Non-generic name	Freq	Percent
Amoxycillin	Amoxil	9	5.6
Ampicillin	-	8	4.9
Ampiclox	-	1	0.6
Antitetanus serum	-	3	1.9
Artesunate	-	1	0.6
Benzylpenicillin	-	4	2.5
Cefuroxime	Zinacef	1	0.6
Cephalexin	Ceporex	1	0.6
Chemotrypsin	Chymoral	3	1.9
Chloramphenicol	-	3	1.9
Chloroquine	-	15	9.3
Cloxacillin	-	3	1.9
Cough mixture	Major	7	4.3
Dettol	-	1	0.6
Dextrose	-	4	2.5
Dextrose saline	-	2	1.2
Diazepam	Valium	5	3.1
Digoxin	-	1	0.6
Dipyrone	Analgin	2	1.2
Eusol	-	4	2.5
Ferroglobin	-	2	1.2
Flamazine	-	2	1.2
Flucloxacillin	Floxapen	1	0.6
Frusemide	Lasix	2	1.2
Gentamicin	-	9	5.6
Glucose	-	1	0.6
Hydrocortisone	-	1	0.6
Hydrogen peroxide	-	1	0.6
Hyoscine butylbromide	Buscopan	3	1.9
Ibuprofen	Brufen	7	4.3
Imferon	-	1	0.6
Methylated Spirit	-	5	3.1
Methyldopa	Aldomet	1	0.6
Metronidazole	Flagyl	3	1.9
Multivitamin	Liverplex, Durol, Folex, M'vite	11	6.8
Nifedipine	-	1	0.6
Normal saline	-	2	1.2
Paracetamol	Panadol	17	10.5
Parentrovite	-	1	0.6
Pethidine	-	4	2.5
Phenobarbitone	Phenobarb	1	0.6
Procaine penicillin/vaseline	-	2	1.2
Red tablet	-	1	0.6
Rifampicin	-	1	0.6
Streptomycin	-	2	1.2
Vitamin C	-	2	1.2
Total		162	100

Annex 6

a. Inappropriate treatment of malaria

MINISTRY OF HEALTH

1st O. P. No. 3241/94

Surname Abass

2nd O. P. No.

Other Names Iddrisu

Unit No. B.H.S

Address (Home)

Address (Employer) Tel No.

Non-Paying Age 19 M F

First Diagnosis

Date, Diagnosis, Clinical History, Treatment, Prescription

27/10/94 fever headache

Chest pains no cough

gen. pains

Imp Malaria

Ref. No.

3cc x 3.

Date, Diagnosis, Clinical History, Treatment, Prescription

Patients Record Card Form M.H. 40 2

b. Inapproriate treatment of malaria with helminthiasis

MINISTRY OF HEALTH

1st O.P. No. 4496/94

Surname Appiah

2nd O.P. No.

Other Names Janet

Address (Home)

Unit No.

Address (Employer)

Non-Paying Age 26 M F

First Diagnosis

DATE, DIAGNOSIS, CLINICAL HISTORY, TREATMENT, PRESCRIPTION

17/11/94

Malaria & Helminthiasis

Ref. No. 12

- Para

DATE, DIAGNOSIS CLINICAL HISTORY, TREATMENT, PRESCRIPTION

- Folic Acid

Buscopan

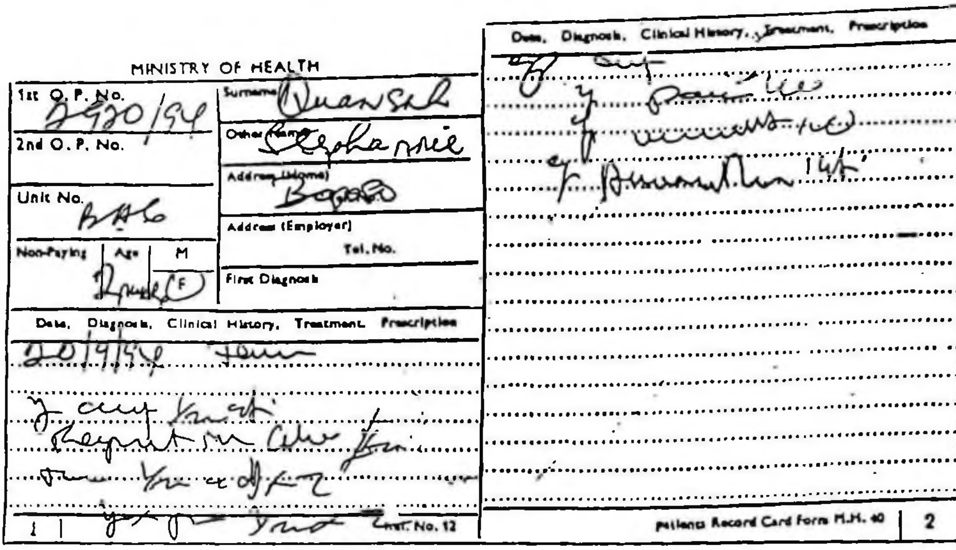
Valium

Piriton

Patients Record Card Form M.H. 40 2

Annex 7

a. **Inappropriate treatment of fever**


MINISTRY OF HEALTH

1st O.P. No. 2920/94

2nd O.P. No.

Unit No. BA6

Non-Paying | Age | M F

Surname Quansah

Other Names Stephanie

Address (Home) Bogoso

Address (Employer)

Tel. No.

First Diagnosis

Date, Diagnosis, Clinical History, Treatment, Prescription

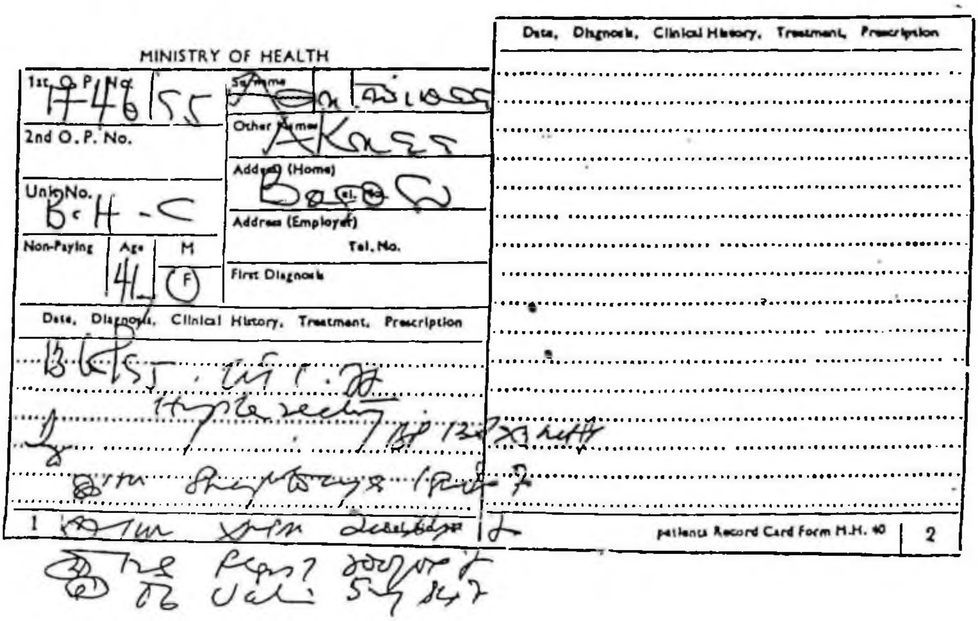
20/4/94 fever

Inst. No. 12

Date, Diagnosis, Clinical History, Treatment, Prescription

patients Record Card Form M.H. 40 | 2

b. **Inappropriate treatment of urinary tract infection**


MINISTRY OF HEALTH

1st O.P. No.

2nd O.P. No.

Unit No.

Non-Paying | Age 41 | M F

Surname

Other Names

Address (Home)

Address (Employer)

Tel. No.

First Diagnosis

Date, Diagnosis, Clinical History, Treatment, Prescription

Date, Diagnosis, Clinical History, Treatment, Prescription

patients Record Card Form M.H. 40 | 2

Annex 8

Indications for antibiotic use in health facilities of the Wassa West district

Disease	TGH	NHC	BHC	HHC	HVHC	DHC	SHC	Total	Percent
Accidents	-	-	1	1	-	2	1	5	1.2
Acute eye infection	1	-	-	-	1	2	-	4	1.0
Anaemia	-	2	1	-	-	-	-	3	0.7
Bites/Minor trauma	2	3	10	2	3	3	10	33	8.1
Boils/cellulitis	1	6	2	1	5	-	5	20	4.9
Chickenpox	-	1	3	1	-	-	-	5	1.2
Diarrhoeal diseases	1	3	5	1	9	-	2	21	5.2
Diarrhoea & Worms	-	-	-	1	-	-	-	1	0.2
Dysentery	1	1	-	1	-	-	-	3	0.7
Ear infection	1	-	-	2	1	-	1	5	1.2
Gastrointestinal disorder	1	-	1	-	1	-	-	3	0.7
Gynaecological disorder	1	-	-	1	1	-	-	3	0.7
Hypertension	-	-	-	1	-	-	-	1	0.2
Intestinal worms	-	2	-	3	-	-	-	5	1.2
Jaundice/hepatitis	1	2	-	-	-	-	-	3	0.7
Liver abscess	1	-	-	-	-	-	-	1	0.2
Malaria	4	2	43	34	10	16	7	116	28.6
Malaria & Acute eye inf.	1	-	-	-	-	-	-	1	0.2
Malaria & Diarrh. dis.	3	1	1	6	1	1	2	15	3.7
Malaria & Dysentery	1	-	-	2	-	1	-	4	1.0
Malaria & Hypertension	-	-	-	1		-	-	1	0.2
Malaria & Orchitis	1	-	-	-		-	-	1	0.2
Malaria & Pregnancy	-	-	-	1	-	-	-	1	0.2
Malaria & Rheumatism	-	-	-	1	-	-	-	1	0.2
Malaria & Skin diseases	-	1	-	-	-	-	1	2	0.5
Malaria & Throat inf.	-	-	-	1	-	-	-	1	0.2
Malaria & URI	15	4	5	5	3	7	4	43	10.6
Malaria & URI & Diarrhoea	-	-	-	1	-	-	-	1	0.2
Malaria & Worms	-	1	-	11	-	-	-	12	3.0
Malnutrition	-	-	-	1	1	-	-	2	0.5
Measles	-	1	-	-	4	3	-	8	2.0
Pelvic Inflamm. Disease	1	1	-	-	1	-	-	3	0.7
Pneumonia	-	2	-	-	-	-	-	2	0.5
Pregnancy and complic.	-	-	2	1	1	-	-	4	1.0
Rheumatism & G/I disord.	-	-	-	1	-	-	-	1	0.2
Rheumatism/joint pains	-	-	2	-	2	-	1	5	1.2
Skin dis. & Dysentery	-	-	-	1	-	-	-	1	0.2
Skin diseases	-	5	1	2	6	2	4	20	4.9
Throat infection	-	-	-	-	1	-	-	1	0.2
Unspecified diagnosis	-	-	-	-	1	-	2	3	0.7
Upper Resp. Inf. (URI)	2	7	1	12	3	5	1	31	7.7
URI & Pregnancy	-	-	-	1	-	-	-	1	0.2
URI & Skin dis.	-	-	-	1	-	-	-	1	0.2
Urinary tract infection	2	-	1	-	-	-	-	3	0.7
Yaws	-	-	-	-	4	-	-	4	1.0
Total	41	45	79	98	59	42	41	405	100

Annex 9

Price List of Selected Drugs in the Wassa West District - October 1995

Drug (Public source)	Price (cedis)	Drug (Private source)	Price (cedis)
Acetylsalicylic acid 300mg	5.00	Albendazole tabs 200mg	1,000.00
Aludrox tabs 500mg	8.00	Amodiaquine tabs 300mg	60.00
Amoxycillin syr 125mg/5ml	900.00	Ampiclox syr. 125mg/5ml 100ml	9,500.00
Amoxycilllin caps 250mg	60.00	Analgin inj. 5ml	500.00
Ampicillin inj. 500mg	600.00	Antitetanus serum inj. 50000iu	800.00
Benzylpenicillin inj. 1mu	350.00	Artesunate tabs (pack of 12 tabs)	8,000.00
Chloramphenicol caps 25mg	30.00	Benzyl benzoate lotion 125ml	2,400.00
Chloramphenicol gutt	550.00	Bisacodyl tabs 5mg	10.00
Chloramphenicol inj 1g	900.00	Calamine lotion 100ml	700.00
Chloramphenicol syr. 150mg/5ml	900.00	Chemotrypsin tabs	60.00
Chloroquine inj. 250mg/5ml	200.00	Cloxacillin caps 250mg	80.00
Chloroquine syr 80mg/5ml	400.00	Cloxacillin syr 125mg/5ml	1,200.00
Chloroquine tabs 150mg	20.00	Dettol lotion 250ml	1,300.00
Chlorpheniramine tabs 4mg	4.00	Durol tonic	1,700.00
Cotrimoxazole syr. 250mg/5ml	700.00	Dynavite tabs	200.00
Cotrimoxazole tabs 480mg	20.00	Eusol solution 250ml	500.00
Cough mixt./Expect Sed	800.00	Ferrous ammonium citrate mixt.	1,000.00
Dextrose inf. 500ml	1,600.00	Flucloxacillin syr.125mg/5ml	10,000.00
Dextrose saline inf. 500ml	1,600.00	Folex tabs	100.00
Diazepam inj. 25mg/5ml	300.00	Gentian violet paint 30ml	300.00
Diazepam tabs 5mg	5.00	Glucose pow der 400g	2,400.00
Ergometrine tabs 500mg	5.00	Hydrochlorothiazide tabs 25mg	20.00
Ferrous sulphate tabs 200mg	5.00	Hyoscine butylbromide inj.20mg/ml	500.00
Flucloxacillin caps 250mg	230.00	Kaolin mist. 200ml	500.00
Folic acid tabs 5mg	4.00	Levamisole tabs 40mg (3 tabs)	100.00
Frusemide tabs 40mg	5.00	Magnesium trisilicate mist. 250ml	800.00
Gentamicin inj. 80mg/2ml	200.00	Methylated spirit 30ml	500.00
Hydrocortisone inj. 100mg	950.00	Methyldopa tabs 250mg	110.00
Hyoscine butylbromide tabs 10mg	25.00	Metronidazole susp. 200mg/5ml	900.00
Ibuprofen tabs 300mg	20.00	Minamino syr. 100ml	2,400.00
Mebendazole tabs 100mg	25.00	Norfloxacin tabs 400mg	2,500.00
Metronidazole tabs 200mg	20.00	Piperazine syr. 750mg/5ml	1,200.00
Multivitamin syr.	500.00	Potassium citrate mist 250ml	800.00
Multivitamin tabs	5.00	Promethazine syr. 125ml	1,300.00
Nalidixic acid tabs 500mg	170.00	Salbutamol syr. 2mg/5ml 150ml	3,000.00
Nitrofurantoin tabs 50mg	20.00	Secnidazole tabs 500mg (4 tabs)	4,500.00
Normal saline inf. 500ml	1,600.00	Sulphadoxine/pyrimeth. 500+25mg	1,500.00
Oral Rehydration Salt sachet	150.00	Sulphathalazole tabs	50.00
Paracetamol syr. 100mg/5ml	500.00	Supervitone syr. 250ml	3,500.00
Paracetamol tabs 500mg	6.00	Syntocinon inj. 2u/2ml	500.00
Pethidine inj. 100mg/2ml	1,000.00	Tetracycline caps 250mg	30.00
Procaine penicillin 4mu	650.00	Tres Oris syr	6,000.00
Promethazine HCL inj. 50mg/2ml	150.00	Vitamin B Complex inj. 10ml	450.00
Promethazine tabs 25mg	10.00	Vitamin C	8.00
Reserpine tabs 0.25mg	6.00	Vitamin K1 inj. 10mg	600.00
Ringer's lactate inf. 500ml	1,000.00	Whitfield oint.	1,000.00
Streptomycin inj. 250mg	200.00	Zinc oxide oint.	1,000.00
Vitamin B Complex tabs	3.00		