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The quality of private pharmacy services in a province of Lao PDR: perceptions, practices and regulatory enforcements

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Stockholm 2002

ISBN 91-7349-357-0

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SE-171 76 Stockholm, Sweden

Repro Print AB
Stockholm 2002

Abstract

Aim: To study the practices of private pharmacies, the quality of drugs and the effectiveness of government regulations. To explore drug sellers' and consumers' knowledge and perceptions about drug quality.

Methods: All 214 licensed private pharmacies and 14 public pharmacies (only analysed in study III) in the 14 districts of the Savannakhet province constitute the study population. The study design was a randomised trial (II), pre-experimental (IV) and cross sectional study (I, III, V). Both qualitative and quantitative methods were applied using structured interviews with drug sellers, exit interviews with customers, inspections of drug purchases, sampling and analysis of four essential drugs, and focus group discussions with drug sellers and community members. The measurement of quality of pharmacy services was based on the concept of Good Pharmacy Practice (GPP) using different types of indicators. The applied regulatory intervention package (II) was part of the quality assurance of the National Drug Policy Programme (NDPP) with inspections, information, distribution of regulation documents to drug sellers and sanctions. Two different intervention levels with "higher intensity" in the "active" districts and "lower intensity" in the "regular" districts were used to test the effectiveness of government regulations on pharmacy services.

Main findings: Most private pharmacies were managed by non-pharmacists. The quality of practices was low, with 59% of the encounters not receiving any information on drug use, 47% of purchased drugs had no label and 26% of all drugs were mixed in the same package. Forty-six percent of drug samples from the baseline study were substandard largely due to poor manufacturing practice. After 1½ years of regulatory intervention, the pharmacies in the active intervention districts showed statistically significant improvements for order, essential material and information indicators. When compared the differences of the means of these indicators from pre- to post-intervention, between the active and the regular intervention districts only essential material indicator differed statistically significant. There was no significant difference between the public and private pharmacies in relation to order, information and labelling. Essential drugs and essential materials were significantly more available in private than in public pharmacies. More antibiotics and injections were dispensed in public pharmacies. The number of substandard drug samples in private pharmacies was reduced significantly from 46% in 1997 to 22% in 1999 ($p<0.001$), yet the numbers remain high. There was inadequate scientific drug knowledge among drug sellers and only a few consumers were aware of the existence of low quality drugs. The majority trust the drug companies and authorities to provide them with good quality drugs. Most sellers did not know what constitutes a good quality drug or of correct storage conditions.

Conclusions and recommendations: The quality of private pharmacies was low including the dispensing of substandard drugs in high proportions. It was possible to improve the practice of private pharmacies including the provision of better quality drugs through regulatory interventions. The limited knowledge and awareness of drug sellers and consumers about drug quality may contribute to the low quality of drugs and services. Further interventions are needed.

Key words: Lao PDR, National Drug Policy Programme, quality, private pharmacy, drug sellers, Good Pharmacy Practice, indicators, inspection, regulatory intervention, knowledge

List of original papers in the thesis

This thesis is based on the following papers, which will be referred to in the text by their Roman numerals:

I. Stenson B, Syhakhang L, Eriksson B, Tomson G. Real world pharmacy: assessing the quality of private pharmacy practice in the Lao People's Democratic Republic. Social Science & Medicine, 2001;52(3):393-404.

II. Stenson B, Syhakhang L, Stålsby Lundborg C, Eriksson B, Tomson G. Private pharmacy practice and regulation. – A randomized trial in Lao PDR. International Journal of Technology Assessment in Health Care, 2001;17(4):579-589.

III. Syhakhang L, Stenson B, Wahlström R, Tomson G. The quality of public and private pharmacy practices: a cross sectional study in the Savannakhet province, Lao PDR. European Journal of Clinical Pharmacology, 2001;57:221-227.

IV. Syhakhang L, Stålsby Lundborg C, Lindgren B, Tomson G. The quality of drugs in private pharmacies in Lao PDR: A repeated study in 1997 and 1999. Submitted manuscript.

V. Syhakhang L, Freudenthal S, Tomson G, Wahlström R. Exploring knowledge and perceptions of drug quality among drug sellers and consumers in Lao PDR. Submitted manuscript.

Table of contents

Abbreviations

BP	British Pharmacopoeia
DALY	Disability Adjusted Life Year
DoP	Department of Pharmacy
DTC	Drug Therapeutic Committee
ED	Essential Drugs
EDC	Essential Drugs Concept
EDL	Essential Drugs List
EM	Essential Materials
FDD	Food and Drug Department, Ministry of Health, Lao PDR
FDU	Food and Drug Unit
GHE	Government Health Expenditure
GDP	Gross Domestic Product
GPP	Good Pharmacy Practice
HPLC	High Performance Liquid Chromatography
HSR	Health Systems Research
IHCAR	Division of International Health, Dept of Public Health Sciences, Karolinska Institutet, Stockholm, Sweden
IMR	Infant Mortality Rate
INN	International Non proprietary Name
INRUD	International Network for Rational Use of Drugs
JICA	Japan International Co-operation Agency
LAK	Lao Kips
PDR	People's Democratic Republic
MMR	Maternal Mortality Rate
MoH	Ministry of Health
MSF	Medicins Sans Frontieres
NDP	National Drug Policy
NEDL	National Essential Drugs List
NGO	Non-Governmental Organisation
NSC	National Statistics Centre
RUD	Rational Use of Drugs
SAREC	Swedish Agency for Research Co-operation with the developing countries
SD	Standard Deviation
Sida	Swedish International Development Co-operation Agency
SPC	State Planning Committee
STG	Standard Treatment Guideline
TLC	Thin Layer Chromatography
THE	Total Health Expenditure
UNDP	United Nations Development Programme
UNICEF	United Nations Children’s Fund
USP	United States Pharmacopoeia
UV	Ultraviolet spectrophotometry
WHO	World Health Organization

Definitions

The following terms are used in the thesis:

Counterfeit drug: A pharmaceutical product, which is deliberately and fraudulently mislabelled with respect to identity and/or source. Counterfeiting can apply to both brand and generic products and counterfeit products may include products with the correct ingredients, with the wrong ingredients, without active ingredients, with an insufficient quantity of active ingredients or with fake packaging (WHO, 1999c).
Developing countries: include both middle- and low-income countries (Lindstrand *et al*., 2001).
Drug (pharmaceutical product): Any substance or mixture of substances that is manufactured for sale or distribution, sold, supplied, offered for sale or presented for use in: (i) the treatment, mitigation, cure, prevention or diagnosis of a disease, an abnormal physical state or the symptoms thereof and abnormal physiological conditions in humans or animals; or (ii) the restoration, correction or modification of organic functions in humans or animals (WHO, 1999c).
Generic drug: Product marketed under a Non-proprietary or approved name rather than a proprietary or brand name (WHO, 1984).
International Non-proprietary Name (INN): A unique name of a pharmaceutical substance or an active pharmaceutical ingredient that is universally recognised and accessible as public property (WHO, 1997a).
Good quality drug: is determined by its efficacy weighed against safety to health according to label claim or as promoted or as publicized, and its conformity to specifications regarding identity, strength, purity and other characteristics (WHO, 1997b).
Good Pharmacy Practice (GPP): The practice of a pharmacy aimed at providing and promoting the best use of drugs and other health care services and products, by patients and members of the public. It requires that the welfare of the patients is the pharmacist's prime concern at all times (WHO, 1999c).
Good Manufacturing Practice (GMP): GMP is that part of quality assurance which ensures that products are consistently produced and controlled to the quality standards appropriate to their intended use and as required by the marketing authorisation (WHO, 1999c).
Medicines: include drug, herbal and traditional products (WHO, 1998).
Rational Use of Drugs: Rational use of drugs requires that patients receive medications appropriate to their medical needs, in doses that meet their own individual requirements for an adequate period of time, and at the lowest cost to them and their community (WHO, 1985).
Self-medication: is the selection and use of medicines by individuals to treat self-recognised illnesses or symptoms (WHO, 1998).
Substandard drugs: include all drugs that do not conform to the international pharmacopoeia specifications, e.g., drugs with too low or too high an amount of active ingredients, or a weight variation outside the standard limits.

Preface

I was born in the Savannakhet province the location where all the studies in this research took place. Following my father's advice, *"pharmacy is a good job and it makes money"*, I performed my first pharmacy training from 1975 to 1979, the same time as the beginning of the transition period when Laos migrated from its former 'capitalism' state to the new 'Marxist Leninism' concept. During this time, Laos lived through much political and socio-economical difficulty (this came after 30 years of war, reaching its liberation in 1975 and, consequently, a post war). Despite this situation, the pharmacy study still utilised the French system. I graduated as an assistant pharmacist in 1979. Since 1980, I have worked for the Food and Drug Department (FDD) of the Ministry of Health (MoH), formerly the Department of Pharmacy (DoP). Working as a drug regulator and not having my own private pharmacy, I could not yet fulfil my father's words. Three years later, I left my work to continue my pharmacy studies and graduated as a qualified pharmacist at the Lao National University in 1987, when I returned to the FDD. The longer I worked the more I became aware of the problems in the pharmaceutical sector in relation to regulation, drug utilisation and pharmacy monitoring and inspections, as well as the lack of problem identification and analysis. No data had been systematically collected to be used for scientific pharmaceutical problem solving. Even though my father's idea has not yet been proved, in the bottom of my mind, I think that every job is a "good job" if we do it well. Whether or not a pharmacy is a good job, depends on the "quality" of service, and should not merely depend on the profit gained.

My first experience in research began with a small-scale operational research on the rational use of drugs, including the prescribing and dispensing practice of drug sellers and medical doctors, this was prepared for the National Seminar towards a National Drug Policy (NDP) in Lao PDR, November 16-18, 1992. This research was conducted with the support of the Swedish International Development Co-operation Agency (Sida) and the Division of International Health (IHCAR). With the continuous support from Sida and the IHCAR, the implementation of the NDP Programme began in 1993 and continued to this day (phase I, II and III), aiming at improving the quality and use of drugs through the development of drug legislation, quality control, guidelines, training, inspections and Health Systems Research. As an implementator and manager (1995-1999) of this programme, my experience and knowledge has developed based on a recurring learning cycle of practice and knowledge. I took my first course on HSR and epidemiology in Umeå, Sweden, in 1996. Then, in late 1998, the HSR courses for NDP implementation in Laos began. Thru these experiences, I have become interested in scientific studies and want to learn more. As a pharmacist working at the Drug Regulatory Authority, FDD, I considered it important to study pharmacy practices including drug quality to understand people's knowledge about the practice in order to change their behaviour, and find strategies for improvement. The work in this thesis was initiated in the second phase of the implementation of the NDP Programme (1996-1998), when the Health Systems Research (HSR) concept was relatively unknown among the FDD/MoH staff. I do hope that the evidence from this study will help planners, administrators and decision makers at FDD (MoH) to better understand the drug situation in Lao PDR and to apply them in practice. I believe that doing research will help us be more realistic about what must be done for the efficient development of our health system.

1. Background

1.1Drug consumption–a public health concern

Drugs are among the most important and cost-effective tools for prevention, treatment and alleviation of diseases in all countries and often a key factor for the success of a health sector reform in developing countries (Falkenberg and Tomson, 2000; MSH, 1997; The World Bank, 1993). Shortage of Essential Drugs (ED) in health facilities may result in malfunctioning and non-sustainability of health services. Worldwide, an estimated 1.3 billion Disability Adjusted Life Years (DALYs) were lost in 1990 due to communicable and non-communicable diseases and injury. Premature mortality was responsible for 60% of the DALYs lost and the disability of the remaining 40%. Approximately 35% of deaths were caused by communicable diseases (Beaglehole and Bonita, 1997). Communicable diseases, where antibiotics are essential, are usually dominant in low-income countries whereas non-communicable diseases are mostly dominant in high-income countries. However, in the Southeast Asian region both disease groups are prevalent (WHO, 1999d). In 1990, the public and private sectors in developing countries spent an estimated USD 44 billion on pharmaceuticals. Global expenditures on pharmaceuticals amounted to about USD 220 billion (The World Bank, 1993). Drug expenditures vary widely, from a low of USD 2 per capita in parts of Sub-Saharan Africa and Bangladesh to a high of USD 412 in Japan (The World Bank, 1993). More than half of all drug expenditures in high-income countries are publicly financed. In developing countries, households' out-of-pocket expenditures make up a much larger proportion, sometimes reaching 90% of the total drug spending (WHO, 2000). Often, 20-50% of the recurrent government health budget in developing countries is used to procure drugs and medical supplies, whereas health facilities usually face a lack of necessary equipment and essential drugs (The World Bank, 1993). Given this high expenditure, achieving improvements in efficiency, quality, appropriateness of drug procurement, and their distribution and utilisation becomes a high priority; particularly in developing countries.

In the public sector, drugs can be purchased efficiently by improving the selection of generic drugs on the basis of the national essential drug list and by competitive purchasing, using open and transparent purchasing procedures (MSH, 1997). These procedures have been applied successfully in some developing countries (The World Bank, 1993). However, the distribution of drugs by professionals in both public and private sectors and the utilisation of drugs by consumers are much more difficult to control and monitor than drug procurement (Cederlöf and Tomson, 1995; Kumaranayake, 1997). Inappropriate distribution and irrational use of drugs is a problem for public health in developing countries (Quick *et al*., 1991; Trostle, 1996).

1.2 Distribution and utilisation of drugs in developing countries

1.2.1 Health sector reform–privatisation–private pharmacies

A "reform" is usually intended as a positive change, an improvement of what already exists. Health reform is defined as the attempt to improve the efficiency, equity and efficacy of the health sector (Antezana and Velásquez, 1996). However, things differ in practice depending on the processes, resources and abilities of the state in performing the changes. As part of the reform

process, policy makers in many countries are actively seeking ways to increase the role of private providers and to work with the private sector (Bennett *et al*., 1997). In practice, the process of privatising health services has not always been accompanied by a strengthening of the role of the ministries of health. Many health ministries have become weaker and do not have the strength to regulate and monitor all their private providers (Antezana and Velásquez, 1996).

In many poor countries, health facilities usually face problems of a lack of necessary equipment, essential drugs and increasing economic difficulties, resulting in the poor performance of the public sector (The World Bank, 1993; WHO, 2000). This has led to a reduction in the role of the state and an increased role of the private sector, which was viewed as a means to improve health service provision (Kumaranayake, 1997). There has been a rapid growth in the provision of private health care worldwide. This is due not only to the onset of the health sector reform, but also the response to increased consumer affluence and preference for a greater quality and quantity of health services (Kumaranayake, 1997). Thus, the private market is increasingly taking over the role of the state, including the distribution of drugs. This shift of roles has already occurred in many Asian countries including Laos and Vietnam, where private pharmacies have flourished (Cederlöf and Tomson, 1995; Chuc *et al*., 2001; Chuc and Tomson, 1999).

In many developing countries, private pharmacies are often staffed by untrained and unlicensed persons, and are often seen as a source of inexpensive medical care (Goel *et al*., 1996; Kamat and Nichter, 1998; Wolffers, 1995). A majority of the drugs are sold directly to the customer without prescriptions. The private pharmacies play a dominant role in drug distribution and "prescribing". Patients tend to utilise private pharmacies rather than public health facilities (Brugha and Zwi, 1998; Cederlöf and Tomson, 1995; Goel *et al*., 1996; Igun, 1987). This is due to factors such as ease of access, shorter waiting time, longer or more flexible opening hours, availability of drugs and a more sensitive attitude between the health staff and the client. Thus, private pharmacies are often the first and only source of health care outside the home for a majority of patients in developing countries (Kamat and Nichter, 1998). Furthermore, the quality of care provided seems to be inappropriate and far from acceptable, including low quality of dispensing, and low quality of the drugs (Chalker *et al*., 2000; Chuc *et al*., 2001; Menkes, 1997; Mills *et al*., 2002; Quick *et al*., 1991; Stenson *et al*., 1998; Tomson and Sterky, 1986; Trostle, 1996; Wolffers, 1995).

1.2.2 Drug utilisation

Irrational use of medicines and self-medication are common in developing countries (Mwenesi, 1994; Trostle, 1996). This includes over prescribing, multi-drug prescribing, misuse, use of unnecessary expensive drugs and the overuse of antibiotics and injections as the most common problems of irrational drug use by prescribers/drug sellers as well as consumers. In Vietnam, studies conducted on pharmacy practice found that 95% of the dispensing was self-prescribed (Chuc and Tomson, 1999), 84% of the total Sexually Transmitted Disease (STD) patients were treated incorrectly by drug sellers (Chalker *et al*., 2000), and that the dispensing of antibiotics for mild Acute Respiratory Infections (ARI) was a common practice among private pharmacies (Chuc *et al*., 2001). In India, self-prescribing was common, including antibiotics without prescription (Kamat and Nichter, 1998). In a survey in a Philippine village, 80% of the 337 children with coughs, colds and diarrhoea were treated with incorrect and unnecessary modern drugs by their parents without consulting a doctor (Hardon and Van der Geest, 1987). In Thailand, the majority

of antibiotics were dispensed inappropriately with respect to the choice of drugs and duration of the treatment (Thamlikitkul, 1988). Another study in three developing countries, Bangladesh, Sri Lanka and Yemen (Tomson and Sterky, 1986), found that only 16 of 75 pharmacies gave the appropriate advice of oral rehydration or consultation with a health worker, and instead non-essential drugs were commonly dispensed. An irrational combination of drugs, such as corticosteroids, vitamins and antibiotics, were reported as major problems (Chuc and Tomson, 1999; Kamat and Nichter, 1998). In many developing countries, there are few trained pharmacists, resulting in the working of untrained staff who lack the knowledge of drug use, contraindications and side effects, leading to low quality information (Goel *et al*., 1996).

Irrational drug use is a major worldwide public health concern with far-reaching health and economic consequences. Improving drug use would have important financial and public health benefits, e.g., the sale of essential, safe and efficacious drugs and the appropriate use of antibiotics and injections (Quick *et al*., 1991; WHO, 1993). Ten recommendations for improvements in developing countries have been suggested (Laing *et al*., 2001) including problem-based basic professional training, targeted in-service education, drug seller training, consumer education and regular monitoring of key pharmaceutical indicators. Much effort has been made to improve prescribing and drug use (Chalker *et al*., 2002; Chuc *et al*., 2002; Lundborg *et al*., 1999b; Ross-Degnan *et al*., 1996). The majority of the intervention studies are focused on prescribers in a public health setting, while irrational use of drugs is widespread in the private sector. Only a few intervention studies address drug use from a consumer's perspective (Le Grand *et al*., 1999) or the regulations possible for improving the practice of private drug sellers.

1.3 Drug quality in developing countries

In several developing countries, where laws and regulations are ineffective (Hongoro and Kumaranayake, 2000; Kumaranayake, 1997; Ratanawijitrasin and Wondemagegnehu, 2002), there is a great concern that the prevalence of low quality drug preparations is high (Hanif *et al*., 1995; Kenyon *et al*., 1994; Menkes, 1997; Nazerali and Hogerzeil, 1998; Newton *et al*., 2001; Ogoh Alubo, 1994; Okuonghae *et al*., 1992; Po, 2001; Roy, 1994; Shakoor *et al*., 1997; Taylor *et al*., 2001). Problems with drug quality are usually linked to counterfeit and fake medicines, which do not only appear in developing countries, but also in wealthy ones. For example, from 1982 to 1999, WHO received 771 confidential and public reports relating to counterfeit drugs, of which 80% were from developing countries. The remaining 20% came from wealthy countries. The prevalence of substandard drugs was also reported to be high in Nigeria and Thailand 36% and 40%, respectively (Shakoor *et al*., 1997), as well as in Myanmar and Vietnam (WHO, 1999a).

1.4 Drug regulations in developing countries

Regulation has been defined as *"the public administrative policing of private activity with respect to a rule prescribed in the public interest"* (Mitnick, 1980). Regulation is often seen as a potential response to many problems, which arise in the private production, financing and delivery of health services. In most developing countries, there exists the basic legislation of health personnel such as registration, licensing requirements, the establishment of professional councils and restrictions against dangerous or unethical clinical practice (Bennett *et al*., 1994; Bhat, 1996; Stenson *et al*., 1997). However, despite this existence of basic regulatory legislation the degree to

which they are enforced is low (Hongoro and Kumaranayake, 2000; Kumaranayake, 1997; Kumaranayake *et al*., 2000; Mills *et al*., 2002; WHO, 1991). Regulation is not costless. It requires both staff and monetary resources in order to design, implement, monitor and enforce. The resource and capacity constraints limit the ability of staff in developing countries to implement regulation successfully (Kumaranayake, 1997). They have the authority but not the capacity to regulate (WHO, 1991). Even if they are adequately resourced, they can be reluctant to operate against their own membership and self-interest (Kumaranayake, 1997), e.g., any cases of malpractice would not be publicised for fear of damaging the reputation of the profession.

Three major problems have been suggested with regulations in developing countries (Bennett *et al*., 1994):

Professional self-interest: Major problems with the implementation of legal and regulatory frameworks are evident. Many of the regulatory problems are based on the role of professionals. It is often not clear who is responsible for professional behaviour, how behaviour is monitored and what penalties exist. The political power of the medical profession tends to protect its members, which makes regulation problematic. In developing countries, most of the medical malpractice cases concern unethical conduct rather than ineffective medical practice.

Lack of information: In many developing countries, little information about the private sector and its activities are available. The government must be able to check and monitor private providers so it can take action when providers violate the regulations.

Government organisational structure: Regulatory capacity requires a considerable degree of decentralisation, and local responsibility and authority. Private sector interests are often powerful and local health managers may have difficulty in asserting authority over private providers.

1.5 Rational Use of Drugs and Good Pharmacy Practice

Efforts to promote the rational use of drugs (RUD) have been made by WHO as well as by related international organisations. In the 1960s, an important step in developing RUD among physicians in the Nordic countries was the establishment of drug committees (Sjöqvist and Boethius, 1986). The committees had an important role in drug selection and use within hospitals. In the 1970s, WHO introduced the concept of essential drugs. The principle of the concept is that a limited number of drugs would lead to a better supply of drugs, better prescribing and lower costs for health care. The model essential drug list includes about 250 drugs, which are generally considered sufficient to treat the majority of diseases. A manual produced by WHO on how to investigate the use of drugs in health facilities was published in 1993 (WHO, 1993). In the manual, core-drug use indicators were introduced to be able to monitor the use of drugs in health facilities (Table 1).

Standards for the quality of pharmacy services were endorsed by the International Pharmaceutical Federation (International Pharmaceutical Federation (FIP), 1993) through the Tokyo declaration in 1993. This document was later adopted by WHO in 1996 (WHO, 1996a), and has been introduced globally as a guideline for Good Pharmacy Practice (GPP) to measure and promote the quality of pharmacy practices.

During the 1990s, the International Network for Rational Use of Drugs (INRUD) (Quick *et al*., 1991) worked to promote the improved quality of care through more clinically effective and

economically efficient use of pharmaceuticals in developing countries, by strengthening regional and national capacities to develop and scientifically evaluate programs to improve drug use and disseminate information.

Table 1. Core-drug use indicators for health facilities

Facility indicators
1. Availability of a copy of ED list or formulary
2. Availability of key drugs
Patient care indicators
1. Average consultation time
2. Average dispensing time
3. Percentage of drugs actually dispensed
4. Percentage of drugs adequately labelled
5. Patients' knowledge of correct dosage
Prescribing indicators
1. Average number of drugs per encounter
2. Percentage of drugs prescribed by generic name
3. Percentage of encounters with an antibiotic prescribed
4. Percentage of encounters with an injection prescribed
5. Percentage of drugs prescribed from essential drugs list or formulary

Source: WHO (WHO, 1993)

1.5.1 Rational Use of Drugs

The rational use of drugs (RUD) is a complicated issue and has been attributed different definitions. People may also have different perceptions and meanings regarding RUD. The conference of experts on the Rational Use of Drugs, assembled by the World Health Organisation in Nairobi in 1985, defined that: *"Rational use of drugs requires that patients receive medications appropriate to their medical needs, in doses that meet their own individual requirements for an adequate period of time, and at the lowest cost to them and their community"* (WHO, 1985). This definition implies that the Rational Use of Drugs should meet the following criteria:

- Appropriate indication: the decision to prescribe drug(s) is based entirely on medical rationale and drug therapy as an effective and safe treatment.
- Appropriate drug: the selection of drugs is based on efficacy, safety, suitability and cost considerations.
- Appropriate patient: there should be no contra-indications, the likelihood of adverse reactions should be minimal and the drug should be acceptable to the patient.
- Appropriate information: patients should be provided with relevant, accurate, important and clear information regarding his or her condition and the medication(s) prescribed.
- Appropriate monitoring: both the anticipated and unexpected effects of medications should be appropriately monitored.

In the Nordic countries, the rational use of drugs with the notion of Rational Drug Therapy has been a key issue within drug treatment during the past decades, dealing with the issues of correct

prescription both on a pharmacotherapeutic and economic level (Hansen, 1988; Sjöqvist and Boethius, 1986).

1.5.2 Good Pharmacy Practice (GPP)

A WHO guideline on GPP in the community was published in 1996 (WHO, 1996a). The Good Pharmacy Practice, defined according to the Tokyo Declaration, 1993, requires that:
A. A pharmacist's first concern is the patient and the welfare of the patient in all settings.
B. The core of pharmacy activity includes:
- the supply of medication and other health care products,
- appropriate information and advice to the patient on the appropriate use of medicines,
- monitoring the effects of their use

C. The pharmacist's part of the contribution is:
- the promotion of rational and economic prescribing
- appropriate use of medicines

D. The objective of each element of pharmacy service is relevant to the individual,
- clearly defined and effectively communicated to all those involved.

The four main elements of Good Pharmacy Practice to be addressed are:
1. Activities associated with the promotion of good health, avoidance of ill health and the achievement of health objectives.
2. Activities associated with the supply and use of medicines and items for the administration of medicines or otherwise related to treatment. These activities may be undertaken in the pharmacy or in an institution or home-care setting.
3. Activities associated with self-care, including advice about, and where appropriate, the supply of medicine or other treatment for the symptoms or ailments that can be properly self-treated.
4. Activities associated with influencing prescribing and medicine use.

1.5.3 The pharmacists' role

The role of pharmacists has changed over the past two decades. The pharmacist is no longer just a supplier of medicines and a concocter of medicinal products, but also a team member involved in the provision of health care whether in the hospital, the community pharmacy, the laboratory or in academic institutions (WHO, 1998).

Pharmacists have been recognised as having a key role to play in promoting rational drug use (RUD), strengthening effective drug management, overcoming chronic shortages of essential drugs, combating problems with fake and inferior quality drug and increasing efforts to educate the public in compliance with recognised drug dosages (Passmore and Kailis, 1994; WHO, 1996a). The pharmacist should be a communicator, a quality drug supplier, a trainer and supervisor, a collaborator and a health promoter (WHO, 1998). The document states their role as follows:

Communicator
- Initiate dialogue with clients to obtain a sufficiently detailed medication history
- Ask key questions and pass on relevant information to address the condition of the patient appropriately
- Be prepared and adequately equipped to perform a proper screening for specific conditions and diseases

- Give information on the drugs dispensed
- Be able to use and interpret additional sources of information to satisfy the needs of the patient
- Be able to help the patient undertake appropriate and responsible self-care
- Ensure confidentiality concerning details of the patient's condition

Quality drug supplier
- The procurement of drugs should be from the right sources
- The storage of drugs should ensure good quality
- The dispensing should be correctly labelled

Trainer and supervisor
- Participate in continuing professional development activities such as continuing education
- Develop protocols for referral to the pharmacist and community health workers involved with the handling and distribution of medicines
- Promote the training and supervision of non-pharmacist staff

Collaborator

It is imperative that pharmacists develop quality collaborative relationships with:
- other health care professionals
- National professional association
- The pharmaceutical industry
- Governments (local/national)
- Patients and the general public

Health promoter
- Participate in health screening to identify health problems and those at risk in the community
- Participate in health promotion campaigns to raise awareness of health issues and disease prevention; and provide advice to individuals to help them make informed health choices

2. Lao PDR

2.1 Geographic and demographic information

Lao PDR is a poor landlocked country, located in the centre of the Southeast Asian peninsula (Figure 1) and covering an area of 238,800 square kilometres. It shares borders with Vietnam in the East, China and Myanmar in the North, Cambodia in the South and Thailand in the West. It is rich in natural resources and has a substantial potential, with only parts of its natural resources having been exploited. The gross domestic product (GDP) per capita in 2000 was USD 322 one of the lowest in the world (National Statistics Centre, 2001). The growth rate of GDP per capita between 1999 and 2000 was 23.8%. The GDP in USD showed a large downfall in 1997 and 1998

(National Statistics Centre, 2000a) due to the fall of the exchange rate of Lao Kips (LAK) against USD caused by the Asian Financial Crisis.

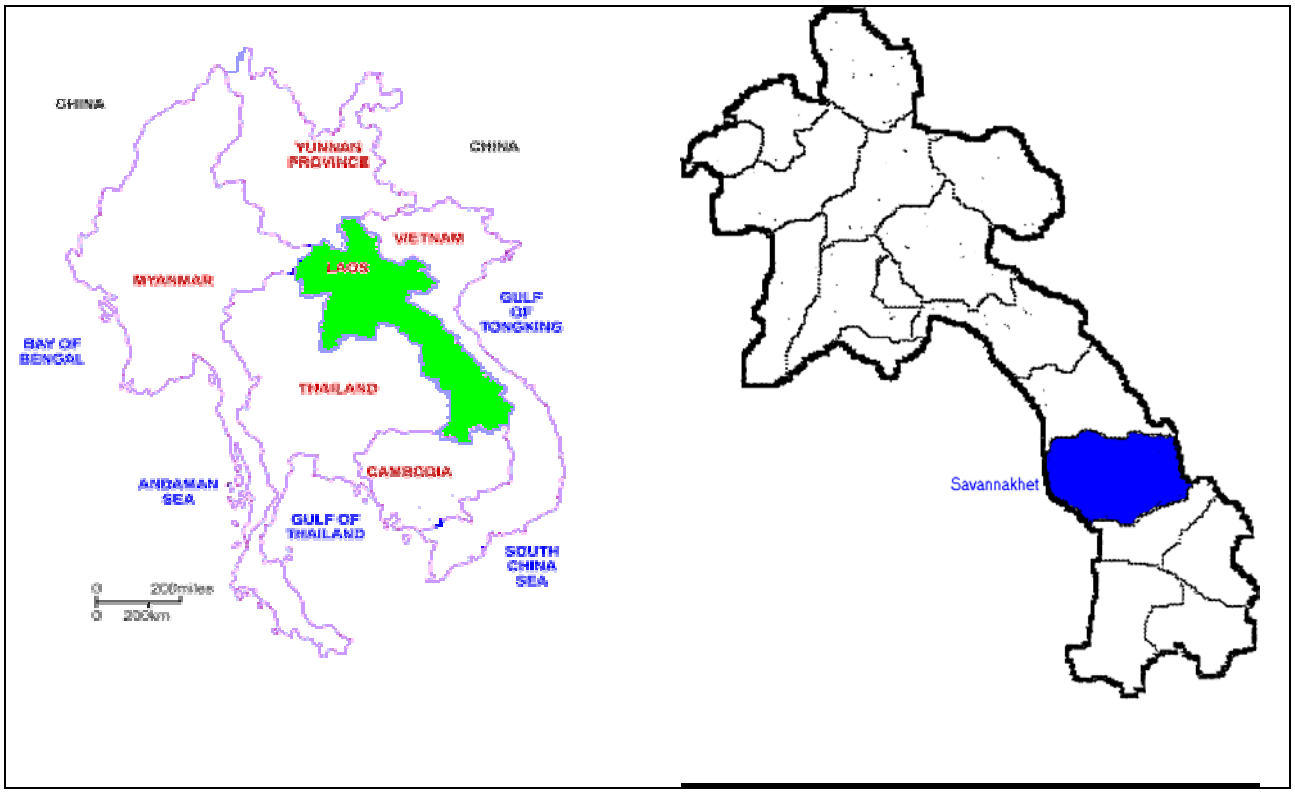

Figure 1. Map of Lao PDR

Lao PDR had a population of 5.1 million with a density of 20 people per km^2 in the year 2000, 51% being women (National Statistics Centre, 2000a). There are some 47 ethnic groups, which are divided into three main subgroups: lowland Lao (Lao Loum) accounting for 66% of the population living on the plains along the Mekong river, upland Lao (Lao Theung) consisting of 22% of the population mainly living on the plateau, and mountain-highland Lao (Lao Soung) living in the mountainous areas and comprising 12% of the total population. About 85% of the population lives in rural areas. The total fertility rate was 5.6 per woman in 1995, and decreased to 4.9 in 2000 (National Statistics Centre, 2000b). The adult literacy rate is 70% (men 82%; women 59%) (National Institute of Public Health, 2001). Some basic data and health indicators are shown in Table 2.

The Lao nation has a long history of struggle for peace, independence, friendship, co-operation and development. Due partly to many decades of war, the Lao people have continued to suffer from low health standards. After the liberation of the nation in 1975, the party and government defined and established policies to heal the wounds of war and to gradually improve the living conditions of the Lao people. All drugs and health services were free of charge at different levels in hospitals. Health posts and village health volunteers (VHV) were established in almost every village in the country. However, this system was not sustainable partly due to the collapse of Soviet communism and the end of Soviet aid (1986), and a limited government budget. The health

system had to undertake the problems of limited resources, shortage of qualified staff, low access to essential drugs as well as low quality of services (Dalaloy, 1997).

Table 2. Basic data on Lao PDR

Basic data and health indicators	
Area (Km^2)	238,800
Population in 2000 [(a)]	5,100,000
- Female (%)	51
Growth rate (%)[(b)]	2.6
Total Fertility Rate (per woman) [(a)]	4.9
Infant mortality rate (per 1000 live-births) [(b)]	82
Under-5 mortality ratio (per 1000 live-births) [(b)]	106
Maternal mortality ratio (per 100,000 live-births) [(b)]	530
Life expectancy at birth (years) [(a)]	59
- Male	57
- Female	61
Adult literacy rate (%)[(a)]	70
- Male	82
- Female	59

Sources: (a) National Statistics Centre (NSC), 2000
(b) Lao Reproductive Health Survey. SPC and NSC, 2001

2.2 New economic policy and privatisation

Corresponding to the conclusion of Soviet aid and the weak provision of public health services, there was a rapid change in the socio-economic system in 1986. The Lao government had to shift from a closed-door policy to an open market policy and from a centrally planned economy to a market economy with privatisation of state owned enterprises. The political system however remained a one-party system (Ivarsson *et al*., 1995).

This new economic policy towards market orientation affected the development of the health care system throughout the country, contributing to the improvement of the health condition of a majority of Lao people as shown in Table 3. However, the health indicators are still poor. Any kind of investment, including private pharmacies, was encouraged. Therefore, the distribution of drugs through the private sector increased dramatically. However, the development of the regulatory system has lagged behind. This has resulted in a drug supply system where any drug is available without a prescription and is easily accessible in private pharmacies (see next chapter) but not from the public health facilities. This led to an uncontrolled private market (see next chapter) with a few, not fully substantiated reports of poor quality of services of private pharmacies (Boupha and Dalaloy, 1997; Dalaloy, 1997; Stenson et al., 1997).

2.3 Health Care in Lao PDR

2.3.1 Public health

There have been some improvements in health indicators over the last 10 years, but the figures are still poor (Table 3). The infant mortality rate (IMR) was 104 in the 1995 census, which decreased to 82/1,000 live births in 2000, a figure still too high. The maternal mortality rate (MMR) was 656/100,000 live births in 1993 (National Statistics Centre, 2000a) and 530/100,000 in 2000 (National Statistics Centre, 2000b). Overall, life expectancy at birth was 51 years in 1995 (National Statistics Centre, 2000a), which increased to about 59 in 2000, 57 years for men and 61

Table 3. Health indicators of Lao PDR, 1993-2000

Health indicators	1993	1994	1995	1996	1999	2000
Infant mortality rate per 1000 live births	125 [a]	113 [b]	104 [c]	102 [g]	93 [h]	82 [d]
Under-5 mortality rate per 1000 live births	182 [a]	142 [b]	-	128 [g]	111 [h]	107 [d]
Maternal mortality rate per 100000 live births	656 [a]	650 [e]	-	-	-	530 [d]
Life expectancy at birth (years)						
- Overall	51 [e]	52 [f]		52 [g]	53 [h]	59 [d]
- Male	50 [e]	50 [f]		51 [g]	52 [h]	57 [d]
- Female	52 [e]	53 [f]		54 [g]	54 [h]	61 [d]

Sources: (a) (NSC, 1993); (b) (NSC, 1996); (c) (National Statistics Centre, 1997); (d) (National Statistics Centre, 2000b; National Statistics Centre, 2001) (e) (UNDP, 1996); (f) (UNDP, 1997); (g) (UNDP, 1998), (h) (UNDP, 2001)

Table 4. Health indicators in Southeast Asian countries

Countries	Life expectancy (years) (1995-2000)	IMR/1000 live births (1999)	U5-MR/1000 live births (1999)	MMR/100000 live births (1980-1999)
Lao PDR	52	93	111	650
Cambodia	56	86	122	470
Myanmar	56	79	112	230
Indonesia	65	38	52	450
Vietnam	67	31	40	160
Philippines	68	31	42	170
Thailand	69	26	30	44
Malaysia	71	8	9	39
Brunei	75	8	9	0
Singapore	77	4	4	6
Japan	80	4	4	8

Source: UNDP, 2001

years for women (National Statistics Centre, 2000b). Compared to the people in other Asian countries, it seems that the Lao people are the least healthy (UNDP, 2001) (Table 4). There could be many factors contributing to poor health in Laos e.g., female education, food security and nutrition, low coverage of immunisation and health education programmes, low access to good water supply and sanitation and preventive and curative health services.

The health situation of the population in Lao PDR is characterised by a high prevalence of infectious diseases mainly affecting those who live in rural/remote areas. The burden of disease is dominated by malaria, acute respiratory infections, diarrhoea, meningitis and dengue haemorrhagic fever (National Institute of Public Health, 2001). The most common causes of morbidity and mortality in Laos are shown in Table 5 in descending order (WHO, 1999b). In addition, tuberculosis, leprosy, gastro-enteritis, hepatitis, maternal and child emergencies, injuries from unexploded bombs, and traffic accidents are important causes of morbidity and mortality. Sexually transmitted diseases (STD), HIV/AIDS and diseases related to smoking and excessive alcohol consumption are gradually increasing (Boupha and Dalaloy, 1997; Dalaloy, 1997; National Institute of Public Health, 2001).

Table 5. Leading causes of morbidity and mortality in Lao PDR, 1999

	Morbidity rate per 100,000 population	Mortality rate per 100,000 population
Malaria	1,762.6	13.7
Pneumonia	676.1	4.7
Influenza	636.9	-
Diarrhoea	523.3	2.7
Meningitis	-	1.6
Dengue haemorrhagic fever	178.5	0.5

Source: WHO, 1999

2.3.2 Organisation of the health sector

There are four organisational levels responsible for public health throughout the country: central, provincial, district and village levels (Figure 2). The central level includes the Ministry of Health (MoH) headquarters and specialised institutions (institutes, centres, hospitals and colleges). The MoH is managed by a Minister and two Vice Ministers. The seven departments (Cabinet Office, Department of Hygiene and Disease Prevention, the Department of Curative Medicine, the Department of Food and Drugs, the Department of Personnel and Organisation, the Department of Planning and Budgeting and the Department of Inspection) within the MoH help the minister formulate policies and develop plans and strategies to implement them effectively. The specialised institutions consist of one institute, 9 centres (including the Food and Drug Quality Control Laboratory Centre (FDQCC)), 8 central hospitals and one college (College of Health Technology).

At the provincial level, the health offices have administrative and technical responsibilities for public health services within their provinces, including provincial hospitals, the network of Primary Health Care facilities, the implementation of vertical programmes (e.g., malaria) and the regulation and inspection of private sector facilities. The district health offices are responsible for the coordination of health service within the districts. At the village level, the Primary Health Care activities have been implemented through the establishment of a health committee based on a health centre (HC) for promoting community participation, the training of village health volunteers (VHV) for introducing drug kits and the drug revolving fund (RDF), implementing health education and social development components.

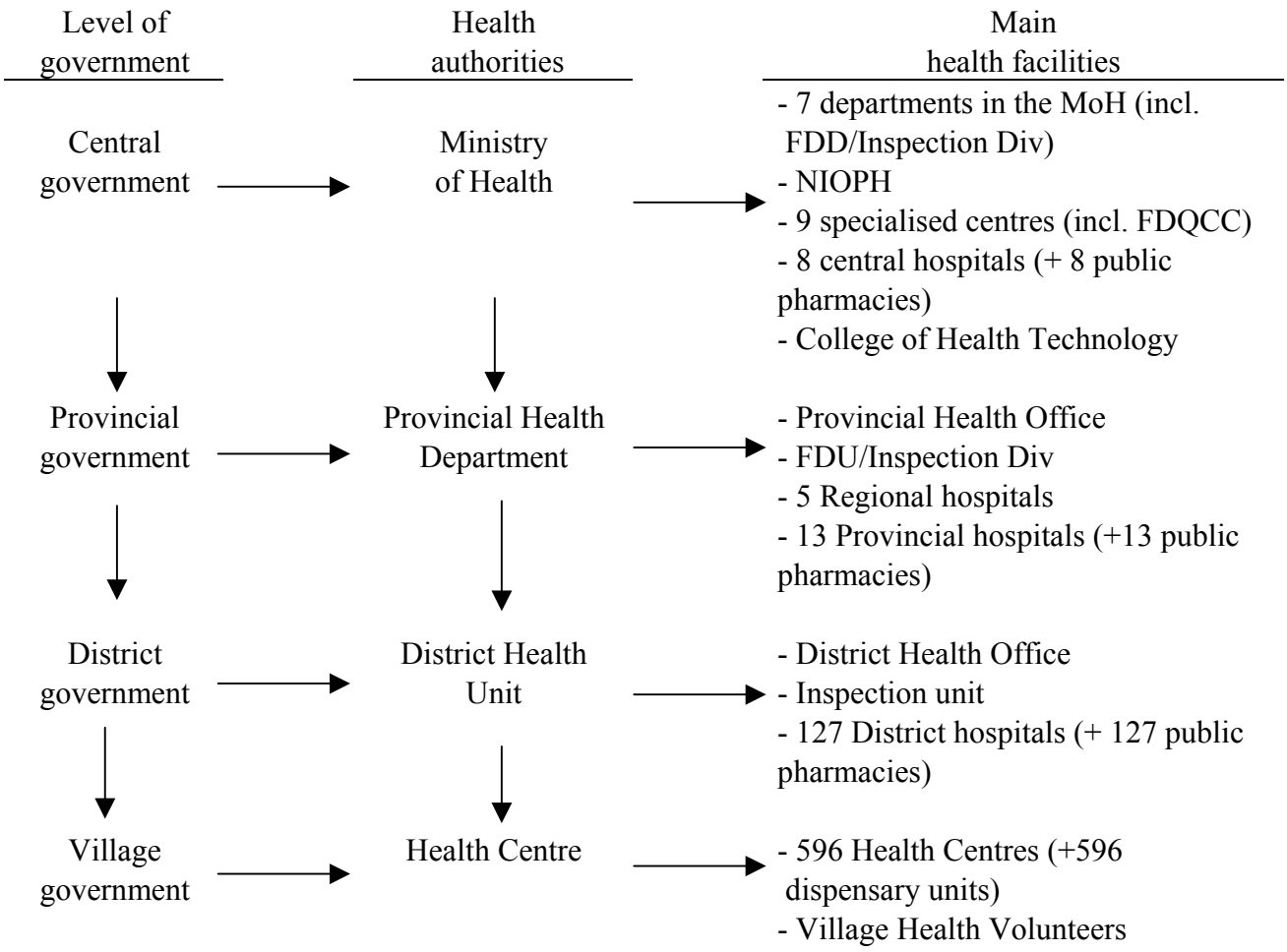

Figure 2. Public health care structure in Lao PDR

In the year 2000, the health system consisted of eight central hospitals, five regional hospitals, 13 provincial hospitals, 127 district hospitals and 596 health centres. In each hospital, there is a hospital pharmacy unit or public pharmacy, which takes responsibility for drug supply management and drug dispensing for both inpatients and outpatients. There were in total 5,317 patient beds with 1.04 hospital beds per 1,000 inhabitants (MoH Technical Working Group and JICA Study Team, 2001) and 3.6 doctors and 6.9 nurses per 10,000 inhabitants, compared to

Thailand with 1.8 hospital beds, 2.8 doctors and 9.3 nurses per 10,000 inhabitants. Vietnam registered 2.2 hospital beds, 4.8 doctors and 5.5 nurses per 10,000 (Health Systems Development. Advanced International Training Program, 1999). In Sweden, a high-income country, the figures amount to 3.4 hospital beds per 1,000 inhabitants and 31.3 doctors and 34 nurses per 10,000 inhabitants (The Swedish Association of the Pharmaceutical Industry, 2001).

2.3.3 Informal health care sector and traditional medicine

When drugs were in short supply and public health facilities did not function well during the mid 1980s, there was a rapid growth in the informal sector characterised by individual practitioners and peddlers, selling drugs without a license or training persons. After the introduction of the new economic policy in 1986, the Lao government encouraged the informal businesses to become formally established under the new regulations. Thus, the number of licensed private pharmacies increased dramatically (Paphassarang *et al*., 1995). However, a few informal practitioners remain, particularly in remote areas where no licensed pharmacy exists. These individuals are referred to as "illegal village practitioners", who prescribe and dispense modern drugs in villages. Most of them are auxiliary nurses who were trained either in the pre-liberation (before 1975) or post-war period (between 1975 and 1985). When the new economic policy was introduced in 1986, they returned to their villages and became "village doctors". At present, they practise medicine informally, including administering injections and selling antibiotics without a licence (MoH Technical Working Group and JICA Study Team, 2001). So far, the number of "village doctors" in this informal sector is unknown, but an estimate reports that their drug distribution is much smaller than that of licensed private pharmacies.

For many centuries, Laos has been rich in natural resources including mineral and medicinal plants; people have also used traditional medicines for alleviating their health problems. In most villages, there have been traditional healers, who treat people by traditional methods, including herbal medicine, rituals or superstition. Some of them are simply spiritualists. They are very active in ethnic minority villages in remote areas (MoH Technical Working Group and JICA Study Team, 2001). The knowledge of traditional medicine methods has been transferred hereditarily from ancestors and this knowledge was kept secret to anyone outside the family. In addition, the monks in some temples have performed treatment for patients using medicinal plants. The number of traditional healers is still unknown.

The Lao government considers traditional medicine (TM) a high priority. TM is one of the 13 elements of the Lao National Drug Policy (NDP). In accordance with the government policy and NDP, the Ministry of Health and the Traditional Medicine Research Centre have actively promoted the integrated use between modern and traditional medicine. As part of the NDP implementation, a health system research project was carried out to explore the knowledge of people on the use of traditional medicine in the Champassack province in 1999 (Sydara *et al*., 2002). The findings from this household survey showed that the use of TM was reported to be common.

2.3.4 Private health providers

The Fifth Party Congress in 1992 (Ministry of Health, 1992) stressed that access to better quality health services must be assured, and permitted the establishment of private clinics and pharmacies under the strict control of the relevant authorities, a position endorsed in the Health Strategy to the year 2000 (Ministry of Health, 1993a). The number of private clinics and pharmacies throughout the country increased rapidly after this shift in policy, creating better access to health services for many people. There is no private hospital in Lao PDR yet. In order to expand outpatient care services, the MoH adopted a registration system for the establishment of private clinics in 1991 (Ministry of Health, 1991). There were in total 309 registered private clinics in 2001 (Department of Curative Medicine, 2001), mostly located in urban areas. These clinics are run after working hours by medical doctors with at least seven years of clinical experience in the public sector, or by doctors who have retired. In addition, in 2001, there were 2,132 registered private pharmacies (see next chapter), 4 private pharmaceutical factories and 25 import drug companies. The services of the private sector have been seen as a means to contribute to the improvement of health in the population. On the other hand, the quality of their services has been reported to be poor.

2.3.5 Health legislation and strategy

So far, there is no existing written or published comprehensive National Health Policy nor any health legislation (Dalaloy, 1997), with the exception of the pharmaceutical policy and legislation. Instead, a health development strategy document has been written to be used as a guideline for developing and implementing health services. In addition, the MoH has established some rules and regulations for managing the health sector. Some important regulations have yet to be formulated, such as a regulation regarding the prescription of antibiotics. This has resulted in the widespread use and sale of antibiotics without prescription among consumers and drug sellers (Paphassarang *et al*., 1995).

The main goal of the health strategy is to "free the country from its status as the least developed country by the year 2020 and ensure that all Lao people have access to health care services". The health strategy stresses four concepts of equity, early integration, demand-based and self-reliant health care services, and six directions for health development (Ministry of Health, 2000a):

1. To strengthen the capability of health staff in terms of attitudes, ethics and technical skills to ensure high quality of services
2. To improve community-based health promotion and disease prevention
3. To improve and expand hospital services at all levels and in remote areas
4. To promote the utilisation of traditional medicine by integrating modern and traditional care
5. To promote scientific and research activities for health development
6. To ensure effective health management, including administration, financing and health insurance systems.

Based on these directions, ten key areas of health development in the next five years have been established, in which two important areas have been emphasised: the improvement of the quality of essential drug production and the promotion of health systems research, which made it different from the previous strategy document.

However, health facilities are still facing a shortage of ED and medical equipment due to limited resources, as well as a lack of motivated health staff (Dalaloy, 1997). This has led to low utilisation of public health facilities (Boupha and Dalaloy, 1997) with an increasing tendency for patients to seek private services.

2.3.6 Health-seeking behaviour

According to the national health survey 2000 (National Institute of Public Health, 2001) carried out in all 18 provinces of Laos, with 38,260 people interviewed in 6,600 households, there are several ways in which patients seek medical care. These are summarised into different categories of health seeking behaviour related to acute illnesses: (i) self-medication including going to a pharmacy (71%), (ii) consultation at government facilities (19%), (iii) Village Health Volunteers or Traditional Birth Attendant (3%), (iv) private clinic or home visit (5%), and (v) spiritualist (1%). A household survey in 11 provinces was also carried out by ADB (Asian Development Bank, 1999). Both the MoH and ADB surveys showed that self-medication, including visiting pharmacies, was the most common health-seeking behaviour, 71% and 63%, respectively.

The results varied across regions, e.g., self-medication was practised in a third of the cases in the central region and in more than half in the northern and southern regions. The proportion of self-medication was reported to be higher in rural than in urban areas. The health-seeking behaviour for females appeared to follow the same pattern as those for males. Self-medication and going to pharmacies was reported to be the same in all age groups (National Institute of Public Health, 2001).

2.3.7 Health expenditure–Sources

The total health expenditure (THE) increased from USD 38 million in 1992-93 to USD 51 million in 1994-95 and USD 72 million in 1997-98 (corresponding to USD 14.9 per capita), which is clearly low by international standards (USD 40 for developing southeast Asia excluding India and China which account for USD 21) (WHO, 2000). The government health expenditure (GHE) usually constitutes as the smallest part of the THE. In 1997-98, the GHE represented 11.5% (USD 8.31 million) of the THE. More than half (58%) corresponded to out-of-pocket expenditure, most of which went to purchase drugs in the private sector. About 30% were spent by donors and NGOs (LECS, 1998).

The health sector activities have been heavily assisted by international donors and Non-Governmental Organisations (NGOs) since the early 1990s. More than half of the international assistance goes to investment, and about 30% to the procurement of drugs (Vinard, 1993). The total donor assistance in 1998 was USD 13.7 million, 37% of which came from multilateral agencies, mostly from the World Bank, the Asian Development Bank, UNICEF and WHO, and 63% from bilateral assistance (Sweden, Australia and Japan) (MoH Technical Working Group and JICA Study Team, 2001). There are about 54 active international NGOs in Lao PDR. Their expenditure in health declined as multilateral agencies became more involved in the country. The construction and renovation of health facilities at the province level rely mostly on donors' support. Each project has its own policy, and the conditions of provincial health services are influenced by the donor projects (MoH Technical Working Group and JICA Study Team, 2001).

2.4 Pharmaceutical sector

2.4.1 Some major stakeholders in the pharmaceutical sector

Government institutions
At the central level, the Ministry of Health is the organisation responsible for health with its seven departments including the Food and Drug Department (FDD) (see 2.4.2). Three centres: Medical Product Supply Centre, Food and Drug Quality Control Centre and Traditional Medicine Research Centre are technically controlled and supervised by the FDD. There are also other ministries collaborating in the pharmaceutical sector, e.g., the Ministry of Education, the Ministry of Information and Culture, the Ministry of Trade, the Ministry of Interior, and the Ministry of Justice, as well as mass organisations (Lao Woman Union, Labour Union and Youth Union).

At the provincial and district level, the Provincial Health Department with its Provincial Food and drug Unit (FDU) and district health office are the main stakeholders.

Health professionals
There were 11,181 health staff members in 2000 (Ministry of Health, 2000b). These were categorised into three levels: high, middle and low (for the details see 2.4.7). Sixteen percent were working at the central level, 34% at provincial and 50% at district levels. So far, in Laos there is no official health professional association.

Pharmaceutical industry
From 1995 to 2001, there were six pharmaceutical factories of which two were state-owned, two were Vietnam and Lao joint ventures, one a Chinese venture and one a Lao Army-Chinese Joint venture (Food and Drug Department, 2001b). The number of private drug companies was reduced from 30 in the mid 1990s to 25 in 2001 of which six were multinational and six joint ventures. There were 2,132 private pharmacies in 2001 (see below). No pharmaceutical industry/company/pharmacy association has been organised yet. The pharmaceutical industry in Lao PDR is said to not be as strong as in other countries (Jönsson, 2002). Sale representatives from the drug companies are reported to commonly visit medical doctors at different wards at hospitals as well as private pharmacies to distribute printed materials and drug samples or sometimes to provide them incentives to promote specific drugs. The drug companies have also organised medical conferences for medical doctors and drug sellers to promote their products. By Lao regulations, all materials used in the conference must be reviewed and monitored by the FDD who also assess drug promotion such as advertisements.

Donors
Sida has been the largest donor of pharmaceutical sector support with technical assistance to the development and implementation of the Lao NDP since 1992.
WHO has supported the essential drug and vaccine programme providing short-term consultants and equipment.
UNICEF has supported drug revolving funds through the Lao Woman Union, and rational use of drugs through maternal and childcare programmes.

WB & ADB have supported essential drug procurement for the health centre in eight provinces and improving pharmacy practices in two provinces using the guideline/indicators developed by the FDD.
NGOs such as Medicins Sans Frontieres, Swiss Red Cross and Comité pour Cooperation avec le Laos have supported revolving drug fund activities in some provinces.

Consumers/lay public
Clearly, the patient, being the ultimate consumer of the drugs, makes them a key stakeholder. There is no private consumer organisation in Laos. Instead, there is local administrative organisation in each village throughout the country headed by a village leader who works closely with other organisations e.g., Lao woman, Youth and Labour unions. Meetings with village members are always organised at this level. Health message delivery to lay public is possible through these channels as well as through mass media such as radio, and for some television.

2.4.2 The Drug Regulatory Authorities (DRA) and their role

The DRA is organised differently in different countries. In some countries, all drug regulatory functions are assigned to a single agency, in others, specific functions are performed by different organisations (Ratanawijitrasin and Wondemagegnehu, 2002). The Food and Drug Department (FDD), formerly the Department of Pharmacy (DoP), is the central drug regulatory authority (DRA) supervised by the Minister and Vice Minister of the MoH. The FDD functions according to the Decree of the Prime Ministers' Council No. 31/CoM, dated 02 May 1989, concerning the Control and Management of the Drug System, including Drug Legislation and Registration, Drug licensing, Import-Export Control, Manufacturing, Marketing, Distribution, Drug utilisation, Quality Assurance including Quality Control and the monitoring of public and private pharmacies. FDD together with the Department of Curative Medicine has initiated and supported Drug Therapeutic Committees (DTC) at central and provincial hospitals to promote, monitor and ensure the rational use of drugs.

At the province and district level, there is a Food and Drug Unit, with delegated responsibilities, mainly post-marketing surveillance, e.g., monitoring, inspection, distribution of legal documents and training. The provincial Food and Drug unit is also responsible for licensing of class III pharmacies (see below) as well as the inspection of imported drugs for the provinces, wherever import drug companies are located (Stenson *et al*., 1997). In practice, many problems regarding pharmaceuticals have been encountered and need to be assessed, e.g., poor facilities, no equipment, limited fund and technical staff, no in-service training programme, no tools and guidelines for different tasks and the lack of essential regulation. Capacities to fulfil all these responsibilities according to the decree are lacking at different levels.

2.4.3 National Drug Policy

In 1992, the government of Lao PDR (DoP, MoH), with financial support from the Swedish International Development Cooperation Agency (Sida) and with technical assistance from IHCAR, initiated a process leading to the formulation of a comprehensive National Drug Policy (NDP) (Paphassarang *et al*., 1995). The original request for assistance was related to support for a Drug Quality Control Centre. The well-established network of experts (IHCAR, Thai, WHO), in

combination with committed officials in the MoH are said to be a crucial factor in the process (Jönsson, 2002). In addition, results from surveys on drug use showed great problems in self-medication, dispensing and prescribing practices, which made decision makers aware of the need for a comprehensive NDP to improve the pharmaceutical sector (Paphassarang *et al*., 1995).

Before 1993, there was only a one-page policy document called 'National Drug Policy' at the Department of Pharmacy (DoP later FDD), due to limited knowledge and experience about policy formulation among DoP staff, as well as the lack of international referenced documents. After a mission of IHCAR to the DoP in early 1992, it was a challenge for the DoP staff to develop a comprehensive National Drug Policy (NDP) with the hope to be able to deal with different problems in the pharmaceutical sector. Problem identification and the need for a comprehensive

Table 6. The 13 elements of the Lao NDP

No	NDP elements
1	Drug legislation and regulation
2	Drug selection
3	Drug nomenclature
4	Drug registration and licensing
5	Drug procurement
6	Financial resources
7	Drug distribution and storage
8	Quality assurance of drug substances and pharmaceuticals
9	Rational drug use
10	Drug advertising and promotion
11	International technical co-operation
12	Traditional medicine
13	Drug monitoring and evaluation

NDP were discussed through different meetings at the MoH with the participation of related departments, institutions and international agencies. There was a saying among the Ministry of Health staff *'how can the child policy* (NDP) *be born before the birth of the mother policy?'* (NHP: National Health policy). Ideally, the NDP should be developed within the framework of a NHP and health care system to make health professionals aware of the ED concept, procurement, prescribing and use of drugs (WHO, 1996b). In spite of the fact that there has been no NHP yet, the Lao NDP was developed within the framework of the health development strategies and the health care system in the country and finally adopted in March 1993 (Ministry of Health, 1993b). It consisted of 13 elements (Table 6). The main objective was to ensure the availability, safety, low price and good quality of the ED affordable to those who needed them, and to ensure the Rational Use of Drugs (RUD) (Paphassarang *et al*., 1995). A National Drug Policy is a commitment to a goal and a guide for action.

2.4.4 NDP programme, phase I, II & III

With continued support from Sida and IHCAR, the FDD has implemented the policy through the Lao National Drug Policy Programme (NDPP) 1993-2002. The implementation in the first phase (1993-95) mainly focused on the training of inspectors in Good Pharmacy Practice (GPP), the rational use of drugs (RUD) and the establishment of a Drug Quality Control Laboratory. In the second phase (1996-2000), the scope had widened and included the development of a Drug Law and regulations, development of standard treatment guidelines (STG) including the indicators to monitor its use, as well as the GPP and RUD indicators (Johansson and Surén, 1998), drug information, traditional medicine, management of drug supply and health system research projects to improve the implementation of the NDP and bridge the gap between theory and practice. The final and consolidating phase of the NDPP (2001-02) was aimed at strengthening the quality assurance core functions including law & regulations, GPP inspections, RUD, Health Systems Research and improving the financial and managerial skills of MoH staff. Major achievements of the NDPP were mentioned in the Sida evaluation in 2000 (Helling-Borda and Andersson, 2000). The implementation of the NDPP involved many sectors, departments and institutions at central and provincial level. Three provinces were selected to be pilot provinces (phase I) and another two including Savannakhet were selected in 1996 for phase II.

2.4.5 Drug Quality Control/Quality Assurance System

2.4.5.1 Drug law & regulations

To ensure a good Quality Control (QC) and Quality Assurance (QA) system, the drug law and regulations should be effectively enforced. Being considered as the most important element to regulate the pharmaceutical sector, drug law and regulation development was ranked as the first element of the NDP, and in the NDPP II (1996-2000), it constituted one of the five projects. In the programme work plan, there were five existing regulations to be updated and five new regulations to be developed in parallel with the development of the Drug Law.

A Drug Law committee was established in 1997, with members from all divisions of FDD, NIOPH (formerly Council of Medical Sciences), the Cabinet of MoH and the Ministry of Justice. The committee has been involved in the development of the draft law and its regulations. The Lao Drug Law has been named “Law on Pharmacy, Drugs and Medicinal Products” and was endorsed in May 2000 by the Prime Minister. The enforcement and adherence of the law has been planned within the NDPP. The explanatory text of the law was prepared to be used for the dissemination of the law. Before the development of the law or during this study period there were a number of regulations available governing the pharmaceutical sector (including the existing regulation to be updated and new regulations developed under the NDPP). The MoH issued most.

- The regulation on private pharmacy was issued in 1988 by the MoH Minister. It has been in revision since 1996.
- The regulation on drug manufacturing, issued in 1989 by the MoH Minister is to be updated.
- The regulation on the import and export of drugs, issued in 1989 by the MoH Minister, is to be updated.
- The regulation on banned drugs issued in 1994 by the MoH Minister, is to be updated.

- The regulation on sanctions issued in 1992 by the MoH Minister, to be updated.
- The regulation governing drug registration in Lao PDR issued in 1995 by the MoH.
- The regulation on Good Manufacturing Practice (GMP) including the checklist was developed in 1998 and approved by the Minister of MoH.
- The regulation on drug advertisements, issued in 1997 by the MoH.
- The regulation on drug procurement, issued in 1998 by the MoH.

The other two regulations: drug donations and drug prescribing are to be developed. The regulations issued in 1988, 1989 and 1990 need to be updated to be relevant and serve the enforcement of the new law. It has been documented that regulations in developing countries are most often ineffective (Hongoro and Kumaranayake, 2000; Kumaranayake, 1997; Kumaranayake *et al*., 2000) mainly due to resources and capacity constraints, which is also the case in Laos.

2.4.5.2 Drug registration–-licensing–-import requirement

Although the regulation governing drug registration in Lao PDR was issued in 1995, the registration had already started in 1991 based on some formal procedures set up by the former Department of Pharmacy. According to the Lao NDP, (Ministry of Health, 1993b) all drugs to be placed on the market in Lao PDR (either manufactured locally or imported) must be evaluated and registered by the FDD of the Ministry of Health. The requirements for the evaluation are based on the WHO recommendations on registration of generic drugs. Essential Drugs have been given preference for registration. Each registration must be renewed every five years. Up to 1999, there were 2,099 registered products in Lao PDR, of which 297 were locally produced and 1793 imported; about 75% were ED products. Most of the products (1,698) were registered between 1996 and 1999. In 2001, the figure went down to about 1,600 because the drug companies did not renew their products after the first five years (Food and Drug Department, 2001b). These registered drugs are to be sold at pharmacies, however in practice unregistered drugs are also available. So far the correct figure of the total drugs distributed and dispensed at private pharmacies is unknown, since no clear mechanism has been established to follow and monitor drugs at private pharmacies as well as all drugs circulated in Lao PDR.

Applications for importing drug products and raw materials into Laos must be submitted to the FDD at the central level, with a detailed attachment for each product, e.g., a certificate of GMP from the country of origin, a certificate of analysis, a certificate of registration from both import and export countries and a certificate of free sale. In order to assure adequate product quality, the MoH applies the current WHO Guidelines of Good Manufacturing Practices to local manufacturers.

The FDD licenses all pharmaceutical establishments before they are allowed to operate. Licenses may be granted upon compliance with the requirements contained in relevant regulations confirmed by inspections carried out by the FDD. The FDD conducts regular inspections of all establishments dealing with drugs.

2.4.5.3 Drug inspection/inspectors

An inspectorate network and a framework for pharmacy inspections has been developed at the central level since 1993 and later at the provincial level in the five pilot provinces, including Savannakhet, under the Sida supported NDPP.

The inspection division is one of six divisions at the FDD responsible for the inspection and monitoring of pharmacies, factories and drug companies in the entire country. At the time of the study, there were five inspectors at the FDD. At the provincial and district level, there were at least one or two inspectors at the Food and Drug Unit at each level. A minimum of two to four inspections were planned to be performed per pharmacy per year, but this plan could not be implemented regularly due to the limitation of funds and limited knowledge of the procedures needed to conduct these inspections. A manual for inspections, including the 10 indicators (see below) for pharmacy inspection, was developed in 1993-1995 by the FDD as part of the NDPP, and distributed to all provincial FDUs. Training was mainly provided for inspectors in the pilot provinces. More than 100 inspectors from 55 districts in the pilot provinces were trained once in Good Pharmacy Practices (GPP). Twenty-three inspectors from the MoH and the pilot provinces have been trained at least twice in Good Manufacturing Practice (GMP), GPP and Good Wholesaling Practice (GWP) (Helling-Borda and Andersson, 2000).

Following the MoH regulation on sanctions No 272/MoH, the inspectors have the authorisation to confiscate drugs in the case that expired drugs, banned drugs, unregistered/drugs without a correct bill, and drugs with unlabelled packaging were found during the inspection. Fines would be imposed according to the total estimated cost of the confiscated drugs. For the first violation, a fine calculated to be double the estimated price of the goods found. For the second violation, the fine amounts to three times the price of the drugs or a one-year revocation of the licence. A third violation would result in the definite revocation of the license. There has been no reported case of the latter type (Stenson *et al*., 1997). During 1995 to 1996, 173 inspections were conducted by the FDD and 60 violations were recorded due to banned and expired drugs (Stenson *et al*., 1997). The total amount of fines imposed was LAK 774,690 (about USD 850) (Food and Drug Department, 1999a). Reports and feedback systems from provinces to FDD do not function well. Thus, inspection data for the country as a whole is not available, with the exception of some information from the five pilot provinces of the NDPP. For the fiscal year of 1999-2000, 1,436 inspections were carried out in 1,251 private pharmacies in five provinces using 10 indicators for pharmacy inspection (see 3.5) (Food and Drug Department, 2001a), however there was no information on violations or sanctions.

The quality of the drugs on the market is continuously monitored by FDD/FDU inspectors through sampling and inspection of the distribution chain (companies, factories and pharmacies at all levels) and by the Food and Drug Quality Control Centre (FDQCC) through drug quality control according to an annual plan for pre- and post-marketing quality surveillance.

2.4.5.4 The Food and Drug Quality Control Centre (FDQCC)

The FDQCC is an official national drug control laboratory under the auspices of the MoH. The laboratory has been supported financially by Sida and WHO. The activities of the FDQCC have

been considered a core function of the Drug Quality Assurance System and are included in the Swedish-supported NDPP at its early stage of support in 1993. The new building was inaugurated in 1995 and was equipped with well-trained staff with technical support from the Medical Product Agency of Sweden. High performance liquid chromatography equipment (HPLC), UV spectrophotometer and other equipment were installed. The staff of the FDQCC has been trained abroad in drug-analysis methods, such as potentiometric, spectrophotometric and HPLC methods, and laboratory management. Training and refreshment training in drug analysis, in the use of new equipment and in administration and regulations has taken place with the help of Thai and Swedish experts (Helling-Borda and Andersson, 2000). The quality of work of the FDQCC has been tested in inter-laboratory testing and the results were in agreement with other laboratories in Thailand and Sweden (Stenson *et al*., 1998).

Samples for analysis have been collected from the pre- and post-marketing surveillance, e.g., from the drug registration and regular inspections of pharmacies, factories and companies, respectively. The total number of analysed samples increased gradually from 224 samples in 1995 to 1,410 in 1999 (including the samples from the study IV), of these 32 and 343 samples were substandard, respectively (Food and Drug Department, 1999a). Sanctions were performed if the source of the drugs could be traced. The FDQCC has been involved in the drug analysis for this study (IV) both in 1997 and in 1999.

2.4.6 National Essential Drug List

Since the Alma Ata Conference on Primary Health Care in 1978, Lao PDR has accepted the Essential Drug Concept (EDC) as a necessary component of Primary Health Care activities. The policy concerning ED is related to the health policy of the Lao Revolutionary Party, the government and the Health Strategy of the Ministry of Health. The first National Essential Drug List (NEDL) was developed in 1978 and modified in 1983. The NEDL was revised again in 1997. The NEDL consists of 261 items in International Non-proprietary Names (INN), which are classified into 4 levels: central, provincial, district and village level, according to the need of each one (Food and Drug Department, 1997). The list of drugs has been classified by different therapeutic groups according to WHO's EDL. The meaning of INN is a unique name of a pharmaceutical substance or an active pharmaceutical ingredient that is universally recognised and accessible as public property (WHO, 1997a).

The NEDL has been distributed to all levels of health facilities with aims to be used as a list of drugs for annual drug estimation and the requirement to be submitted to the MoH for the purpose of improving health through accessibility of safe, good quality and efficient ED at affordable prices and with a more rational use of drugs. The NEDL is also to be available at private pharmacies.

2.4.7 Classification and training of health personnel

In Lao PDR, there were 11,181 health personnel in 2000 (Ministry of Health, 2000b). They are categorised into three levels: high, middle and low level, according to their educational level.

High-level personnel (1,904) include medical doctors, pharmacists and dentists who completed five to seven years of study after senior high school at the Faculty of Medical Science, National University of Laos (formerly the University of Health Sciences). The training for medical doctors does not contain much pharmacology. In the proposed new curriculum, there would be a component totalling 128 hours out of the six-year training, but training regarding drug use is absent (Faculty of Medicine, 1996).

Middle-level personnel (3,621) include registered nurses/midwives, assistant pharmacists, assistant dentists, physiotherapists, laboratory assistants, and hygienists, who have completed 3 years of study after senior high school at the College of Health Technology in Vientiane Municipality or four to five year courses at the Faculty of Medical Science. The registered nurses, who undergo training at the College of Health Technology, receive 32 hours of pharmacology during the first year of training (previously 64 hours) out of a three-year curriculum encompassing a total of 2,640 hours. However, the concept of ED and the use of drugs are absent from the curricula.

Finally, the low-level staff (5,656) consists of auxiliary nurses, laboratory technicians and pharmacy technicians. The educational background of low-level staff is variable. Until 1994, each province had an auxiliary nurse school where the length of the training varied from 3 to 24 months. Auxiliary nurses and pharmacy technicians, who constitute low-level personnel, study two years or less in nursing schools in the provinces. Their general educational background also differs. Some have completed or just started junior or senior high school; others have not even completed primary school. Some also received short-term nurse training in the army during the period of revolution. They are regarded as auxiliary nurses and categorised as low-level staff on the basis that they have received no more than 2 years of formal training. Therefore, it has not been possible to establish the amount of training given to the auxiliary nurses, who represented the majority in our study sample.

The pharmacists are divided into three levels according to their educational level as mentioned above. There were, in total, 901 pharmacists for all levels in 2000 (Food and Drug Department, 2001c):

- Qualified pharmacists (308)
- Assistant pharmacists (255)
- Low level pharmacists or pharmacy technicians (338)

Qualified pharmacists should have studied for five years at the National University, which was established in 1982. The number of new pharmacist students per year is between 30 and 40. In 2000, there were in total 308 qualified pharmacists working for the government (Food and Drug Department, 2001c). A few were trained abroad.

Assistant pharmacists have had three years of education at the College of Health Technology, which was established in 1969, and has trained about 40 new assistant pharmacists per year since 1982. However, according to FDD, there were only 255 assistant pharmacists in 2000, in the public sector (Food and Drug Department, 2001c).

There were 338 low-level pharmacists or pharmacy technicians (Food and Drug Department, 2001c) working for the public sector in 2000. They have been trained for one to two years at the provincial nursing school in Lao PDR or in Vietnam. Today, there is no more training for this level of pharmacists since there is no longer any need for them in the services (Boupha and Dalaloy, 1997).

In general, the training curriculum for pharmacists contains more pharmacology and chemistry than those for physicians and registered nurses. The concept of ED, the EDL, RUD and GPP has not been included in the curriculum. These concepts have only been introduced for participants through workshops and training courses organised by the NDPP under Sida support, starting from the end of the first phase of 1995. In Lao PDR, there has not been systematic continuing education training programmes or in-service training for health staff. Different donor agencies provide different ad hoc in-service training for a minority of health staff according to their strategies and needs.

2.4.8 The role of pharmacists

In Lao PDR, the role of the pharmacist in the health care system has been neglected and is not well defined. Thus, pharmacists are few and not well known in society and mostly work for the government. In 2000, there were about 900 staff of all levels of pharmacists (Food and Drug Department, 2001c), who worked at drug regulatory authorities including inspectors, at hospitals, as faculty of pharmacies and laboratories, at the central, provincial and district level. This figure corresponds to about 6 qualified pharmacists per 100,000 inhabitants. In 2000, there were 349 retired staff members working at private pharmacies (26 qualified pharmacists, 166 assistant pharmacists and 157 low-level pharmacists) of which there was one qualified pharmacist, 11 assistant pharmacists and 11 low-level pharmacists in the Savannakhet province (Food and Drug Department, 2001b; Food and Drug Unit, 1999). As per the shortage of pharmacists, government policy allows any type of medical professional to be in charge of pharmacy services, mainly in handling private pharmacy class III.

2.4.9 Drug procurement & supply

After the country's liberation in 1975, up until 1988, the health care services including drugs (if available) were free of charge (Boupha and Dalaloy, 1997), though there was usually a shortage of some essential drugs and equipment at the health facilities. The main sources of drug supply were the former Soviet Union and other socialist countries. The annual government budget for drug expenditure was very limited. The health facility survey showed that the drugs supplied annually by MoH lasted only 3-4 months (Boupha and Dalaloy, 1997).

Although the Lao NDP requirement is USD 1 per capita per year, which is considered the minimum amount by WHO (Ministry of Health, 1993b), the drug budget in 1997-98 amounted to only USD 1 million (Food and Drug Department, 1999b), equivalent to USD 0.2 per capita per year. This represented 12% of the GHE (USD 8.31 million). The GHE always represents a low proportion of GDP, less than 1% and fell to less than 0.5% because of the Asian crisis. The total drug expenditure is estimated at USD 6 per capita per year, 96% of which is generated from out-of-pocket payment (Ministry of Health, 1998). The corresponding figure for Sweden, in 1998,

was USD 220 per capita per year, or 12.8% of the total health expenditure, which in turn corresponds to 8.4% of GDP for 1998 (The Swedish Association of the Pharmaceutical Industry, 2001).

Before 1999, the MoH was responsible for supplying drugs to the whole country; from the central level (MoH) to the provincial level (provincial health offices); from the provincial level to the district level (district health offices); and from the district level to the village level (health centres) (Boupha and Dalaloy, 1997). In line with the decentralisation of government institutions, the MoH began to delegate drug procurement and accompanying governmental budget to the provinces in 1999. Thus, since 1999, the provincial health offices have carried out the procurement of drugs within the government budget.

To make health facilities functional and sustainable, revolving drug funds (RDFs) were introduced first in the early 1990s by a few NGOs at different health facilities; lately, other NGOs have followed. As part of the user charge scheme, RDFs are now in place in most provincial hospitals, district hospitals and village health units. The RDF is a system whereby the revenue generated by the sale of drugs to patients is used to purchase new drugs, providing safe quality drugs at affordable prices and is part of wider user-charge schemes (MoH Technical Working Group and JICA Study Team, 2001). In 1993, the Lao government officially approved the RDF system with the exemptions for poor people and civil servants, including monks, novices and students. Drugs provided by the government are added into the drug stock and given free to those exempted from paying the user charge.

The MoH has prioritised the two state-owned factories, factories Nos. 2 and 3, as the first source of drug supply, with private local factories or companies, and foreign companies as the second and third source, respectively. So far, there are four private factories and 25 drug import companies in Lao PDR (Food and Drug Department, 2001b; Ministry of Health, 1998). Although being a low-income country, Lao PDR is also producing drugs domestically (Food and Drug Department, 1999b). The two national pharmaceutical factories produce drugs for hospitals and for the market, including private pharmacies. Annually, about 400 drug products are produced, including analgesics/antipyretics, antibiotics, anti-malarial drugs, vitamins, injections and infusions, among others. All raw materials including packaging materials used for the production are being imported from abroad. The quality of production complies with the MoH regulation. No factory in Laos has met the GMP standard yet. Although the country has been importing drugs from neighbouring countries, the share of these imports has been decreasing year by year.

2.4.10 Private pharmacies

As a result of the new economic policy of 1986, the number of private pharmacies increased dramatically within a period of a few years, from none in 1988 to 1,690 in 1993 (Paphassarang *et al*., 1995) after launching the first regulation governing private pharmacies in 1988, and up to 2,132 in 2001 (Food and Drug Department, 2001b; Stenson *et al*., 1997) (Figure 3). This resulted in 2,500 individuals per pharmacy in average, varying approximately from 1,300 in Vientiane (a rich province) up to 5,700 in Phonsaly (a poor province). By the pharmacy regulation No 1036/MoH, only an average of 6,000 people per pharmacy is required.

"Private pharmacies" in this thesis are defined as private for-profit owned businesses, which are licensed by health professionals to sell medicinal products according to the Ministry of Health regulations. The private pharmacies are classified into three categories according to the qualification of the licensee:

- Class I run by a qualified pharmacist with a university degree (26)
- Class II run by an assistant pharmacist (156)
- Class III run by any medical professional usually auxiliary nurse or low-level pharmacist (1,950).

The number of private pharmacies managed by any other professionals than pharmacists, assistant pharmacists and low-level pharmacists was about 84% of the total number (Food and Drug Department, 2001b). In Sweden, there were 817 pharmacies in 2000 with only one class, all organised within Apoteket AB, in which the state is the majority shareholder (The Swedish Association of the Pharmaceutical Industry, 2001)

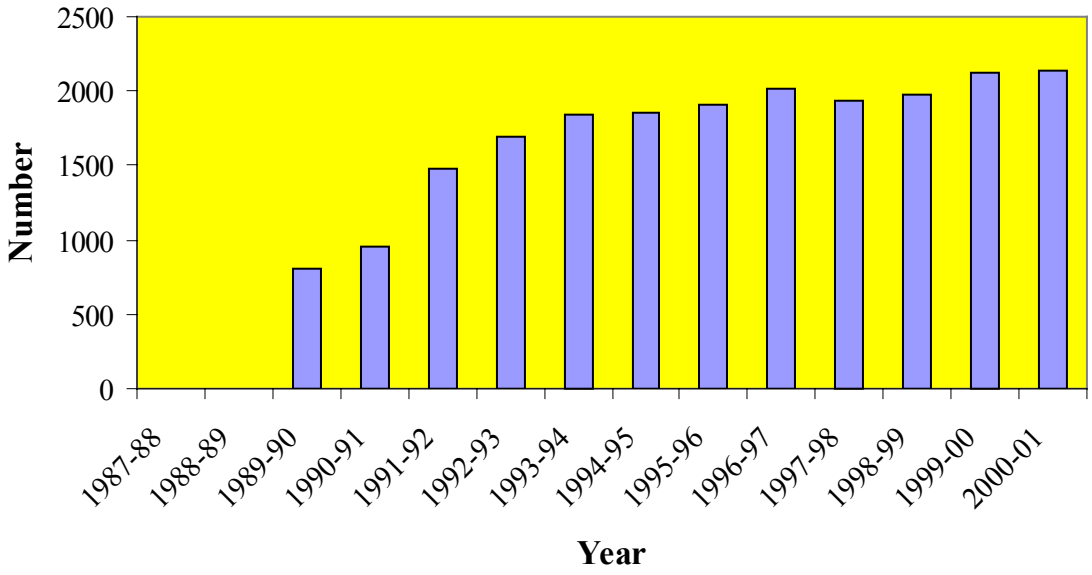

Figure 3. Number of private pharmacies class I, II and III in Lao PDR 1988-2001

Licensing systems vary from country to country. In many countries, priority has been given to qualified pharmacists running pharmacies in order to take charge of the pharmacy services and ensure quality of care is delivered to its patients (Farris and Kirking, 1993; Schondelmeyer, 1982). In Lao PDR, retired pharmacists, nurses or health workers who have worked for the government for at least five years, can apply to run any of class I, II or III pharmacies (Stenson *et al*., 1997). Unofficially, it is also possible to own more than one pharmacy, of which the owner's name need not be known to the authorities. This situation is similar in India, where drug regulations require pharmacies to have a qualified pharmacist in order to be granted a licence. However, in reality, businesspersons can own many pharmacies by paying for the services of qualified pharmacists on a part-time basis (Kamat and Nichter, 1998).

In the 1988 pharmacy regulation, there was no requirement for the standard of pharmacy resulting in poor pharmacy premises, which differ greatly from place to place, depending on the economics of the owners. Figure 4 shows a pharmacy in the city and Figure 5 a pharmacy in the rural area. Most of the private pharmacies are located close to crowded places e.g., markets, bus stations or hospitals. The opening and closing time is approximately 7 am. to 8 pm., after this time, in emergencies drugs can also be dispensed. The owners and their family usually live in the pharmacies, so that family members can assist in dispensing the drugs. It is not common that they hire another person, except for the licensee in the case that the owners do not have any qualification to run a pharmacy. The hired licensee person is seldom present at the pharmacy.

Figure 4. A private pharmacy in the urban area of the Savannakhet province

In theory and by regulation in Lao PDR, Class I pharmacies are allowed to dispense 311 chemical entities, class II 230 and class III 58. The chemical entities for each class of pharmacies are listed in INN. One chemical entity can have many different brand names. So far, there is no existing list of drugs with both INN and brand names for each class of pharmacies. There has been no limit for the volume of drugs as well as all kinds of different brand name drugs. In reality, class III pharmacies are dispensing drugs in the same way as class I, that is, one can find 311 different entities in both (Stenson *et al*., 1997).

The right sources for purchasing drugs for private pharmacies should be licensed drug companies and factories, which are controlled by FDD. In practice, private pharmacies can also buy any type of drug and at any amount from any wholesalers or other sources e.g., traffickers and other drug traders, where there is no guarantee in quality. In theory, only good quality, safe, efficacious drugs should be available to the public and the private sector. In reality, this is far from the actual

practice because the private sector cannot, as of yet, be controlled. In addition, unregistered drugs are reported to be available for sale in private pharmacies (Food and Drug Department, 2001c). There is continuous smuggling of drugs from neighbouring countries. It is estimated that about 3,000 items of drugs in INN and brand names are available on the Lao market. However, only approximately 1,600 items of drugs have been registered (Food and Drug Department, 2001b). As for comparison, in Sweden, in 2001 there were approximately 5,068 registered pharmaceutical preparations (The Swedish Association of the Pharmaceutical Industry, 2001).

Figure 5. A private pharmacy in the rural area of the Savannakhet province

2.4.11 Drug utilisation

In Lao PDR, the rational use of drugs (RUD) is one of the most important elements of the NDP (Paphassarang *et al*., 1995), according to the Ministry of Health, the Consumer Protection Programme as well as the Sida supported NDPP of the Food and Drug Department. According to the concept of RUD, to be able to achieve the rational use of drugs, the interrelationship between medical doctors/prescribers, pharmacists/dispensers and consumers should be considered. In theory, medical doctors should ensure the right diagnosis of diseases, and effective and safe prescription according to the Standard Treatment Guideline, which is acceptable to the patient. Pharmacists/dispensers should know and consider the concepts of good quality, efficacy, safe and cost consideration as criteria for drug selection. Pharmacists should provide relevant, accurate and clear information regarding the dispensed medicine(s), label drugs adequately, and monitor their use. Consumers should comply with the treatment/prescription if correct, however financial constraints and the lack of information prohibits consumers from making the most rational and cost-effective decisions. As shown by two household surveys (NIOPH and ADB) self-medication

via pharmacies is the norm in Laos (National Institute of Public Health, 2001). The role of drug sellers in selecting appropriate drugs and drug information is thus of considerable importance. Poorly trained drug sellers both "prescribe" and dispense drugs with their dual roles, a professional role and a business role (Cederlöf and Tomson, 1995), they may maximise the sale of costly and effective drugs and also dispense less useful drugs that generate high profits. So far, there has been no Pharmacy Treatment Guideline developed for drug sellers.

For RUD, some activities without a direct link to pharmacists have been implemented through the NDP programme during 1996 to 2000. One important example is the development of Standard Treatment Guidelines (STGs) for improving the prescribing practices of doctors, and increasing training about their use, together with the development of STG and RUD indicators, by the Department of Curative Medicine (Johansson, 1995). The first STG covers the seven most common diseases (malaria, diarrhoea, parasites, pneumonia, dengue fever, tuberculosis and leprosy) and the second STG includes emergency in surgery, gynaecology-obstetrics and internal medicines. The Drug Therapeutic Committee (DTC) as a monitoring system has been introduced at all central and provincial hospitals, using STG and RUD indicators to measure the quality of treatment and the rational use of drugs in prescribing. This system has been well established in Sweden for the last three decades (Sjöqvist and Boethius, 1986). One HSR project experimented with STGs to improve treatment practices of malaria, diarrhoea and pneumonia, at 24 departments in eight provincial hospitals in Laos, significant improvements were shown in the intervention hospitals (Wahlström *et al*., 2002). Information on RUD to lay people through the mass media has also been implemented through the NDPP.

3. Conceptual framework

3.1 Health Systems Research (HSR) applied to pharmacy services

"The focus of HSR is ultimately concerned with improving the health of a community, by enhancing the efficiency and effectiveness of the health system as an integral part of the overall process of socioeconomic development" (Varkevisser *et al*., 1991). According to the WHO definition, *"a health system includes all activities whose primary purpose is to promote, restore or maintain health"* (WHO, 2000). The aim of HSR is to provide health managers at all levels, as well as community leaders, with the relevant information they need to make decisions about the problems they are facing (Varkevisser *et al*., 1991). The main characteristics of HSR should focus on priority problems in health care, should be action-oriented, require multidisciplinary approaches and should focus to a large extent on low cost studies that can be undertaken by management and service personnel in the courses of daily activities (Varkevisser *et al*., 1991). Health Systems Research has been applied to study drug utilisation in society (Tomson, 1990), and pharmacy practice (Chuc, 2002).

The conceptual framework of this thesis is related to the focus of HSR and the primary focus is on the delivery of health care services by private pharmacy staff in terms of supplying medicine, promoting patient self-care and improving prescribing/dispensing practices and medicine use, all aimed at improving the health of Lao people. In light of the above definitions, the thesis presented

here can be classified as health systems research focused on pharmacy performance in health care delivery.

Although HSR has only recently been introduced in Laos, its main characteristics have been applied. This study involved policy makers from central level FDD, MoH, provincial and district FDU levels, from the very start. Problems related to pharmaceutical area were discussed thoroughly and prioritised according to the resources available in the country. The research objectives were developed aiming at developing solutions and solving problems. Each step and procedure in research implementation was followed by the policy makers at each level. Findings from the study were first reported to the policy makers and then disseminated to all related health professionals, pharmacists and drug sellers. Recommendations for improvement have been considered and prioritised to put into practice.

3.2 Factors and strategies to improve pharmacy behaviour

Four major factors that could affect the "prescribing" behaviour of drug sellers were identified (Goel *et al*., 1996): pharmacy factors, client expectations, physician practice and local regulatory factors.

Pharmacy factors: In many developing countries, the number of pharmacists is very low resulting in licensing to non-pharmacists who have little or no pharmacy training. In addition, they usually receive more information from drug company salespersons than from the drug regulatory authority. Among pharmacy staff, profit is likely to be a motivating factor in product recommendations. The location of the pharmacy with respect to the socio-economic status and the type of district (urban/rural) may also affect pharmacy behaviour (Goel *et al*., 1996).

Client expectations: Client demands for particular drugs may be affected by knowledge about their illness or the expected efficacy of the product (Goel *et al*., 1996). Pharmacy sellers usually comply with the clients' demands and rarely provide adequate advice to the clients (Ferraz *et al*., 1996).

Physician practice: Pharmacies function in a medical context in some countries dominated by physicians. The presence of medical malpractice could also influence the drug sellers' behaviour (Goel *et al*., 1996). The physicians' prescribing practice seemed to be more related to agreement with social expectation and the caretakers' perception of the physicians' role than they were to the standard biomedical of disease management (Paredes *et al*., 1996).

Local regulatory factors: Regulatory factors such as the number and types of drugs, banning of certain useless drugs, education requirements and control of profit margins, can influence pharmacy behaviour (Goel *et al*., 1996).

These factors can be classified into demand-side factors through the action of the clients/customers, and supply-side factors, which influence the drug sellers' behaviour (Cederlöf and Tomson, 1995):

Demand-side factors: Social and cultural attitudes, surroundings i.e. relatives, friends, neighbours, information from pharmacists, myths e.g. *"foreign drugs are better", "injections are better than pills", "expensive drugs are better than cheap drugs"*, promotion from the drug industry, economy, symptom, age, sex and religion.

Supply-side factors: Economic incentives e.g., an incentive to maximise the number of effective and expensive drugs sold instead of giving advice to minimise the number of drugs or choose the

less expensive drugs, demand from customers, education and training of drug sellers, and national regulations including regulatory activity and enforcement of regulations.

Interrelationships between these factors can also be important determinants of private pharmacy behaviour. For example, drug sellers may be affected by client demand and physician practice and the influence of regulatory factors may vary with the location (Goel *et al*., 1996).

Four strategies for improving pharmacy behaviour have been proposed (Goel *et al*., 1996): information alone, persuasion, incentives and coercion. (i) *Information alone* strategy: provides a necessary input into the decision making process. This strategy is easy to implement with low cost, changed physicians' behaviour in a developing country study, however, it was found to be weak in developed countries. (ii) *Persuasion* strategy: seeks to change behaviour in such a way that the pharmacy staff is motivated to select an appropriate treatment option through communication. (iii) *Incentive* strategy: increasing the profitability of socially desirable products. Requires inputs, which may be difficult to obtain in developing countries. (iv) *Coercion:* banning certain drugs which are not useful or are unsafe e.g., antidiarrheals; they may also create the unnecessary use of other drugs.

General intervention strategies have been classified into three categories (Quick *et al*., 1991): (i) *Educational strategies* based on changing drug use pattern through information and persuasion, (ii) *Managerial strategies* try to influence usage by better structuring the decision-making process e.g., use of standard treatment guidelines, effective package labelling, and (iii) *Regulatory strategies* based on restricting provider and consumer decisions e.g., banning unsafe drugs or required consultation. This classification was adapted in a review of the intervention research of the rational use of drugs (Le Grand *et al*., 1999).

Educational interventions are the most commonly used strategy (Le Grand *et al*., 1999) for both prescribers and consumers in developing and developed countries to promote the rational prescribing and use of drugs. There are different educational materials used e.g., STGs, bulletins, newsletters, printed information as well as different ways of using these materials e.g., face-to-face education, seminars or workshops, FGDs, peer review and in-service training/supervision. In Indonesia, both a small group of face-to-face intervention and a formal seminar for prescribers using written information to improve the use of drugs for acute diarrhoea showed a significant reduction in antidiarrhoeal usage (Santoso *et al*., 1996). Controlled trials to determine the efficacy of face-to-face education for drug sellers in Kenya and Indonesia using a training guide had a significant short-term improvement (Ross-Degnan *et al*., 1996). Other randomised trial educational intervention studies showing positive effects were carried out in Sweden (Lundborg *et al*., 1999b; Wahlström *et al*., 1997).

Managerial interventions usually provide tools for improving the decision-making process in drug selection, procurement, distribution, prescribing and dispensing (Quick *et al*., 1991). The concept of EDL has been widely adopted, but implementation is difficult. Introduction of an EDL is most effective if accompanied by an introductory campaign and adequate monitoring (Hogerzeil, 1995). Few evaluations exist of the impact of an EDL (Le Grand *et al*., 1999). Essential drug kits have been introduced in many developing counties, but have not been well investigated. Clear

labelling of drugs is known to be a problem, but no completed evaluation studies have been conducted on package labelling (Le Grand *et al*., 1999).

Regulatory interventions are another approach for improved prescribing behaviour (Brugha and Zwi, 1998; Goel *et al*., 1996; Le Grand *et al*., 1999; Quick *et al*., 1991). There are a few studies regarding regulatory interventions for improving practice in private pharmacies in developing countries (Brugha and Zwi, 1998; Hongoro and Kumaranayake, 2000; Kumaranayake, 1997).

In the thesis, according to the above classification, the intervention package (II) falls into the regulatory category, but also contains some aspects of educational and managerial strategies. The reason for selecting this type of intervention was to improve the quality of service of private drug sellers through regulatory means while testing whether the existing regulatory activities had any impact on the quality of service. It is important to develop the mechanism for enforcement of regulations and to assess its effects. It is also essential to develop a realistic intervention to test the effectiveness of regulation in a real world setting, one which would, in principle, be feasible to extend throughout Laos as a whole.

3.3 Quality of pharmacy services

Pharmacy services are part of public health services and medical care. The assessment of quality must rest on a conceptual and operational definition of what the "quality of medical care" means. Many problems are present at this fundamental level, for the quality of care is a remarkably difficult notion to define (Donabedian, 1966). According to Donabedian, *"the definition of quality may be almost anything anyone wishes it to be, although it is, ordinarily, a reflection of values and goals current in the medical care system and in the larger society of which it is a part"*.

To measure the quality of pharmacy services, WHO adopted a Good Pharmacy Practice (GPP) document in 1996 (WHO, 1996a). According to this document, the core of pharmacy activity or the process of care includes the supply of medication, the provision of appropriate information and advice to the patient on the appropriate use of medicines and the monitoring of the effects of their use. Comparing this core activity to the role of pharmacists/drug sellers in relation to RUD, there is a strong linkage, as all core activities are already included in the role of pharmacists and RUD requirements.

No study on the assessment of quality of services of public and private pharmacies in Lao PDR has been carried out before this project was started, and there was no clear definition of what is meant by "quality of services". FDD, the central drug regulatory agency, recently adopted the 10 indicators for pharmacy inspection developed in the Sida funded NDP project for monitoring the practice of pharmacies, as well as their quality of services (see below). So far, there has been no systematic monitoring or assessment of the private pharmacy practice. This is partly due to the weakness of drug regulatory authorities at different levels, lack of skilled and capable inspectors and limited resources for implementation (Bennett *et al*., 1994; Kumaranayake, 1997). Priority has been given to private pharmacies due to their recorded problems and their abundance. Pharmacies should serve society according to the goal *"health for all"* of the Ministry of Health: *"follow the drug regulations strictly, supply only safe, good quality efficient drugs, have a good relationship with customers and provide them with sufficient information on drug use"*. In

practice, it seems to be far from the set theory, as private pharmacies cannot yet be controlled or monitored.

3.4 Quality of Drugs

Standards for "quality" of drugs, according to the World Health Organization (WHO, 1997b), require that a drug product is efficacious without too severe side effects, and that it contains the quantity of active ingredient(s) claimed on its label within the accepted limits of its specification. It also means that the drug product should maintain its appearance, potency and therapeutic availability until its claimed shelf-life expiry. Unless drugs meet these requirements, they may cause negative clinical effects, which are clearly detrimental to health as well as to the financial circumstances of the patients. Bacterial resistance may occur with the use of low quality antibiotics, resulting in therapeutic failure (Okeke *et al*., 1999).

The high prevalence of low-drug quality at private pharmacies in Lao PDR has been reported, in which 46% of 366 drug samples were found to be substandard (Stenson *et al*., 1998). Furthermore, a recent study in Southeast Asia reported that 38% (3 of 8 samples) of sampled drugs labelled as artesunate from Laos did not contain artesunate (Newton *et al*., 2001).

However, the concept "quality of drugs" may be abstract and difficult to grasp both for health professionals and lay people. To a well educated medical-pharmacological professional, drug quality is most likely to be understood as defined by the WHO, mentioned above, but lay people might describe it differently. A study in Guinea by Haddad showed that lay people perceived the quality of drugs by their efficacy (Haddad *et al*., 1998). How lay people in Lao PDR perceive quality of drugs has not been properly investigated. Are people aware of the fact that drugs can be of good or bad quality? As the quality of drugs is the major area to be regulated in Lao PDR (Newton *et al*., 2001; Stenson *et al*., 1998), the knowledge, understanding and perceptions of the consumers are important in order to support evidence-based decision making for improved drug use and quality.

3.5 Pharmacy inspections and indicator development

Inspection is part of the quality assurance scheme as well as regulatory enforcement control to ensure that drugs available in the market are safe, efficacious and of good quality. Inspection includes: factory (production) inspection or GMP inspection, company or wholesaler (import/export) inspection and pharmacy inspection. Inspection is important as it enables drug regulatory authorities to monitor whether pharmaceutical operations are carried out in accordance with approved standards and guidelines. Weaknesses and actual errors in drug production, quality control, storage and distribution of drugs can be discovered. In order to perform these duties, inspectors should be assigned the necessary legal powers. They should also be suitably qualified and free from conflicts of interest and political pressure (Ratanawijitrasin and Wondemagegnehu, 2002). To carry out a good inspection, inspectors should have adequate knowledge and theory on how to handle inspections, e.g., a manual for inspection, standards and regulations. Specific qualifications as required by WHO, should be followed (WHO, 1999c).

The inspectors at FDD have a specific power to carry out an inspection at any pharmaceutical sites in the whole country. They carry an inspection card signed by the Health Minister. The provincial and district inspectors can perform inspection normally in their province and district (see 2.4.5.3). The effectiveness of pharmacy inspection may not only depend on the knowledge, competence and abilities of inspectors in carrying out inspections, but also on their power, ethics and moralities, which so far cannot be monitored or assessed.

The inspection division at FDD is the main coordinating unit for the development of the tool and guideline for pharmacy inspection including the development of 10 indicators for pharmacy inspection (Box 1). The development has been technically supported by the Medical Products Agency of Sweden. The manual and indicators have increasingly being used countrywide since 1995-96. Previously, there was no existing guideline for inspectors, therefore pharmacy inspections were not carried out on a regular basis.

Box 1. The 10 indicators for pharmacy inspection in Lao PDR

1. The order in the pharmacy
2. Absence of banned drugs
3. Availability of ED with INN and correct labelling
4. Quality of drugs and date of expiry
5. The correct bill
6. Drug dispensing
7. Knowledge of drug sellers on malarial and diarrhoeal drugs
8. Prescriptions for antibiotics
9. Availability of Essential Materials for good dispensing practices
10. Presence of technical staff

The development of indicators was initiated in the first phase of NDPP, in 1993. The choice of indicators was based on some criteria such as relevance, which is an important pharmacy problem and will affect health measurability if the indicators are practicable and reliable. The selection of each indicator was based on the real problem and the every day situations encountered in the pharmacies. In the Lao context, this accounted for the poor management and disorder in pharmacies including inappropriate storage of drugs, poor cleanliness, low availability of ED, the presence of banned and expired drugs, illegal purchasing of drugs, poor dispensing and the lack of knowledge about dispensing drugs for common diseases, among others.

An indicator may score from 0 (bad) to 10 (very good). The indicators have been tested for applicability and reliability. They have become a tool for inspectors and been used in the regular inspection of private pharmacies throughout the country (Johansson and Surén, 1998). Although the indicators do not cover all aspects of GPP, they cover the most important parts and indicate areas, which should be emphasised (Johansson and Surén, 1998). Facility indicators, management and drug supply indicators as well as indicators on the knowledge of drug sellers have been included in the document. The author of this thesis was involved in the whole process of the development of these indicators from 1993-1995.

Indicators are also to be used when the situation improves; it is possible to "sharpen" the criteria to improve even more. It is estimated that not many countries in the world have developed similar indicators for use in regular inspection in private pharmacies (Personal communication with Dr Gosta Surén, senior inspector at Medical Products Agency, Sweden). Most countries have their own rules and guidelines which are used for pharmacy inspection. WHO has also introduced a guideline on inspection of drug distribution channels including the inspection checklist for retail and hospital pharmacies (WHO, 1999c) which can be applied into the inspection performance in each country. The study in 12 developing countries (Hogerzeil *et al*., 1993) used the drug use indicators to monitor the use of drugs in public health facilities according to the WHO guideline (WHO, 1993). Some drug use indicators were recommended in a drug utilisation study in Sri Lanka (Tomson, 1990).

4. Rationale of the study

The fact that national household survey showed how dominating seeking care directly at private pharmacies in Lao PDR has become supports the rational for the study. Another is that pharmacy behaviour and the irrational use of drugs including poor quality of drugs have become a major problem in many countries, not only in low-income countries but also in industrialised countries (Allan *et al*., 1995; Chuc and Tomson, 1999; Goel *et al*., 1996; Hassell *et al*., 1998; Kamat and Nichter, 1998; Menkes, 1997; Roy, 1994; Shakoor *et al*., 1997; Trostle, 1996; WHO, 1999a). Efforts have been made to improve the situation in low-income countries through different strategies by national and international groups such as the International Network for Rational Use of Drugs (INRUD) and WHO's Action Programme on Essential Drugs and Vaccines (DAP) (Quick *et al*., 1991). The World Health Organization's guidelines on the role of pharmacists in self-care and self-medication (WHO, 1998), the monitoring of the use of drugs in health facilities (WHO, 1993), and measuring the quality of pharmacy practice (WHO, 1996a) are very important for the pharmaceutical area, mainly in developing countries. Different countries may face different problems in pharmaceutical policy and drug use. So far, there has been no gold standard for each country to measure and improve pharmacy services. Every country has to develop its own guidelines and strategies to improve and monitor the services according to the national needs.

So far, in Lao PDR little has been known about the quality of services in both public and private pharmacies. No previous study on pharmacy practices, drug quality, perceptions and practices of drug sellers and community members has been carried out nor any assessment study on the effectiveness of pharmacy regulation. Many new activities were carried out as part of the NDPP and more evidence was needed to guide the policy implementation.

Some questions needed to be answered:

1. What is the current situation of pharmacy practice in Lao PDR?
2. To what extent do the private pharmacies comply with the Good Pharmacy Practice including the rational use of drugs?
3. Are there quality differences between the public pharmacy services and the private ones?
4. What is the situation of drug quality in Lao PDR?
5. Are people aware about the situation with substandard drugs and insufficient knowledge of drug sellers?

6. Is there any impact of government regulation with respect to the improvement of pharmacy practice and quality of drugs in Lao PDR?

5. Objectives

5.1 General objective of the study

To study the pharmacy practices in the Savannakhet province, including drug quality, knowledge of drug sellers and community members, and the effectiveness of government regulations.

5.2 Specific objectives

1. To describe the quality of private pharmacy practice (I)
2. To assess the impact on the quality of private pharmacy services of actively enforced regulatory intervention (II)
3. To study and compare the practices of public and private pharmacies, in relation to some aspects of Good Pharmacy Practice and Rational Use of Drugs (III)
4. To assess the pharmaceutical quality of a number of sampled essential drugs in 1997 and 1999 (IV)
5. To explore the knowledge and perceptions about the quality of drugs among drug sellers, customers and community members (V)

6. Materials and methods

6.1 Study area

All studies were carried out in the Savannakhet province, which was selected because it is a large province and a pilot province of the Sida supported NDPP, since 1996. The Savannakhet province (Figure 6) has an area of 22,000 square kilometres and a population of 672,000 in 1995 (15% of the entire country).

There are 13* districts and 1,600 villages. The average literacy rate in Savannakhet is 56%. The rate varies from 17% in a remote and poor district to 77% in an urban, rich district. The health system in the Savannakhet province consists of one provincial hospital, 13 district hospitals, 26 health centres and 21 private clinics and about 1,000 health personnel, of which 64% are high level, 44% middle level and 36% low level staff (Food and Drug Unit, 1999; Ministry of Health, 2000b).

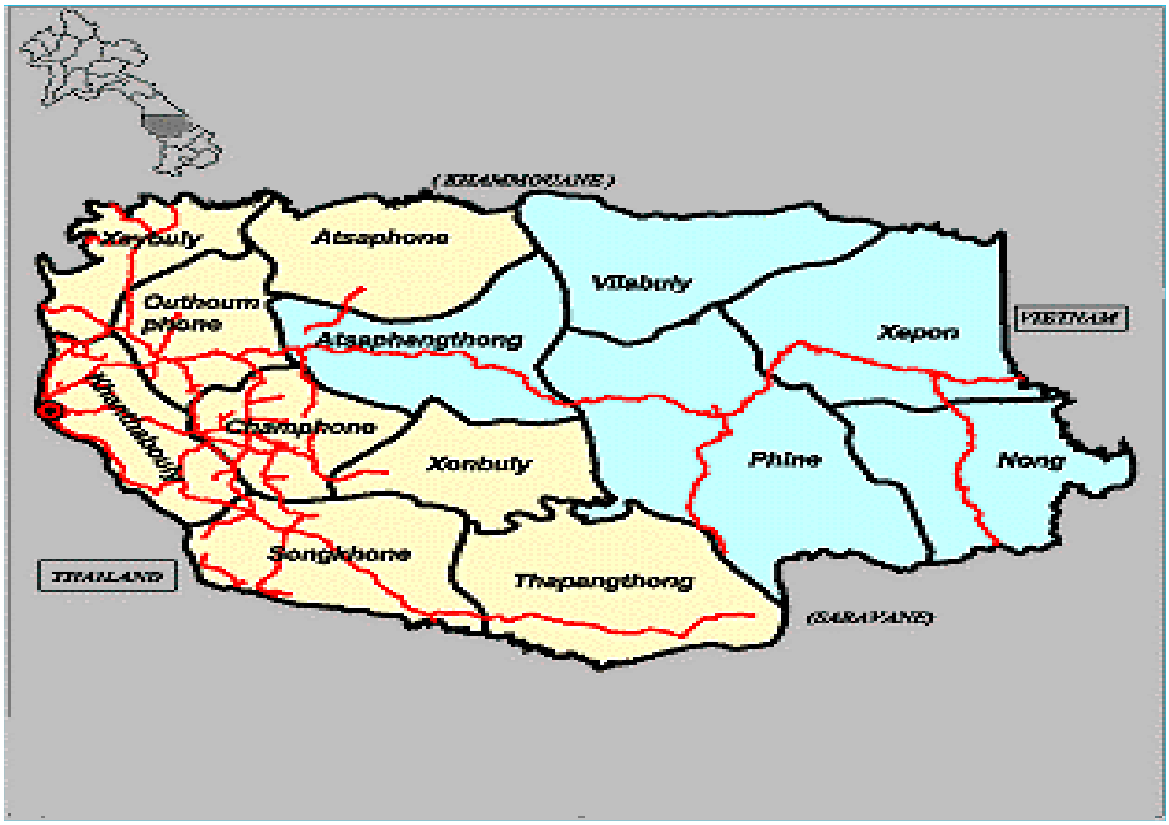

Figure 6. A map of Savannakhet

There are 214 licensed private pharmacies and 14 public pharmacies at each of the hospitals. Of the 214 licensed private pharmacies, there is one class I pharmacy, two class II, and 211 class III pharmacies. The number of unlicensed drug stores is unknown as well as whether drug peddlers still exist. However, as in contrast to many African settings (Krause *et al*., 1998) after the shift in

* One district namely Khanthabuly, which is the provincial capital of Savannakhet, was divided into two, north and south districts, for the purpose of the research project. Thus, the total number of districts for the study was 14.

economic policy in Laos in 1986, the informal sector has become smaller as the government facilitated the formalisation of informal business (see also 2.3.3).

6.2 Study designs

Figure 7 shows the design of the five studies. Studies I, III, and V were cross sectional. Study II was a randomised controlled trial and study IV was pre-experimental.

Study I is the baseline study, study II is the comparison of the baseline data with the post-intervention measurements in the active and the regular intervention pharmacies with seven districts in each arm. Study III used the same material as the post-intervention study but included the public pharmacies in the analysis. Study IV is the analysis of drug samples from the baseline and post-intervention data collections. Study V was conducted in the seven regular intervention districts after the post-intervention data collection.

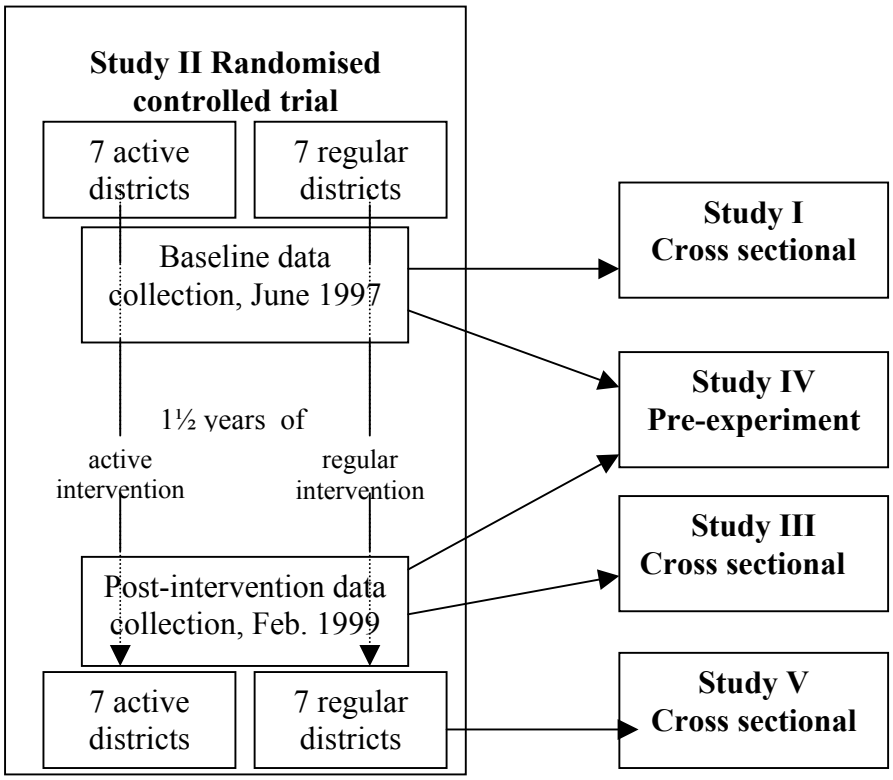

Figure 7. Study design

6.3 Sample size, sampling and methods

6.3.1 Some theories on data collection methods used in the studies (I, II, III, IV, V)

A structured interview is a questionnaire read by the interviewer as prescribed by the researcher. This instrument does not allow freedom to adjust any of its elements, such as content, wording or order of the questionnaire. The interview is based on the schedule, and strict adherence to the questions and the instructions is paramount (Sarantakos, 1998). This technique was used in

studies I, II, III, and V to obtain background characteristics of drug sellers and customers on pharmacy practice and purchased drugs.

Unstructured interviews have no strict procedures to follow as structured interviews. There are no restrictions in the wording of the questions, the order of questions or the interview schedule. The interviewer acts freely in this context, based on certain research points, formulating questions as and when required and employing neutral probing. The structure of this interview is flexible and the restriction minimal, being presented in most cases in the form of guides rather than rules. This type of interview is mostly used in qualitative research (Sarantakos, 1998).

Semi-structured interviews lie between structured and unstructured interviews. They contain elements of both structured and unstructured interviews. The degree to which interviews are structured depends on the research topic and purpose, resources, methodological standards and preferences, and the type of information sought, which are determined by the research objective (Sarantakos, 1998). This technique was used to interview the customers in studies I, II, III, and V, to obtain information on purchased drugs and perceptions of drug quality and use.

Focus Group Discussions (FGDs) have a wide application in the field of behavioural research (Murphy *et al*., 1992). FGDs explore a predefined topic, yet are open and flexible, thus allowing intensive exploration of opinions, feelings, attitudes and behaviours not possible through quantitative methods. Focus group data can provide additional insight into the motives and reasons for reported attitudes and behaviours. In qualitative research, sources of data include unstructured interviews, observations and documents (Côté-Arsenault and Morrisson-Beedy, 1999). The interviews may be conducted with individuals or in groups (Wright and McKeever, 2002). FGDs were used in study V to explore the knowledge and perceptions about drug quality among drug sellers and consumers.

6.3.2 Sample size, sampling and methods for studies I, II, & III

The 214 licensed private pharmacies and 14 public pharmacies constitute the study population. In the districts where there were ten or less pharmacies, all pharmacies were selected and in those districts with a higher number, ten were randomly selected by picking a sheet of paper with the name of the pharmacy from a box. This procedure resulted in a sample of 115 pharmacies. It was estimated that a sample of this size would have about 80% power to detect changes in the quality indicators of 10% between the intervention and control groups with a significance level of 5%. All 14 public pharmacies were selected for the studies I, II, III, but this thesis only reports data from them in study III.

The 14 districts were matched in pairs (II) according to socio-economic criteria such as income level and literacy (appendix 1). Thereafter the districts were assigned to “active” or “regular” intervention from each pair by random selection procedures (II). The names of the two districts in each pair were written on identical squares of paper and drawn from a box.

The baseline data collection (I, II) was carried out in June of 1997 and the post-intervention data collection (II, III) was conducted in February of 1999, after a year and a half intervention. One district of the seven regular intervention districts with three pharmacies had to be left out, as the

road was impassable. The research team visited 106 pharmacies for the baseline (I, II) and 92 pharmacies for the post-intervention study (II, III).

The methods used were:

- Structured interviews with the drug sellers (appendix 2)
- Indicator surveys of the pharmacies (appendix 3)
- Semi-structured exit interviews with customers outside the pharmacies (appendix 2)
- Inspection of drug purchases (appendix 2)
- Recording of prices of drug samples (appendix 2)
- Structured interviews with the district drug inspectors (appendix 2)

The data collection methods used for studies I, II, III were the same but the analysis of each study was different depending on the specific objectives of each study.

In each pharmacy, a structured interview was conducted with the drug seller. After the interview, the pharmacy was inspected by using three out of the ten indicators developed by the FDD for regular inspection. The three selected indicators were named 'facility indicators'. The first indicator concerned the order of the pharmacy (order), including whether there were any advertisements, whether drugs were kept away from sunlight, whether they were kept in good order and in their original container and assessing the cleanliness. The second indicator concerned the availability of 10 specific essential drugs (ED), and the third measured to what extent the pharmacy possessed essential materials for dispensing (EM) (see appendix 3). The first ten customers who appeared in each pharmacy during the inspection were interviewed upon their exit. The drug-specific data was obtained from the inspection of each drug purchase in combination with the information provided by the customers.

The data on dispensing related to the drugs bought by the interviewed customers was collected. The data was called 'dispensing indicators' (I, II) or 'patient-care indicators' in study III, which concerned the oral information given to customer regarding each purchased drug (information), the packaging and labelling of the drugs (labelling) and whether different drugs were mixed in the same package (mixing).

The data on prescribing or 'prescribing indicators' was also obtained from the inspection and recording of drug purchases. The indicators related the average number of drug purchased per customer/ per encounter, the percentage of antibiotics, ED, INNs and injections.

6.3.3 Sample size, sampling and methods for study IV

The drug samples in this study (IV) were collected from the same pharmacies as in studies I and II. Four drugs (ampicillin, tetracycline, chloroquine and acetylsalicylic acid) were selected as tracers for drug quality based on their importance judged in relation to their common use because of the burden of diseases in Laos as well as their inclusion in the national Essential Drug List. The detailed selection criterion is presented in Table 7.

In each pharmacy and for each of the four drugs available, the research assistant bought 'a sample' without explaining the purpose. The sample consisted of 30 tablets or capsules taken

from a selected container. The container selection was made by: (i) asking the seller to show all available containers (usually less than five for each drug) in order to choose; (ii) counting the containers and picking one according to the last number of four bank notes (one for each drug) selected from the assistant's pocket; (iii) asking the seller to dispense 30 tablets from each selected container.

Methods

- Sampling of four drugs
- Analysis of drug samples

All samples from the pre- and post-intervention study were analysed at the Food and Drug Quality Control Centre (FDQCC) in Vientiane. The quality of work of the laboratory was investigated in an inter-laboratory test in 1996 using three analytical methods: High Performance Liquid Chromatography (HPLC), potentiometric titration and Ultraviolet spectrophotometry (UV). The results were tallied with those of other laboratories in Thailand and Sweden (Stenson *et al*., 1998).

Table 7: The criteria used for the selection of the four drug samples, ampicillin, tetracycline, chloroquine and ASA in the Savannakhet province in 1997 and 1999

Criteria for selection	Ampicillin	Tetracycline	Chloro-quine	ASA
Inclusion in the National Essential Drug List	✓	✓	✓	✓
Most commonly used drugs	✓	✓	✓	✓
Easily destroyed under unfavourable storage conditions		✓		✓
Potential toxicity in case of degradation		✓		
First line drugs for:				
- Pneumonia	✓			
- Sexually transmitted diseases		✓		
- Malaria			✓	
Have frequently been reported to have no active ingredient	✓	✓		

The drug samples in our study were tested in three ways, under the supervision of Björn Lindgren, Analysis Expert from the Medical Products Agency of Sweden: identity, assay (content of active component) and measurement of weight variation.

The identity was confirmed by Thin Layer Chromatography (TLC), UV or colour reactions in accordance with the different pharmacopoeias used. Titrimetric, UV and HPLC methods were used for assay. The assessments were made according to the specifications of the British (BP) and the United States pharmacopoeias (USP), except for weight variation where 10 instead of 20 tablets/capsules were used due to the limited number of tablets/capsules of each drug available in most of the pharmacies. As an ethical responsibility, the last tablets in stock were not taken.

The research team was well aware of the risk of reporting bias, i.e. lower quality drugs could be deliberately hidden. To minimise the risk of this bias, the drug sellers did not know if and when samples were bought for testing, minimising the opportunity to hide a substandard drug.

6.3.4 Sample size, sampling and methods for study V

As one of the aims of this study was to explore the knowledge of drug quality among drug sellers, to avoid the possible bias that drug sellers may have improved their knowledge as a result of the active intervention, only the non-intervention districts[♥] were selected for the study. All 145 private pharmacies in these districts constituted the study population, out of these, 63 were randomly selected, and constituted the study sample. The pharmacies were categorised into three different geographical areas, urban, rural and remote, according to the distance from the provincial headquarters.

The data collection was conducted in July 1999. The research team visited 59 (94%) out of 63 pharmacies (29 in the urban, 15 rural and 15 remote). Exit interviews were conducted with 278 customers (120 urban, 75 in the rural and 83 in the remote areas), who visited each pharmacy during a two-hour period.

Focus Group Discussions (FGDs) were carried out in the three selected geographical areas with 62 community members and 15 drug sellers. Six FGDs were conducted with community members in three districts representing urban, rural and remote areas. In each of three districts, two FGDs (one for men and one for women) were held in a purposefully selected village, with 7-12 participants (aged 30-50 years). The participants were selected from a list of all families in the village. Each participant was invited by the research team one day in advance. The selection criterion was that he/she should be able to make decisions in the family. The groups were relatively homogenous with respect to socio-economic status. Two FGDs were held with drug sellers (mixed women and men) in one urban and one remote district. The groups comprised of drug sellers who were owners or licensees of the pharmacy. All five drug sellers in the remote district and another 10 purposive selected drug sellers in the urban district were invited 2-3 days in advance and informed about the FGD.

Methods

Quantitative and qualitative methods were used for collecting data. This study was cross sectional, and was carried out by two methods:

- Structured interviews with the drug sellers and exit customers (appendix 4)
- Focus group discussions with community members and drug sellers (appendix 4)

In each pharmacy, both drug sellers and customers were interviewed. For the sake of convenience, those customers who appeared in each pharmacy during a two-hour period were interviewed. Six pharmacies had no customers at all during the time of the study. Exit interviews were made with 278 customers (120 from the urban, 75 from the rural and 83 from the remote area).

[♥] including six regular intervention districts that were reached and one newly established district namely Phalanexay, where there had neither been any intervention.

FGDs were conducted with drug sellers and community members to explore their views and perceptions on drug quality. An interview guide (appendix 4) was used covering the main themes in relation to what a good quality drug should entail.

Each FGD was conducted by the author of the thesis as moderator who was trained by Solveig Freudenthal, an anthropologist from IHCAR. Each session lasted about 1.5-2 hours. The venues for the discussions were carefully chosen in an effort to obtain a relaxed and open atmosphere. In the rural and remote settings, a place at the temple or a schoolyard was used while in the urban setting the village conference room was used.

The structured questionnaires to drug sellers and exit customers as well as the interview guide for FGDs were developed and pre-tested in the Vientiane province. The research team consisted of the author and two other pharmacists from the FDD of the Ministry of Health in Vientiane, plus one pharmacist and one assistant pharmacist from the Savannakhet Food and Drug Unit (FDU). We introduced ourselves as 'researchers' to the drug sellers and customers. The position and title of each team member remained unknown.

In this study the knowledge among drug sellers of *a good quality drug* was defined according to the four following criteria: i.) a drug with the correct label, ii.) registered with the Food and Drug Department, iii.) being tested and having passed the standard for quality by the Food and Drug Quality Control Centre, iv.) containing the right amount of active ingredients as mentioned on the label, within the accepted standard limits. A correct drug label is a label, which includes: name and strength of the drug, lot number, expiry date, instructions for use and the manufacturer's address. The scale of measurement for the knowledge of a good quality drug was categorised based on the above four aspects of a good quality drug.

Table 8 shows the summary of the study designs, methods and results from the data collection for all studies.

Table 8. Summary of study designs, data collection methods, sample size and data collection time

Studies	Study designs and data collection methods	Sample size	Time
I. Real world pharmacy: assessing the quality of private pharmacy practice in Lao PDR	Cross sectional Structured interviews with drug sellers, exit customers and inspectors Indicator surveys Inspection of drug purchases	106 private pharmacies/ drug sellers 420 exit customers 676 drugs purchased by customers	June 1997
II. Private pharmacy practice and regulation - A randomised trial in Lao PDR	Randomised controlled trial Structured interviews with drug sellers, exit customers and inspectors Indicator surveys Inspection of drug purchases	92 private pharmacies/ drug sellers 491 exit customers 706 drugs purchased by customers	June 1997 and February 1999
III. The quality of public and private pharmacy practices: a cross sectional study in the Savannakhet province, Lao PDR	Cross sectional Structured interviews with drug sellers and exit customers Indicator surveys Inspection of drug purchases	13/92 public/private pharmacies 85/491 public/private exit customers 204/706 drugs purchased by customers in the public/ private	February 1999
IV. The quality of drugs in private pharmacies in Lao PDR: A comparative study in 1997 and 1999	Pre-experimental Sampling of four Essential Drugs Analysis of drug samples	In 1997: 366 samples in 106 private pharmacies In 1999: 300 samples in 92 private pharmacies	June 1997 and February 1999
V. Exploring knowledge and perceptions of drug quality among drug sellers and consumers in Lao PDR	Cross sectional Structured interviews with drug sellers and exit customers Focus Group Discussions (FGDs)	59 private pharmacies 278 exit customers 2 FGDs with drug sellers, 6 FGDs with community members	July 1999

6.4 Intervention

The whole intervention is part of the National Drug Policy. It is based on the regulations issued by the Ministry of Health and implemented by the drug regulatory authority (DRA), FDD at the central level and its regular staff at the provincial and district levels in the Savannakhet province. It was categorised as a regulatory intervention, which included quality assurance system (QA) at FDD, DRA focussing on both improving drug quality and pharmacy services, regular intervention and active intervention aiming only at improving private pharmacy services. The detailed intervention packages are described below.

The regulatory intervention was implemented at two different levels with "higher intensity" in the "active" intervention districts and "lower intensity" in the "regular" intervention districts. The "regular" intervention package was implemented in a way and at a speed that would have taken place in the absence of this study (II). The aim is to allow the regular intervention follow its natural course. The "active" intervention package had the same legal basis and consisted of the same components, aiming at a higher intensity than in the regular package, with some additional activities. The "active" and "regular" intervention packages are illustrated in Figure 8.

6.4.1 Quality Assurance System of the NDPP at FDD, DRA

During the study period of 1997-1999, the central drug regulatory authority FDD, MoH, implemented a number of activities relating to a Quality Assurance (QA) system within the on-going NDPP, with a potential impact on drug quality (IV), as well as pharmacy services (II). This included (i) the development of Good Manufacturing Practice (GMP) regulation, (ii) the improvement of the drug registration system, including requirements for imported products, (iii) training on GMP, and 10 indicators for pharmacy inspections for the drug inspectors from the five pilot provinces, followed by GMP inspections in all factories and pharmacies, (iv) appropriate legal action was taken e.g., fines were imposed and products recalled, and (v) a 4WD pick up Toyota and 10 motorcycles were provided to the Savannakhet provincial and district FDU to strengthen the inspections in the province. It was suggested that the motorcycles be distributed only to the seven active intervention districts, but in reality, two out of six regular intervention districts also received one each.

6.4.2 Regular intervention package

A number of regulatory activities in relation to pharmacy services as part of the NDPP intervention had been carried out in the Savannakhet province since it became a NDPP province in 1996 before the fieldwork for the research started in 1997. This activity is called "regular intervention", which included:

(i) A number of pharmacy inspections per year (Inspections)
(ii) Information to drug sellers after each inspection (Information)
(iii) Distribution of some drug regulation documents (Documents)
(iv) Imposition of fines or seizure of banned or expired drugs (Sanctions)
(v) Training for district drug inspectors in pharmacy inspections using 10 indicators (Training)

According to the submitted annual work plan, inspection of private pharmacies in each district was to be performed 2-4 times a year, but in practice, few pharmacies had 4 inspections per year. According to the records at the district FDU, two was the average number of inspections per pharmacy per year. In some districts, no inspection was performed at all. Experiences showed that very little information was given to drug sellers in relation to each inspection, or if it was, the content of information was not specific to the particular points in need of improvements. The enforcement of regulation was generally weak, characterised by no sanctions performed in the case of violation against the regulation. The regulation documents and other information related to pharmacy and drugs from the central FDD were only found at the provincial FDU, and were rarely available at the private pharmacies. Weakness of regulation is well known in low-income

countries, reported to be largely due to a lack of resources and skilled staff (Bennett *et al*., 1994; Kumaranayake, 1997).

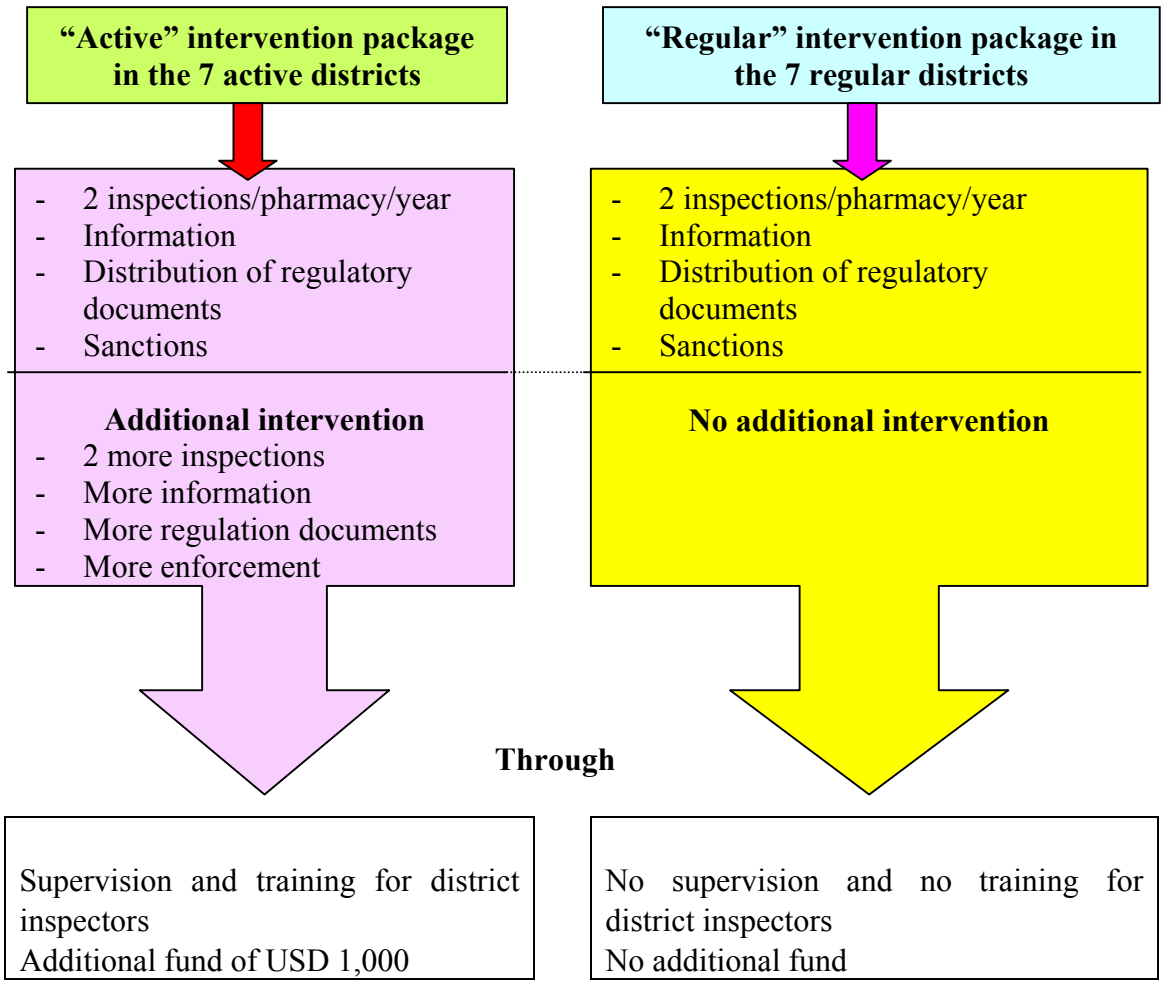

Figure 8. Differences between the regular and active intervention packages during the study period

6.4.3 Active intervention package

Based on the above information regarding regular intervention, and in collaboration with the FDD and FDU at the central and provincial level, the "active intervention" package (II) was designed to strengthen and improve the current NDPP intervention, in a way that was action-orientated and at a low cost, which are important characteristics of HSR (Varkevisser *et al*., 1991). An intervention that was affordable and possible to generalise nationally was needed. A major ambition was to adhere closely to the NDPP and the set of regulatory interventions that the MoH aimed to introduce in the whole country. The "active" intervention package (II) was comprised of:

1. Ensuring four high-quality inspections of each private pharmacy per year in accordance with the 10 indicator inspection in force (Inspections);

2. Using the inspections to provide information to the drug sellers about particular points needing improvement (Information);
3. Ensuring the supply of up-to date regulatory documents to private pharmacies (Documents);
4. Enforcement of regulations through the imposition of fines in cases where banned or expired drugs were found during inspections (Sanctions).

In addition, the active intervention package was actively promoted through intensified supervision (Supervision) and additional training (Training) for the district drug inspectors and an additional funding of USD 1,000 to ensure transportation and per diems for the district drug inspectors. The greatest possible effort was made to standardise the intervention in the active intervention districts.

It was estimated that the regular intervention package would have been implemented with lower intensity than the active. Only the seven "active" intervention districts were informed about the intervention. Two seminars were organised in early 1997 with the heads of the district health office and district inspectors from the seven "active" intervention districts to plan the intervention and to train them on the use of 10 indicators for pharmacy inspections, as well as to make them aware that higher intensity must be assured.

The implementation of the intervention was registered by the provincial FDU and was compiled, checked and crosschecked in a district profile for each district during the post-intervention study.

6.4.4 UNICEF pharmacist training project (Confounder)

During 1998-1999, the Ministry of Health, with assistance from UNICEF, implemented a pharmacist training project directed at the private drug sellers in all provinces. The aim was to increase their knowledge on correct standard treatment for acute respiratory infections, diarrhoea and malaria. One-day training sessions were organised with drug sellers in all districts in Savannakhet except one. A total of 170 of 194 pharmacies participated. In addition to the disease-specific information, the deputy provincial FDU held a lecture on good pharmacy practice (personal communication, Dr. Intong, UNICEF). This intervention was handled as an external influence of the type that occurs in real life situations where governments and agencies undertake a variety of projects with little or no coordination.

6.5 Measurements of outcomes

The attempt to measure the quality of pharmacy services is based on the concept of Good Pharmacy Practice as defined by the International Pharmaceutical Federation (International Pharmaceutical Federation (FIP), 1993) and endorsed by WHO (WHO, 1996a). As depicted in Table 9 the methods employed in the study try to measure three out of the four elements of GPP: (i) promotion of good health and avoidance of ill health and the achievement of health objectives, (ii) supply and use of medicines, (iii) self-care and (iv) influencing prescribing and medicine use. It was *not* possible to address the first element (i) related to activities associated with the promotion of good health and avoidance of ill health and the achievement of health objectives as this element is difficult to measure and is not an explicit component of the NDP and is not being promoted at present. The GPP document in itself is of a policy nature and has to be

operationalised in a national context. The combination of indicators used was chosen in order to generate as valid and reliable data as possible.

The quality of the services of a pharmacy in this thesis has been defined as 'the service provided by drug sellers in supplying medicine and patient self care and improving prescribing and medicine use' based on the GPP standard (WHO, 1985; WHO, 1996a). In this thesis, the level of quality is based on the level of score and percentages of the three types of indicators, facility, patient care and prescribing indicators (Table 9), covering the aspects of GPP and RUD to be used in the analysis. These indicators were developed for the purpose of the study to measure the quality of services in the pharmacies.

Three of the ten indicators, developed by the Food and Drug Department as part of the Sida-funded NDP project and used in regular inspections of pharmacies (Johansson and Surén, 1998) were selected for this study as facility indicators. Patient care (dispensing) and prescribing indicators were, in most cases, selected and adapted from existing WHO indicators (WHO, 1993).

Table 9. Indicators and their relationship to GPP elements

GPP-element method/indicator	Supply and use of medicines	Self-care	Influencing prescribing and medicine use
Facility indicators			
Order in the pharmacy	X		
Availability of ED	X	X	X
Availability of EM	X		
Patient care/dispensing indicators			
Information		X	X
Labelling		X	X
Mixing		X	X
Prescribing indicators			
Average no. of drugs	X	X	X
% of Antibiotic	X	X	X
% of ED prescribed	X	X	X
% of INN prescribed	X	X	X
% of Injection	X	X	X

The selected facility indicators, order in the pharmacy, availability of essential drugs and availability of essential materials are composite indicators. Each comprises of five to ten different components. Details of the selected indicators are presented in Appendix 3. The main contents of the three selected indicators are the following:

The order in the pharmacy indicator: There are five components to be checked:
1. Available advertising stickers for drug promotion
2. Drugs should be away from sunlight, high temperature and humidity
3. Maintaining good order

4. Drugs kept in their original container
5. Cleanliness

Availability of the 10 Essential Drugs with INN and correct labelling: the following 10 ED to be checked, for each up to five names (brand or generic), its INN and label should also be checked:
1. Acetyl Salicylic Acid, 2. Iron, 3. Ampicillin, 4. Chloroquine, 5. Co-trimoxazol, 6. Mebendazol, 7. Paracetamol, 8. Penicillin V, 9. Violet de Gentiane and 10. ORS. These drugs were selected according to the list of drugs for the revolving drug fund at the village level in Lao PDR.

Availability of some Essential Materials for good dispensing practices: The following 10 components are to be checked:
1. Hygienic counter, 2. Display cabinet in glass, 3. Refrigerator, 4. Regulation book, 5. Banned drug list, 6. Manual for ED use, 7. ED list for three classes of pharmacies and list of available drugs, 8. Packaging materials, 9. Facture book and 10. Monitoring book for pharmacy.

All ten indicators were used in the on-going NDPP inspections of pharmacies in the regular and active intervention districts. Among the remaining seven indicators (Box 1), three had contributed to the intervention activities (sanctions) e.g., indicator No.2 the existence of banned drugs, No.4 the existence of expired drugs, No.5 drugs without the correct bill, two were already included in the data collection method, e.g., indicator No.10 presence of technical staff included in the questionnaire as well as indicator No.6 drug dispensing. Only two not relevant to the study objectives, but were still checked during inspections as part of regular NDPP activities e.g., indicator No.7 knowledge of drug sellers of malarial and diarrhoeal drugs and No. 8 the use of prescriptions for antibiotics. They were not used in the study since the intervention did not include education on specific diseases nor antibiotic use.

6.6 Data analysis

The Epi Info programme (version 6.04) was used for data entry and analysis for all studies, in addition, SPSS version 9.0 was used for the analysis in study II. The author participated in the fieldwork and supervised and monitored the data collection of all studies to ensure quality of data. The data was coded and checked by the author for completeness; data cleaning and running frequencies to find mistakes before analysis were also conducted.

The unit of analysis was the pharmacy (I, II, III). Statistical analysis was undertaken to relate the quality of pharmacy services, as measured through the facility, patient care and prescribing indicators to the characteristics of drug sellers. Standard statistical methods were used to estimate proportions, means and correlations.

Indicator scores were calculated for each pharmacy. Dispensing data was aggregated to the pharmacy level by calculating a proportion of customers/drugs fulfilling the criteria indicated by each dispensing indicator. Except for study I, dispensing indicators were calculated based on a proportion of drugs with information, labelling and mixing/drugs in total.

In study II, dispensing indicator means for each pharmacy were weighed with the numbers of customers to give each pharmacy the appropriate importance. Comparisons of baseline means were made using ordinary t-tests for independent samples formulated as regression models with intervention as the independent variable. The comparisons between the pre- and post-intervention periods, for the active and regular intervention, respectively, were made using the differences. A regression model was used to evaluate the intervention impact. The dependent variables were the differences between the means of the pre- and post-intervention indicators. The independent variables were binary variables indicating regular or active intervention and the baseline indicator mean. The second variable was included since it must be suspected that the pre-post change depends on the initial level.

The differences between two proportions (IV) or mean values of the elements of the facility and patient care indicators (III) were tested at 95% CI. Epi Info Statcalc 2 by 2 tables were done to obtain the p-values. Statistical significance refers to either 95% CI not including zero or p-value <0.05.

All focus group discussions (V) were tape-recorded, thereafter transcribed and then translated into English. The transcriptions and translations were double-checked and carefully read by the authors. The data were organised by using two approaches for qualitative data analysis: (i) an inventory of points discussed, and (ii) margin coding (Bertrand *et al*., 1992). The data was then transferred into categories and coded on paper individually, in order to identify themes and patterns. Comparisons between male and female community members in urban, rural and remote areas were made in order to find out if there were any differences in perceptions among women and men as well as in relation to different geographical areas.

6.7 Ethical considerations

The project has been approved by the National Institute of Public Health and the Ministry of Health in Lao PDR, and has received ethical clearance by the ethics committee at the Karolinska Institutet: KI d nr 96-317, 1997-05-16. All drug regulatory authorities at central (FDD), provincial (FDU) and district (FDU) levels were informed about the study programme. Informed consent was obtained from the drug sellers, exit customers and community members. All agreed to participate.

7. Main findings

7.1 Assessing the quality of private pharmacy practice (Study I)

7.1.1 The educational background of drug sellers

All 106 private pharmacies visited in 1997 were class III, except one. The majority of drug sellers were low-level medical staff such as auxiliary nurses while only 15 had specific pharmacy training and only one was a fully trained pharmacist. The sex, age and educational background of drug sellers are presented in Table 10.

Table 10. Background characteristics of drug sellers at private pharmacies in Savannakhet

Characteristics	n=106	%
Sex		
Men	50	47.2
Women	56	52.8
Age (years)		
Mean	44.8	
Range	18-67	
Education		
Pharmacist	01	0.9
Assistant pharmacist	04	3.4
Low level pharmacist	10	9.4
Medical doctor	06	5.7
Medical assistant	21	19.8
Low level nurse	38	35.8
Other	26	24.5

7.1.2 Quality of pharmacy practices

The assessment of the quality of private pharmacy practices was made according to the two sets of indicators: facility and dispensing indicators:

Facility indicators: The average of the mean scores of the three indicators in all districts were for:

- Order indicator 5.7 range (2-9.5),
- Essential Drugs 5.9 range (1.3-9.0) and
- Essential Material 5.1 range (1.0-9.0).

There was a tendency of lower indicator scores in the more distant districts. However, the relationship between indicator scores and distance of the district from the provincial capital was not significant. There was a positive relationship between indicator scores and availability of regulatory documents. However, the correlation between the quality indicators and the drug sellers' knowledge of regulations was not statistically significant.

Dispensing indicators: The total number of customers was 420, of which 235 (56.0%) were women. They bought drugs for a small amount, range 50-8250 kips (USD 0.05-8.00), median 400 kips (USD 0.4). Almost half of the drugs (49.0%) were not sold in their original packages.
There was no information about drug use to the customer for 59.4% of the drugs sold. 47.3 % of the drugs dispensed had no label, and 26.2% of drugs were mixed with other drugs in the same bag.

7.1.3 The regulatory system

There was a list of licensed private pharmacies at the provincial level. Of the pharmacies selected from the list, 108 (94%) existed in reality. Those that did not exist had not yet opened or had moved to another district. In each district there was a district drug inspector. One was a trained pharmacist, four were assistant pharmacists, four were low-level pharmacists (pharmacy technicians) and the three remaining were medical assistants or nurses. Some regulatory activities had started in all districts, 1-4 rounds of inspections of private pharmacies had been carried out before the study based on the 10 indicators developed by the FDD. However, district drug inspectors were not familiar with the system, and the indicators were often found to be incorrectly calculated.

7.2 Private pharmacy practice and regulatory intervention (Study II)

All 106 private pharmacies in the baseline study (I) were included in the post-intervention study, but only 92 were reached in the later study (II). The 14 dropout pharmacies were excluded from the analysis. The reasons for missing pharmacies were mortality among drug sellers or the event that pharmacies had moved or closed for personal reasons. The analysis of the intervention impact is based on the 92 pharmacies (46 in regular intervention and 46 in active intervention districts) that were reached in both the baseline and post-intervention studies.

7.2.1 Differences between the active and regular intervention districts

Only small and not statistically significant differences existed between the active and regular intervention districts in 1997 before the intervention for the facility and dispensing indicators, indicating that the randomisation successfully dealt with inter-district differences.

7.2.2 Differences between the pre- and post-intervention

The comparisons of changes in the indicator values during the intervention period in the active and regular intervention districts are shown in Table 11. The pharmacies in the active intervention districts showed statistically significant improvement for three of the six indicators (order, essential materials and information). The pharmacies in the regular intervention districts also showed statistically significant improvement for three of the six indicators (order, essential materials and mixing). The differences of the means of these indicators from pre- to post-intervention differed statistically significant between the active and regular intervention districts only for one indicator (essential materials) (Table 12). For the labelling indicator there was no change in the active intervention districts and a deterioration in the regular intervention districts. Information to customers increased significantly in the active intervention districts, but not in the

regular intervention districts (Table 11). The differences between them were not significant (p=0.1) (Table 12) because the regular intervention districts had an initial value that was higher than the active intervention group.

Table 11. Pre- and post-intervention indicator score means in active and regular intervention pharmacies

Indicator	District	Pre-intervention	Post-intervention	p-value
Order	Active (n=46)	5.75	6.78	0.0001
	Regular (n=46)	5.77	6.94	0.0001
Essential drugs	Active (n=46)	6.19	6.77	0.0712
	Regular (n=46)	5.87	6.04	0.4513
Materials	Active (n=46)	5.25	7.29	0.0001
	Regular (n=46)	5.06	6.54	0.0001
Information	Active (n=46)	0.30	0.59	0.0001
	Regular (n=46)	0.42	0.43	0.1207
Labelling	Active (n=46)	0.53	0.53	0.7474
	Regular (n=46)	0.53	0.46	0.6229
Mixing	Active (n=46)	0.12	0.09	0.1405
	Regular (n=46)	0.23	0.09	0.0025

The differences in all indicator scores from the pre- to post-intervention period between the active intervention and regular intervention districts are positive, except for labelling in the regular intervention districts. Negative for mixing means improvement (Table 12).

Table 12. Post-pre indicator difference means in active and regular intervention pharmacies

Indicator	Intervention level	Difference means	p-value
Facility indicators			
Order	Active (n=46)	1.03	.1175
	Regular (n=46)	1.17	
Essential drugs	Active (n=46)	0.58	.0969
	Regular (n=46)	0.17	
Materials	Active (n=46)	2.04	.0241
	Regular (n=46)	1.48	
Dispensing indicators			
Information	Active (n=46)	0.29	.1066
	Regular (n=46)	0.01	
Labelling	Active (n=46)	0.00	.9306
	Regular (n=46)	- 0.06	
Mixing	Active (n=46)	- 0.04	.5223
	Regular (n=46)	- 0.14	

7.2.3 Regulatory interventions

In reality, most activities (for detailed information see 6.4.2, 6.4.3) were implemented in both the active and regular intervention districts. The average number of activities was higher for the active districts than those for the regular, except for sanctions and information. Less than four inspections (average 3.5-lower than expected) were performed in the active intervention districts, and more than two inspections (average 2.5-higher than expected) were carried out in the regular intervention districts. Information was provided to drug sellers in connection to each inspection in both groups of districts based on the concept of good pharmacy and dispensing practices related to drug information to customers, labelling, not mixing drugs, as well as the importance of ED, EM and good order in pharmacies. More regulatory documents were distributed in the active than in the regular intervention districts. However, there were more sanctions in the form of fines in the regular than in the active intervention districts, usually due to the presence of expired or/and banned drugs (the total amounts of approximately USD 400 in the regular and USD 300 in the active districts were imposed for the pharmacies). Supervisions for the district drug inspectors carried out by the provincial drug inspectors were more common in the active than in the regular intervention districts. The content was to assist the district inspectors in technical issues and to ensure that the intervention was implemented as planned. Training activities, which included training for district drug inspectors in pharmacy inspection and training for drug sellers in drug regulations, were held only in the active intervention districts.

In summary, there was a considerable improvement in the aspects of private pharmacy practice quality during the year and a half of the intervention period, as measured through the indicators. Improvements occurred in both the active and regular intervention districts.

7.3 Comparing the quality of public and private pharmacy practices (Study III)

7.3.1 Background characteristics of drug sellers and customers

In the public pharmacies, the majority of drug sellers were medical assistants and nurses (54%), while in the private pharmacies, the majority group were auxiliary nurses (low-level nurses) (60%). Patients at both pharmacies stated that they knew the use of more than half of the drugs they bought. Knowledge was defined as answering yes to the question “Do you know how to use this medicine?” At public pharmacies, almost all of the drugs were prescribed by medical doctors, whereas 84% were self-prescribed at private pharmacies. Of these, 40% were decided by the customers themselves, 25% by drug sellers and 19% by friends.

7.3.2 Differences between public and private pharmacies

Public pharmacies differed significantly from private pharmacies, with lower mean score regarding availability of the Essential Drugs (ED) (5.1 vs.6.4), Essential Materials (EM) (5.6 vs. 6.9), a higher percentage of antibiotics dispensed (35% vs. 24%), as well as more injections (31% vs. 7%) and drugs per customer (2.4 vs. 1.4) (Table 13). More drug purchases were decided by health workers at public than at private pharmacies (92% vs. 16%). At public pharmacies, a

significantly larger amount of drugs were prescribed from the National Essential Drug List (76% vs. 56%), and more drugs had an International Non-proprietary Name (67% vs. 35%) (Table 13).

Table 13. Comparison of facility, patient care and prescribing indicators between public and private pharmacies

	Public pharmacies	**Private pharmacies**	
Facility indicators	**N=13**	**N=92**	**95% CI**
	Means (SD)	**Means (SD)**	
Order	7.1 (1.4)	6.8 (1.3)	(-0.54; 1.04)
Essential Drugs	5.1 (1.6)	6.4 (1.8)	(-2.23; -0.34)
Essential Materials	5.6 (1.9)	6.9 (1.5)	(-2.40; -0.20)
Patient care indicators	**N=13**	**N=84***	**95% CI**
	Means (SD)	**Means (SD)**	
Oral information	67.5 (31.3)	50.4 (37.1)	(-0.5; 36.5)
Drug with label	52.7 (24.2)	49.4 (28.7)	(-11.2; 17.8)
Mixing	0 (0)	8.4 (18.1)	(-12.3; -4.5)
Prescribing indicators	**N=204**	**N=706**	
Average number of drugs	2.4	1.4	(0.84; 1.16)
% of antibiotics	35	24	p=0.02
% of ED prescribed	76	56	p=0.004
% of INN prescribed	67	35	p<0.001
% of injections	31	7	p<0.001

Note (*) Eight pharmacies had no customers

7.3.3 Similarities between public and private pharmacies

There was no significant difference regarding order in the pharmacy (7.1 vs. 6.8), oral information (67.5 vs. 50.4) and adequately labelled drugs (52.7 vs. 49.4) between the public and private pharmacies (Table 13).

7.3.4 Additional results on factors influencing the quality of service of private pharmacies

The number of inspections per year did not have any significant influence on the order in the pharmacy, the availability of Essential Drugs and adequate drug labelling, except the availability of Essential Materials and the oral information provided.

7.4 The quality of drugs: Problems and improvements (Study IV)

7.4.1 Prevalence of substandard drug samples

In 1997, there was a high proportion of substandard ampicillin, tetracycline, chloroquine and ASA, in total 46% (169/366). The highest was ampicillin 66/169, followed by chloroquine 46/169 and tetracycline 38/169.

The proportion of substandard drugs had significantly decreased from 46% (169/366) in 1997 to 22% (66/300) in 1999. The improvement was mainly due to the reduction of substandard ampicillin (67% to 9%) and tetracycline samples (38% to 12%), whereas there was only a small change among chloroquine (50% to 42%) and no change for ASA (25% to 25%) samples (Table 14). No significant difference in percentage of substandard drugs was found in 1999 between the "active" and the "regular" intervention pharmacies (25% vs. 20%, p=0.215).

Table 14. Comparison of the quality of drug samples in 1997 and 1999

Drug samples	# of drug samples		# of substandard samples (%)		χ^2	p-values
	1997	1999	1997	1999		
Ampicillin	98	77	66 (67.3)	7[a] (9.1)	59.84	<0.001
Tetracycline	100	81	38 (38.0)	10[b] (12.3)	15.03	<0.001
Chloroquine	93	82	46 (49.5)	34[c] (41.5)	1.12	0.290
ASA	75	60	19 (25.3)	15[d] (25.0)	0.00	0.964
Total	366	300	169 (46.2)	66 (22.0)	42.13	<0.001

[a] 2 from Laos, 2 from Thailand, 1 from Vietnam and 2 from unknown sources
[b] 3 from Laos, 2 from Thailand, 5 from unknown sources
[c] 16 from Laos, 8 from Thailand, 1 from France and 9 from unknown sources
[d] 2 from Laos, 12 from Thailand and 1 from unknown sources. 8 cases had a higher percentage of free salicylic acid than 0.3%

7.4.2 The origins of substandard samples

In 1999, 66 of 300 were substandard samples. Of these 23 of 97 originated from Laos, 24 of 143 from Thailand, 1 of 23 from Vietnam, 1 of 1 from France and 17 of 36 from unknown sources. The proportions of substandard drugs from Lao factories are higher than other known sources in both 1997 and 1999. The share of ampicillin from Laos in 1999 was 71% (55/77), of these only two were substandard as the tablet weight was not within the standard. Sixteen chloroquine sugar-coated tablets out of 30 from local factories were substandard also due to their weight. Eight out of 35 chloroquine samples from Thailand also had weight variation outside of the standard, among these, one contained too high a content of the active ingredient. One chloroquine from France contained too much weight and too high a content of the active ingredient. One chloroquine sample from France contained too high a level of the active ingredient. All 9 ASA with a level of active ingredient outside standard limits were from Thailand.

In 1997, 28 out of 54 drugs with no active ingredient or active ingredient below or above the approval limits could be traced. Of these, 20 originated from Lao factories, five from Thailand and three from Vietnam.

7.4.3 Reasons for being substandard drugs

The reasons for drugs being substandard in 1997 and 1999 were mainly for weight variations outside the standard limit, some with too much or too little an active ingredient and few with fake or no active ingredient. Weight variation outside pharmacopoeial limits had significantly reduced from 35% in 1997 to 14% in 1999. Only a few drugs were fake or contained no active ingredient, 3% and 1% in 1997 and 1999, respectively. Some drugs had too much of an active ingredient, 7% and 2%, and some had too little 4% and 2% (Table 15).

Table 15. Substandard drugs according to different methods in 1997 and 1999

Name of drugs	# of drug samples		# with indicated quantity of active ingredient in relation to approved limits[a]						# of weight variation outside standard		# of bad management	
			None		Below		Above					
	1997	1999	1997	1999	1997	1999	1997	1999	1997	1999	1997	1999
Ampicillin	98	77	10	2	10[b1]	1[b2]	0	0	43	4	4	1
Tetracycline	100	81	0	1	3[c1]	0	0	1[c2]	38	5	0	1
Chloroquine	93	82	2	0	1[d1]	0	13[d1]	2[d2]	38	33	0	2
ASA	75	60	0	0	2[e1]	6[e2]	13[e1]	3[e2]	9	1	0	0
Total	366	300	12	3	16	7	26	6	128	43	4	4
(%)			(3.3)	(1.0)	(4.4)	(2.3)	(7.1)	(2.0)	(35.0)	(14.3)	(1.1)	(1.3)

[a] The limits for quantity of active ingredient (in % of stated content) for each drug are the following:
Ampicillin 90-120% (USP23), Tetracycline 90-125% (USP23),
Chloroquine 93-107% (USP 23), and ASA 95-105% (BP 1988).

[b1] 58.1, 62.5, 76.9, 78.3, 80.6, 80.7, 83.5, 85.0, 85.1, 86.8
[b2] 87.5
[c1] 75.6, 81.7, 82.1
[c2] 127.7
[d1] 83.7, 107.6, 107.7, 108.6, 108.9, 109.3, 109.5, 109.6, 109.9, 110.2, 110.3, 110.5, 111.2, 169.7
[d2] 107.7, 170.3
[e1] 90.2, 93.9, 107.2, 107.2, 107.5, 107.5, 108.2, 108.4, 108.6, 108.7, 108.7, 109.3, 110.0, 111.1, 128.3
[e2] 83.2, 85.4, 86.4, 87.0, 87.5, 88.6, 117.0, 113.0, 127.5

As shown in Table 15, the majority of substandard drug samples contained active ingredients at levels approaching the limit for approval. In the ASA and chloroquine case, they are mostly high while the ampicillin and tetracycline cases fell low.

7.5 Exploring knowledge and perceptions of the quality of drugs among drug sellers and consumers (Study V)

7.5.1 Background characteristics of drug sellers and consumers

Of the 59 drug sellers interviewed (26 men and 33 women), 56 had medical background training with a predominance of low-level medical staff such as auxiliary nurses, and only three had low level pharmacist training and had no qualified pharmacist. Two Focus Group Discussions (FGDs) were held with the participation of fifteen pharmacy owners. There were an equal number of men and women among the 278 exit-customers interviewed. They bought drugs mainly for themselves and family members. Six FGDs were conducted with 62 participants, 34 women and 28 men, with two FGDs in each urban, rural and remote area.

7.5.2 Drug quality and efficacy

Drug sellers defined the quality of drugs by their efficacy and related it to the judgement of the people using the drug whether patients were cured and recovered from their diseases. "*The drug is good when it can treat the human diseases with a good result, but if it cannot, I will say that it is not of good quality."* (A male drug seller in the remote area). The same kind of reasoning was found in both the urban and remote areas.

Many drug sellers (78%) said that all the drugs they sold were of very good quality, but most of them did not know what constitutes a good quality drug, nor how to keep some medicines and vaccines in the right temperature. It seemed that they understood the importance of labelling quite well, *" The label of the drug is very important for us, from which we can look at the expiry date, the indication and other information. If there is no label, we should not buy them. Nowadays, there are many illegal drugs, some of them lack labels."* (A female drug seller in the urban area). However, they stated that they also bought unlabelled drugs. The drug sellers in the urban district discussed that a good quality drug was likely to be an expensive drug and often advised their customers to avoid the drug with a lower price.

Of the customers interviewed, 64% said that drugs were of good quality and 89% never heard about fake drugs or that drugs could contain lower amounts of active ingredients than indicated on the label. According to the FGDs, the community members reported that they perceived that all drugs were of good quality if they treat the disease effectively. *"All drugs are of good quality, if after taking them the symptom goes away."* (A rural woman). They also perceived that the expensive drugs are good quality drugs, and that the cheap drugs seem to be the bad quality drugs as expressed by an urban man *"Nowadays, everything in the market possesses two kinds of quality with different prices, the real and expensive one, and the imitative and cheap one. When we take the more expensive drugs just for a while, then we'll feel better. That's the good quality drugs."* In addition, most of them said that they did not know anything about fake or substandard drugs, they simply took them. As expressed by a man from the remote area, using the wording of a well-known Laotian proverb *"I don't know anything about fake or substandard drugs. It's like playing a flute for a buffalo."*

7.5.3 Awareness and trust

Forty one percent of drug sellers were aware of the existence of low quality drugs, but only a few of them (7%) thought that the security in drug quality is a problem. Almost all (96%) said that they bought drugs from the authorised sources, in addition, 58% stated that they usually bought some drugs from illegal and non-authorised sources, where there was no guarantee of security in quality. During the FGDs, the drug sellers discussed that they trusted the drug regulatory authorities, including the inspections of imported and manufactured drugs, to control and monitor the quality of drugs. *"A good quality drug is a drug that we buy from a company controlled by drug authorities, with full label so that we know its expiry date. We should not buy from everywhere."* (A female drug seller in the urban area).

Eighty nine percent of the interviewed customers said that they were very satisfied with the drugs they received. Only one quarter of them was concerned about the quality of the drugs. During the FGDs, most female and male participants from all areas expressed that all drugs were of good quality, and they were not concerned about the quality, expiry date or drugs being with or without a label. They often expressed that they trusted pharmacy services, drug companies, physicians and drug regulatory authorities to provide them with good quality drugs only. They reported that they did not have to worry about the quality of drugs. *"A good quality drug is a drug from pharmacy and factory, otherwise they won't sell it."* (A rural woman). *"I do not worry about drugs because everything is up to the doctors and government who have to monitor and control drugs. And if drugs are bad, the drug sellers will not dispense them."* (A rural man).

7.5.4 Cost of drugs and affordability

The drug sellers expressed that their customers bought drugs according to what they could afford, and therefore they asked for the less expensive drugs, which consequently, might carry the high risk of low-quality drugs. *"The main reasons why low quality drugs still exist and are sold in society are that the customers wanted cheap drugs and the drug sellers wanted good profits"* (An urban male drug seller).

The main problem for most people was the high cost of drugs. This seemed to be of greater interest than any problem that could arise from purchasing low-quality drugs. *"I'm not afraid of drug quality but afraid of not having enough money to pay."* (An urban man). *"The only problem is we don't have enough money to buy. If we talk about money my tear will drop out, one bottle already costs 10000-15000 Kips (about USD 1.4-2.1). If we don't have this amount we can't get the drug."* (A woman in the remote area).

7.5.5 Factors influencing the knowledge and perceptions of drug sellers and customers

The drug sellers' education level and the location of the pharmacies did not influence their knowledge regarding the quality of drugs. However, customers who lived in better economic situations had significantly ($p<0.001$) more knowledge about the quality of drugs than those of medium or lower economic status.

8. Discussion

Low quality practice was found to be a major problem in private pharmacies in the Savannakhet province. This included poor dispensing practices such as lack of information to customers, inadequate drug labelling and the mixing of drugs. In addition, the prevalence of low-quality drugs was unacceptably high, in combination with low awareness of drug quality among consumers and inadequate scientific drug knowledge among drug sellers. The study has demonstrated significant improvements in private pharmacy services and drug quality during the study period of 1997-99. The pharmacies in the active intervention districts showed statistically significant improvements for order, essential material and information indicators. When compared the differences of the means of these indicators from pre- to post-intervention, between the active and the regular intervention districts only essential material indicator differed statistically significant. The active regulatory intervention consisting of inspections, information to drug sellers, distribution of regulatory documents and sanctions and the quality assurance system within the on-going NDPP implementation are likely to have been an important catalyst for the positive development of the quality of private pharmacy services and drug quality.

8.1 Methodological considerations

Indicator development and use

Using the quality indicators developed based on the concept of GPP to assess the quality of pharmacy services is a way to measure the practice and describe the present situation. No published article has been found regarding pharmacy inspection indicators. There are a few publications using indicators to monitor the use of drugs in health facilities (Hazra *et al*., 2000; Hogerzeil *et al*., 1993), however several only use part of the recommended prescribing indicators to assess prescribing practices for case management of diseases in health facilities (Nizami *et al*., 1996; Ofori-Adjei and Arhinful, 1996; Paredes *et al*., 1996; Prawitasari Hadiyono *et al*., 1996) and pharmacies (Ferraz *et al*., 1996). The facility, dispensing and prescribing indicators correspond to structure and process indicators (Donabedian, 1966). The conditions of pharmacy facilities were assessed in relation to whether they were suitable places for providing care to patients, whether the drug sellers had sufficient knowledge in performing their job and whether necessary equipment and ED were available for the services. We also studied the dispensing and interaction between the drug sellers and consumers. There is no specific standard for measuring the practice of pharmacies (WHO, 1993); each country needs to develop their own standard following the WHO guideline (WHO, 1996a).

The facility indicators used in studies I, II, III are composite indicators, each comprising of five to ten components, 25 in total. Scoring of the availability of 10 ED and 10 EM may not be a technical problem, each available item will receive one score. However, for the "order in pharmacy" indicator that includes advertising stickers, storage of drugs, good order keeping, drugs in their original container and cleanliness, the scoring becomes more complicated. For example, the scoring for cleanliness in a pharmacy is subjective and might differ from one research assistant to another. Efforts were made to ensure that similar criteria were used by all research assistants. The analysis was conducted based on the overall score of each indicator, as a consequence, the detailed information regarding each component was not recorded e.g., the

identification of the container, the missing item of ED and EM and the reduction of advertising stickers. Instead, there is a summary figure for each indicator.

All three sets of indicators, facility, dispensing and prescribing indicators were used in study III to assess and compare the practice of public and private pharmacies. The prescribing indicators may be more relevant to the public rather than the private facility in the Lao context as prescriptions were rarely found at private pharmacies. Accordingly, the prescribing indicators were not used to measure the outcome in studies I and II, and consequently, several RUD aspects were not studied.

The number of drugs dispensed per customer at private pharmacies is not completely comparable with the number of drugs dispensed per customer who came with a prescription to the public pharmacies. The customers at public pharmacies could potentially be considered to have more serious medical conditions than those at private pharmacies.

The mean scores of facility indicators were low, which means that the pharmacy facilities were poor in terms of order and availability of ED and EM. A possible problem may have been that some pharmacies had run out of ED when the team conducted the inspection. However, the records of the previous inspections were checked and no important difference was found between the results and the records.

Sample size and data collection methods

All districts were included in studies I, II, III, IV except study V. In study V, only half of the districts were included. The pharmacies were sampled from each district using random procedures. Due to the limited number of pharmacies in some districts, there was an uneven distribution of pharmacies and a disproportionate over-representation of pharmacies from remote areas and a consequent under-representation of pharmacies from urban areas. This was arranged as the location and socio-economic status of districts were assessed to be important determinant factors for performance of pharmacy services.

The 14 dropout pharmacies in the post-intervention data collection might have affected the results of the statistical analysis (II) as they were excluded from the analysis. They were excluded because the analysis of the intervention was decided to be based on the 92 pharmacies that were reached in both the baseline and post-intervention data collection. Furthermore, a comparative analysis of the 92 pharmacies and the 14 dropout pharmacies showed no major deviation in baseline characteristics.

For study V, as the specific purpose was to explore the knowledge and perceptions of drug sellers and consumers it was decided to take the pharmacy samples from only the non-intervention districts to avoid any bias that the drug sellers' knowledge might had improved as a result of the active intervention. As the procedure for sampling these pharmacies was done in a strategic and random way, the sample can be regarded representative for the pharmacies in the Savannakhet province and with the limitation that there was an under-representation of pharmacies from the urban area.

As this study was the very first HSR project in Laos in the pharmaceutical sector, it was considered of value to obtain the overall information regarding pharmacy practices rather than focusing on how specific diseases were managed as other studies have done in Vietnam (Chalker *et al*., 2002; Chuc *et al*., 2002). A monitoring instrument describing general pharmacy practice needed to be developed. Consequently, more general information was gained regarding pharmacy behaviour towards dispensing practice than detailed knowledge about certain issues, e.g., treatment of specific diseases and how drug sellers interact with their customers in this regard. This points to a lack of information about the quality of practices and drug dispensing in relation to specific diseases. Another reason for not examining specific case management was that the simulated client method, though common in low-income countries, was not used (SCM) (Madden *et al*., 1997). In rural areas with a well-defined catchment area, it may be difficult for a research assistant, foreign to the area to pose as a customer (SCM) without the risk of being recognised. The consequences of not using the SCM in studies I, II, III is that the drug sellers would have told the research team what they thought to be the correct answers, leading to possible biased results in the studies. For example, in the presence of the research team, the drug sellers may tend to give more information on drug use to the customers than is normal, which would mean the low level of information found in the study might be even lower.

Not being able to use SCM posed a limitation for study IV where it was desired to obtain representative drug samples. However, attempts to avoid bias included allowing the research assistants to buy the drugs without informing the sellers of the analysis. The sellers were not previously informed of the drug types in question providing less possibility to hide substandard drugs in the immediate presence of the team. The drug sellers may have inadvertently bought substandard drugs without their knowledge, as most of the drug sellers did not even know what constitutes a good or bad quality drug (V). They had not received any information about the drug analysis from the baseline study. In general, as they were not only being interviewed but also selling a relatively large amount of drugs to the research assistants, the sellers seemed to be very satisfied and showed the assistants all the required containers. The number of substandard ampicillin and tetracycline samples bought was significantly reduced from 1997 to 1999, but not the corresponding chloroquine and ASA samples, and it is unlikely that the drug sellers deliberately hid only the bad quality ampicillin and tetracycline but not the chloroquine and ASA. This difference could, in this context, be interpreted as a sign that sampling bias was not of a major importance and not the explanatory factor for the improvement.

The four selected drug samples (ampicillin, tetracycline, chloroquine and aspirin) in study IV could be seen as too few an amount for being representative of all essential drugs. It was, however not possible to include more samples due to limitations in terms of funds for analysis. All four drugs were included in the EDL and commonly used. The use of 10 tablets/capsules instead of 20 for the test of weight variation was a limitation in study IV. However, it would not have been possible to perform this test at all using the requirement of BP (1988) of 20 tablets/capsules, due to the situation of shortage of ED in some remote and rural pharmacies in Lao PDR. For ethical reasons, the last tablets on the shelf were not purchased. In conjunction with an experienced drug analysis expert from the Medical Products Agency, Sweden, it was decided to use 10 tablets/capsules for the test, which provided an acceptable approximation of the situation. The possibility that the significant reduction in samples with excess weight variation from 1997 to 1999 was due to the use of 10 instead of 20 tablets/capsules is unlikely as both the sampling and

analytical procedures were the same. To avoid bias in the analysis, only the name, strength and the code of drug samples were provided to the laboratory so that the manufacturers would remain unknown. Thus, it is unlikely that the staff and manufacturers had any contact in the event that substandard drugs were detected.

Ten exit customers were to be selected per pharmacy within an approximate two-hour time period (I, II, III, V). However, some pharmacies had no customers, others only a few. In many pharmacies, particularly in the remote areas, the time was prolonged from two to three and a half hours to allow for more customers, but still there were only a few customers, which resulted in a smaller sample size than expected (about an average of five customers per pharmacy). Customers (I, II, III, V) were selected as they appeared in the pharmacies during a minimum of a two-hour period. This selection is prone to bias as the hours of observation may influence the type of customer. For example, there may be differences when men and women usually visit the pharmacies. This may also be different between pharmacies in districts in different areas. We have no direct information of how this might have affected our sample of customers. A sample of five customers per pharmacy was previously used for studying pharmacy practice in a drugstore survey in Mexico (Calve, 1996). Five simulated clients were also used per pharmacy in studies conducted in Vietnam (Chalker *et al*., 2000; Chuc *et al*., 2001). A clear limitation of this study is that there is little information on customers, who they were and what they came for. The focus was on the pharmacy and its staff. An exception is study V, which however did not look at customers appearing at private pharmacies.

Several types of data collection techniques were used in studies I, II, III and V, including structured and semi-structured as well as Focus Group Discussions (FGDs). One advantage of using structured interviews in studies I, II, III and V was that they enabled statistical analysis. However, the disadvantage of this technique is that important information may be missed because spontaneous remarks by respondents are usually not recorded or explored (Hardon *et al*., 2001). For example, in study III, the yes/no answer question "*Do you know how to use this medicine?"* is probably too superficial and it is not possible to identify the characteristics of the stated knowledge. On the contrary, in-depth information and exploration was permitted in the semi-structured interview (Sarantakos, 1998). Using different data collection techniques e.g., structured interviews and FGDs can be seen as a way of ensuring comprehensiveness, where some of the results support or complement each other (Mays and Pope, 2000). In the interviews (V) most of the customers said that they had never heard of fake or substandard drugs, in the FGD the community members said that, *"all drugs are of good quality"* and, *"I don't know anything about fake or substandard drugs. It's like playing a flute for a buffalo"*. In this case, the results support each other. In addition, in the FGDs, some drug sellers said that, *"we should not buy drugs from the wrong sources"*, but from the interviews, it was recorded that 58% stated that they bought some drugs from unauthorised sources. These have clearly complemented each other. FGDs are most often processes revealing social norms as opposed to interviews, which highlight the views and attitudes of individuals. For this reason people in FGDs probably refer to the social norms rather than revealing their actual behaviour (Hardon *et al*., 2001; Lunt and Livingston, 1996).

The number of FGDs (two for drug sellers and six for community members) was not decided according to the principle of "content saturation", but in order to get more in depth local perceptions and views from selected women and men in each of the three geographical areas. In

some of the FGDs it was difficult to get a good discussion going. Participants answered the moderators questions but did not continue to discuss among themselves. This could partly be explained by that this type of group discussion was unfamiliar to many people and they felt shy but one contributing factor was probably also that some participants recognised that the researchers were part of the authorities.

Randomised controlled trial in real life

The study design (II) was intended to be a randomised controlled trial with two arms, one with active intervention and another with regular intervention. In the strict clinical trial, the treatments are well defined and can be applied exactly as planned (Stephenson and Imrie, 1998), but this was not the case in study II. "Treatment" in terms of regulatory enforcement including education was given to both arms with different doses. Although efforts were made to standardise the intervention in the active intervention arm through intensified supervision and training of the district drug inspectors (II), the intervention might be affected by factors beyond control. The NDPP implementation at all pharmacies as part of the Sida support as well as the UNICEF extra pharmacist training project on the three specific diseases was carried out during the intervention period. They could not have been excluded from the study nor controlled and may have had positive effects on the practices, but there is no reason for differences between the two groups in this respect.

There could be several reasons why there were only a few significant differences between the active and regular intervention districts. Contamination between the active and the regular intervention districts may have been possible thru visits or supervisions of the provincial inspectors and also by the district inspectors who travelled between districts because there is no barrier between them. The inspectors in the regular districts might have become informed about the intervention study. The motorcycles were distributed to not only the active intervention districts but also to two other regular intervention districts, which may have made them aware of the intervention and caused them to improve the pharmacy practice in their own districts. The fact that Khanthabuly, the provincial capital, was divided into two North and South districts to become a matched pair "active" and "regular" districts may have resulted in a higher risk for contamination since they are in one district. It was not possible for the provincial drug inspectors to concentrate regulatory activity to the active intervention districts and not visit the regular intervention during a period of 1½ years.

The regular intervention included as part of the NDPP might have been implemented with higher intensity than estimated. The added value of the active intervention pharmacies may have been too small and therefore reduced the possibilities to show an intervention effect. In complex interventions such as policy or regulatory measures, it is less likely with highly improved results (Oxman *et al*., 1995; Podhipak *et al*., 1993). It could thus be feasible that the study sample size was too small in study II due to the fact that the expected differences between the active and regular intervention groups was assumed to be larger than in reality. With a small study, quite large differences may fail to be statistically significant (Campbell and Machin, 1993).

The Hawthorne* effect (Last, 2001) might also have affected the results of the studies. This means that the drug seller's behaviour in both arms may be altered because they know they are being studied, which may in itself have led to an improvement in pharmacy practice from pre- to post-interventions. To minimise this the pharmacies were randomised into two groups "active" and "regular". By doing this the Hawthorne effect as well as other unknown confounding is assumed to be the same in both groups and thus the differences are due to other factors.

Since there was no direct information about the economic status at the district level, the classification of socio-economic status or income level was decided through a consensus meeting involving experienced provincial government staff, where the available data on literacy rate and the location of the pharmacies was further assessed for accuracy of classification. Mostly high economic status was associated with high literacy rate and close proximity to the provincial capital.

8.2 Problems in pharmacy services

The main findings from the studies (I, II, III) showed poor pharmacy practices characterised by poor organization in the pharmacy, low availability of Essential Drugs (ED) and Essential Materials (EM) and poor dispensing practices e.g., no information to customers, no adequate labelling and mixing drugs. Furthermore, some problems in "prescribing" practices were shown in private pharmacies (III) e.g., low percentage of ED and INN drugs dispensed and high percentage of antibiotics dispensed. The common use of private pharmacies in Lao PDR as shown from household surveys (Asian Development Bank, 1999; National Institute of Public Health, 2001) has become a health concern in relation to drug use and the type of service received, as the quality of pharmacy service (I, II, III) and drugs (IV) was shown to be of an unacceptable standard. This clearly implies that pharmacy drug sellers did not fulfil their obligation as good drug suppliers and communicators (WHO, 1998). The lack of knowledge about the following elements contributes to the irrational use of drugs in a society, including Laos, where the notion of rational drug therapy (WHO, 1985; Hansen, 1988), including the choice of drug, dose and duration of the treatment with respect to efficacy and safety, as well as the users' knowledge is not taken into account. This low quality of pharmacy services has also become a concern in many other developing countries (Chuc and Tomson, 1999; Goel *et al*., 1996; Kamat and Nichter, 1998; Krause *et al*., 1998; Trostle, 1996). In many high-income countries, problems have also been reported (Allan *et al*., 1995; Bond and Raehl, 2001). There could be many reasons behind poor pharmacy practices, including the educational and professional level of pharmacy staff. Very few were pharmacists and the curricula of assistant nurses includes little pharmacology and nothing on good pharmacy practice. Continuing professional development programmes don't exist in Lao PDR. Customer demands could also have affected the drug sellers' practice described in other studies (Kamat and Nichter, 1998; Paredes *et al*., 1996).

There was more availability of essential drugs in private than in public pharmacies (about 65% vs. 51% on average) based on the 10 essential drugs studied through the ED indicator. The field tests

* Hawthorne effect: The effect (usually positive or beneficial) of being under study upon the persons being studied; their knowledge of the study often influences their behaviour. The name derives from work studies by Whitehead, Dickson, Roethlisberger, and others, in the Western Electric Plant, Hawthorne, Illinois, reported by Elton Mayo in *The Social problems of an Industrial Civilization* (London: Routledge, 1949)

for rational use of drugs in twelve developing countries found that the availability of ED was 65% (Hogerzeil *et al*., 1993), which is similar to the results in studies I, II, III.

Only about half of the customers received oral information and only about half of the drugs dispensed were adequately labelled in both public and private pharmacies (III). Information and adequate label indicators are important issues in Good Pharmacy Practice (WHO, 1996a) and Rational Use of Drugs (WHO, 1985), to ensure that customers get the right drugs they need with accurate information. According to the role of pharmacists/drug sellers, as front-line health workers and communicators, they should check whether their customers fully understand the use of the drugs (WHO, 1996a). However, the drug sellers in this study did not fulfil this task.

The lack of information and interaction between drug sellers and customers (I, II, III) may lead to the inappropriate use of drugs and low awareness regarding drug quality (V), and could cause harmful health effects including an adverse drug reaction. There could be many reasons for providing little information to customers. From the findings (III), a lot of the drug purchases at private pharmacies were decided by the customers themselves (40%), which could be seen as an indication that they already knew the use of the drugs. In such a case, the drug seller might feel that it is unnecessary to provide information, as there was no demand from the customers. Customer demand is a suggested factor influencing the practice of drug sellers (Brugha and Zwi, 1998; Cederlöf and Tomson, 1995; Goel *et al*., 1996). People may not ask for information about drugs they have already used.

Another explanation could be that the drug sellers did not have enough knowledge of drugs, including indications and contraindications, in order to provide advice on the safety of medicines (Goel *et al*., 1996). The majority of the drug sellers in the study were auxiliary nurses who had undergone different types of medical training at the provincial level where the quality of training is usually low. Thus, their limited knowledge about pharmacology, might have negatively affected the quality of services in relation to information. As shown in study V, most of the drug sellers did not know what constitutes a good quality drug and how to store drugs properly. A situation with little oral information on drug use is common in developing countries including Vietnam and India (Chalker *et al*., 2000; Chuc *et al*., 2001; Chuc and Tomson, 1999; Kamat and Nichter, 1998; Tomson and Sterky, 1986) as well as in rich countries (Allan *et al*., 1995; Fritsch and Lamp, 1997; Hassell *et al*., 1998). In a study conducted in 100 community pharmacies in New Jersey, New York and Florida (Allan *et al*., 1995) oral counselling was provided to only 64% of the patients, covering an average of 3 of the 14 categories of drug information according to the Omnibus Budget Reconciliation Act of 1990 (OBRA'90). Another study in 50 pharmacies Kansas City (Fritsch and Lamp, 1997) showed that pharmacists provided counselling in only 30% of all encounters. The studies (I, II, III) did not assess the quality of the given information, nor was the patients knowledge of the correct dosage assessed. as was done in a dispensing study in India (Hazra *et al*., 2000) showed that 65% of patients knew the correct mode of use for the drug dispensed.

Drugs without adequate labels (III) were found in about half of both public and private pharmacies corresponding to results of a dispensing study in India (Hazra *et al*., 2000). There can be many possible explanations for this including the lack of knowledge of both drug sellers and customers regarding labelling, weakness of the labelling system and financial constraints. First,

the drug sellers might not be aware of their own role in patient counselling and the importance of labelling (WHO, 1996a; WHO, 1998), as it is usually not requested by customers, especially if only a few tablets are being sold at a time. Customers are likely to buy small amounts of drugs and never ask for labelling. They may, in some cases, recognise drugs by their shape and colour. Awareness of the high illiteracy rate in the districts discourages drug sellers from labelling their products, without considering that others in the village could possibly help. Second, there is no clear system for drug labelling. The labels of imported drugs are usually in English or French. Furthermore, the labels of some local products are also in English or French for market competition reasons. Finally, for financial reasons, most pharmacies buy their drugs in bulk, not in their original package, which requires writing a special label for each drug purchase. The lack of labelling may result in failure of drug monitoring and inappropriate drug use. The lack of labelling has previously been shown to originate from the pharmaceutical companies (Frankel, 1993).

Antibiotics were commonly dispensed at private (24%) and public (35%) pharmacies. The figures are quite similar to the drugstore survey in Mexico (29%) (Calva, 1996), but lower at the health facilities of the 12 developing countries study (41%) (Hogerzeil *et al*., 1993), and the health facility study in India (73%) (Hazra *et al*., 2000). It is not possible to assess the appropriateness of the antibiotic dispensing pattern in our study as we did not assess the dispensing in relation to diagnosis including adherence to Standard Treatment Guidelines as in contrast to studies in Vietnam (Chalker *et al*., 2002; Chuc *et al*., 2002). The latter studies assessed this with the simulated client method. Important aspects of improving the use of antibiotics are both to use the correct drug for a respective disease and to avoid contributing to resistance. One main issue of concern is the information suggesting that a customer, especially in rural and remote areas usually purchases antibiotics in small amounts without prescriptions and uses them inappropriately (Boupha *et al*., 2000; NSC, 1993; Pongpradith *et al*., 1993).

8.3 Effectiveness of regulatory intervention

Efforts were made to improve poor pharmacy practices (I, III) through the regulatory intervention package (II). The findings showed statistically significant improvements in pharmacy practices in the active intervention districts for the order, EM and information indicators. Statistical significant improvements were also found in the regular intervention districts for order, EM and mixing indicators (Table 11). When compared the differences of the means of these indicators from pre- to post-intervention between the two groups, only one indicator (EM) differed statistically significant. This means that improvement in pharmacy practices was found in both the regular and the active intervention groups, from pre- to post-intervention after the year and a half of regulatory intervention. The positive changes were in scores for order in the pharmacy, the availability of essential materials, provision of information to customers and not mixing drugs. These changes/factors could be relatively easily influenced. Order in the pharmacies and providing oral information can be improved at little or no extra cost. To dispense drugs in separate bags can be done at a small cost, while investing in other new materials would imply additional expenditures. The availability of ED is likely to be influenced more by customer demand and availability of funds to replenish stocks. The possible explanatory factors of why the labelling practices did not improve have already been discussed (8.2). No published paper was found regarding regulatory intervention in pharmacies using facility and dispensing indicators as

outcome measurements, so it has not been possible to find data for comparison. Most of the published intervention studies regarding drug use have focussed on changing prescriber behaviour in public health facilities using educational strategies showing possible effects of intervention (Angunawela *et al*., 1991; Bexell *et al*., 1996; Diwan *et al*., 1995; Eve *et al*., 1996; Lundborg *et al*., 1999a; Santoso *et al*., 1996; Wahlström *et al*., 1997). Many reviews concerning the improvement of private sector behaviour have generally found that single interventions have been less effective than a package comprising of multiple interventions (Brugha and Zwi, 1998; Farris and Schopflocher, 1999; Trostle, 1996). There is also accumulating evidence to show that providing information on its own will not lead to substantial changes in practice (Freemantle and Bloor, 1996) and that legal interventions alone are insufficient to obtain the desired policy outcomes (Kumaranayake, 1997). In contrast with these, study II gives a more positive result with regard to the effect of government regulation.

The face-to-face educational outreach program on diarrhoea treatment in pharmacies in Kenya and Indonesia (Ross-Degnan *et al*., 1996) showed that the sale of ORS in intervention pharmacies increased by an average of 30% in Kenya and 21% in Indonesia ($p<0.05$), whereas antidiarrhoeal sales declined by an average of 15% in Kenya and 20% in Indonesia compared to controls ($p<0.05$). Another educational intervention study on diarrhoea treatment in pharmacies in Thailand showed effective higher percent change in prescribing ORS for watery diarrhoea in intervention group (11.8%) compared with -7.7% in the control group, but no change was observed in treatment of dysentery (Podhipak *et al*., 1993). The success of regulatory interventions is said to depend on the extent to which consumer behaviour and demand is addressed (Le Grand *et al*., 1999). In Pakistan, a regulatory strategy of banning paediatric antimotility drugs failed (Bhutta and Balchin, 1996) resulting in the black marketing of these drugs and leading to the use of other irrational drugs, because it did not address the educational or patient-demand factors responsible for physicians' irrational prescribing. A few countries e.g., Indonesia, Mexico, Pakistan, Peru and Sri Lanka, have taken regulatory action to restrict the use of some paediatric formulation of antidiarrhoeals (Health Action International-Europe (HAI), 1993). In Laos, these drugs were banned in 1994 including some other 500 brands (Ministry of Health, 1994). Drug sellers would be fined if these banned drugs were found during the inspection of their pharmacies. A multifaceted intervention (one compenent being regulatory enforcement) in private pharmacies in Hanoi focussed on case management of acute respiratory infection (ARI), sexually transmitted diseases (STD) showed significant improvements in changing the knowledge and reported practice (Chalker *et al*., 2002), as well as the actual practice of drug sellers (Chuc *et al*., 2002).

The probability that the intervention effect in our study would become significantly higher in the active than in the regular intervention pharmacies might have been reduced by a higher intensity of regulatory intervention in the NDPP than expected. A lower intensity of intervention often results in a smaller outcome (Oxman *et al*., 1995; Podhipak *et al*., 1993; Ratanawijitrasin *et al*., 2001). In reality, more than two inspections were conducted in the pharmacies in the regular intervention districts. Thus, the one or two extra inspections in the active intervention group might not have been enough to show a statistically significant difference with one exception. Other activities were also implemented at the same intensity in both regular and active intervention pharmacies. Supervision and training were only expected to be coordinated for the active intervention group, however these activities were also performed in the regular intervention group

followed by information and distribution of the regulation documents in connection to each inspection and supervision. It could also be that the NDPP was so strong it overtook the effects of the study results. Other effective NDPP implementations have been illustrated in another pilot province in a cross-sectional study e.g., significantly more availability of ED, higher proportion of ED prescriptions (95% vs. 86%), less drugs per patient (2.7 vs. 3.3) in the pilot than the non-pilot province as well as the management of simple diarrhoea in children being more in accordance with STGs (Paphassarang *et al*., 2002b).

There were less sanctions in the active district than in the regular district according to the district records, though more regulation enforcement was ensured in the active districts. However, it was not possible to know the quantity of real problems and the number of sanctions at this early stage in the development. It was probably more important, with the power of the district drug inspector and of the health administration, for their relationship with the drug sellers. The power of inspectors to implement or enforce the regulations might have been low e.g., sanction would not be performed for an inspection to a powerful private pharmacy if something was found to be wrong. Private providers are often powerful in developing countries and local health managers may have difficulty in asserting authority over them (Bennett *et al*., 1994). District inspectors might have also been reluctant to punish the drug sellers who are their relatives or friends or even people who live in the same district. This was a problem which was raised during an inspection seminar within the MoH many years ago, and a suggested solution was that inspectors should not perform inspections in their own district, or their relative or friend's pharmacy. This issue has yet to be taken into practice. Regulation enforcements in low-income countries are often ineffective (Hongoro and Kumaranayake, 2000; Kumaranayake, 1997). This is due to the weak system for enforcement of regulations. In addition, the content of the regulation document itself might have made enforcement impossible. As an example, the sanction regulation states that "licence to be revoked on the third violation" which in practice rarely happens. Inspectors may generally feel that the private drug sellers have not been given adequate information to be able to apply these rules properly (Stenson *et al*., 1997).

Significant improvement in both active and regular intervention districts from pre- to post-intervention could be due to other factors rather than the active and regular intervention. It has been suggested that pharmacy factors, client expectations, physician practice and local regulating factors influence the quality of services of private pharmacies (Cederlöf and Tomson, 1995; Goel *et al*., 1996; Quick *et al*., 1991). These factors were classified into demand side factors through the action of the clients/customers, and supply side factors, which influence drug sellers' behaviour in other ways. A change in demand could be as a result of economic and social development, resulting in increased drug literacy and more resources among customers. Although not included in our study, this factor would not be likely to have any impact in the short run, especially not in the intervention period which was characterised by the Asian economic crisis. Moreover, no dramatic changes in the general socio-economic condition in Savannakhet could be registered. Neither were there any signs of change in the competitive situation with regard to the number and location of private pharmacies. On the supply side, no dramatic changes in government provisions or industry drug marketing programs were registered. Physician practice could have had only little influence in pharmacy service since most of drugs purchased were without prescription. Pressure from agents and wholesalers on one side and demands from customers on the other as well as the necessity to generate a profit in a highly competitive

situation could easily provoke a further deterioration of pharmacy service quality. However, the results (II) point in the opposite direction. The parallel disease management intervention supported by UNICEF is not likely to have had a strong influence, because it emphasised increasing general awareness of professional behaviour among drug sellers in relation only to a few specific diseases such as malaria, diarrhoea and acute respiratory infection. The fact that the Xaybury district, which was not exposed to the disease management intervention, does not stand out in terms of changes in the indicator score is also a sign that this project did not have a strong influence on the measurements.

There is little to indicate that any of the demand and supply side factors outside NDPP regulations would have had a decisive influence on the service quality in the private pharmacies. Therefore, the enforcement of regulatory standards within the on-going NDPP stands out as being the most likely cause for the improvement in both arms (II).

8.4 Quality of drugs

A high proportion (46%) of substandard drug samples were found in 1997. The highest number was for ampicillin followed by chloroquine and tetracycline. Significant reduction was found after 1997, but substandard drug samples remained high (22%). A level of 20% or more of substandard drugs has been regarded as extremely poor (Kenyon *et al*., 1994). Other studies from developing countries showed problems with drug quality (Newton *et al*., 2001; Shakoor *et al*., 1997; Taylor *et al*., 2001), but none had repeated measurements over time thus enabling looking at possibilities for improvements. An assessment study of the incidence of substandard drugs in Nigeria and Thailand showed 36% out of 81 samples and 40% out of 15 samples, respectively, contained an amount of active ingredients outside the British pharmacopoeial limits (Shakoor *et al*., 1997). Another study conducted in Nigeria reported that 48% of 581 samples of 27 different drugs from 35 pharmacies did not comply with set pharmacopoeial limits (Taylor *et al*., 2001). In Bangladesh 37% of 137 samples were reported as substandard (Roy, 1994).

As no significant difference in the reduction of substandard samples was found between the "active" and "regular" intervention districts, the interventions in the randomised trial meant to improve pharmacy service seems not to have been important for drug quality. Thus, the most probable reason for improvements in study IV was the development and enforcement of the QA system within the NDPP, between 1997 and 1999. During the study period, legal action including imposing fines according to the sanction regulation was enforced when substandard drugs were discovered. This might have increased the manufacturers' and importers' awareness about drug quality. Manufacturing practice in local factories probably improved, as almost all ampicillin samples from Laos's factories being analysed were of good standard. This could be due to the effect of GMP regulation, which was approved and came into force in 1998. During the study period, drug registrations and import regulations were strictly implemented with many required drug quality certificates for imported products. These procedures could have affected the quality of import drugs since only a few tetracyclines from Thailand in 1999 were substandard. Pharmacy inspections could also have influenced the quality of drugs in relation to their storage and purchasing from the right sources. Drug sellers may have stored drugs under better conditions as they were inspected regularly, and could have bought drugs from legal sources more often as there were less drugs available from unknown sources in 1999.

A significant reduction in the number of substandard samples was found for ampicillin and tetracycline samples in 1997 compared to 1999, but not for chloroquine and ASA samples. The majority of substandard drugs originated from Lao factories. The slight difference in weight variations and a few being fake or having too low or too high an amount of active ingredients were the main reasons for being classified as substandard. This is in contrast to the international debate, in which the low quality of some drugs in developing countries is often attributed to counterfeiting (Menkes, 1997; WHO, 1999a). From 1982 to 1999, WHO received 771 confidential reports relating to counterfeit drugs from both developed and developing countries. Of these only 325 cases reported, indicated the quality of active ingredients. About 59% out of 325 cases contained no active ingredients, 7% contained the correct amount of active ingredients and 16% contained different active ingredients (WHO, 1999a). Another study in Myanmar and Vietnam (WHO, 1999a) found that 16% and 8% out of 500 samples from both countries failed to comply with international standard, and high failure rates were observed in the case of unregistered drugs. In Myanmar 5 (6%) out of the 89 registered products failed, compared with 29 (24%) out of 123 unregistered products. In Vietnam, the failure rate for registered products was 7 (3%) out of 212, compared with 15 (20%) out of 76 for unregistered products. This implies that registered drugs are of high quality and therefore implementing an effective drug registration system could improve the quality of drugs on the market (WHO, 1999a). However, study IV lacked information about drug quality in relation to registered products.

The significant reduction of samples with too low or too high a content of active ingredient, as well as the reduction in samples with weight variation outside the standards indicates that the local manufacturing practices have improved as most samples originated from Laos.

Failure to comply with the limits on weight variation or having the level of active ingredient close to the range of acceptability may be considered less serious and of relatively little clinical consequences for drugs with a wide therapeutic window. However, if drugs with low or high content of active ingredient coincide with low or high tablet weight, the treatment may result in too little pharmacological effect or potential adverse effects in cases where effect and adverse effects are dependent on concentration. This is especially serious when the drug has a narrow therapeutic window, e.g., digoxin, which is included in the Lao essential drug list and used for chronic disorders, increasingly prevalent in low-income countries. However, even if serious quality problems are relatively rare as in this study, one undetected quality problem may result in serious problems for individual patients.

For the drugs analysed examples of clinical consequences are that infective drugs of poor quality may cause treatment failure (James, 1993; Okeke *et al*., 1999). In Laos, ampicillin and tetracycline are the first line drugs for acute respiratory infections and sexually transmitted diseases, and chloroquine is the drug of choice for malaria, all three are major contributors to the burden of disease in Laos. About 1% of these drugs had no active ingredient, and 4% had too low or too high a content of active ingredient, which may cause absence of effect, or adverse clinical effects, respectively. Tetracycline is hepatotoxic in excessive doses (Avery, 1976; James, 1993), chloroquine is cardiotoxic in overdose (James, 1993). One case of chloroquine sample from this study had a very high content of active ingredient (170.3%), which could result in serious adverse drug reactions for the individual patient. Such adverse reactions would also be extremely difficult

to detect and handle in a resource poor country such as Laos, where knowledge and perceptions of drug sellers and consumers regarding drug quality is relatively low (V).

8.5 Knowledge and perceptions of drug sellers and consumers

Findings from studies I, III and V could provide answers to why the majority of people in Laos self-medicate through private pharmacies (National Institute of Public Health, 2001) and why low quality drugs exist (IV). It could be that they believe that drugs are safe and good for their health (V) as little or no information on side effects or contraindication has been provided to them by the drug sellers (I, II, III), more availability of ED in private than in public pharmacies (III) and other factors such as ease of access and shorter waiting time (Goel *et al*., 1996; Kamat and Nichter, 1998). Drug advertisements through radio or TV may be their only source of drug information (Boupha *et al*., 2000). Although increasing geographical accessibility, this situation could lead to a serious problem of drug use and quality.

Both drug sellers and consumers in the Savannakhet province (V) perceived "a good quality drug" by its efficacy, and by the notion that if a sick person is cured the drug is of good quality. This is similar to the findings from a study in Guinea (Haddad *et al*., 1998). For a layperson, often illiterate in the Lao context, it could be regarded as rational to assess the drug quality in this way, even if it is important not to think in terms of needing "a pill for every ill". However, for a drug seller as a professional, he/she should know that many diseases are cured without treatment. The drug sellers should also be knowledgeable of the correct prescribing, dispensing and the appropriate use of drugs. Many drug sellers in the study perceived drug quality in a similar way as consumers, showing a lack of required "scientific knowledge" (Giddens, 1990).

The drug sellers' limited knowledge is potentially dangerous. It is not enough to trust the company and drug regulatory authority. As a professional, one needs adequate knowledge on the different issues of drug quality. One potential explanatory factor regarding the knowledge deficiencies in some aspects of drug quality includes that none of the drug sellers were qualified pharmacists, rather low level nurses with no or little training in pharmacology. Moreover, there is no continuing professional development programme in Laos. Training of pharmacy staff in pharmacology as was done in Nepal (Kafle *et al*., 1992), which can be a model for increasing knowledge. The UNICEF one-day training sessions for pharmacies in all provinces only focussed on management of three diseases, but little on pharmacology. The drug sellers should know how to select a reliable supplier, e.g., whether it is a licensed company or not, whether the drugs they buy are essential and registered by the drug regulatory authority. They should also know how to recognise correct labelling, including the expiry date, and finally, understand how to keep drugs under the right storage conditions.

Generally, for lay people, 'scientific knowledge' is not required. The medically correct definition of quality may not be meaningful. Lay people may ask themselves why they, as lay people, should worry about expiry dates and fake drugs, as it is the responsibility of the drug sellers to sell good quality drugs. Trust can be seen as a fundamental principle in the functioning of modern institutions with expert systems (Giddens, 1990). Still, consumer alertness is part of this process, and it would be an advantage for improving pharmacy services if people were aware that drugs can be of poor quality and can cause harmful effects to their health, especially in a country such as

Laos, where effective regulation is rather low, including drug production and import and distribution regulations. If consumers are strong and empowered, they will ask for more drug information. More demand for quality may be a significant factor in contributing to the improvement of poor dispensing practice (I, II, III) and drug quality (IV). However, about three quarters of lay people in our study were not aware of the existence of low-quality drugs. This could contribute to the continued existence of poor pharmacy practices and the poor performance of drug sellers including dispensing poor quality drugs as there is no explicit consumer demand for good quality drugs (Goel *et al*., 1996). To increase awareness among consumers, there is the need for communicating adequate information regarding drugs and drug quality. This could be achieved through education regarding the questions people should ask their doctors or drug sellers as to the quality of drugs they receive. Using public education campaigns with concise techniques to draw attention to the existence of low-quality drugs may be a means of increasing awareness (Po, 2001). Some suggested questions might be developed to enable patients to ask their doctor about their prescriptions and possible side effects (Herxheimer, 1976). In addition, there are some issues related specifically to drug quality that customers might ask the drug sellers, for example requesting proper labelling (name, strength, indication on the use), asking for the expiry date, and whether the drugs have been registered by the Ministry of Health. A clear label is useful for illiterate people as they can ask someone in their neighbourhood to do the reading for them.

Expensive drugs were believed, by both drug sellers and consumers, to be of good quality. It is important for drug sellers to understand that, although the risk of low quality may be greater for cheap drugs in contexts such as Lao, the price of the drug is not in itself a measure of its quality, both expensive and cheap drugs can be of both good or low quality. As a result, they would not recommend that their customers avoid cheap drugs. Dispensing of expensive non-ED has been common among practitioners in low-income countries (Hardon, 1987). Affordability of drugs seems to be more important for people in the study mainly in the rural and remote areas than the drug quality similar to other low-income countries (Krause *et al*., 1998). Ideally, it is the responsibility of drug sellers to help with information on the cost and equivalence of alternative preparation when consumers wish to spend as little as possible (Hermann *et al*., 1978). This is part of the role of the pharmacy staff as outlined in the WHO document (WHO, 1998).

Because many drug sellers were not aware of the risk of low quality drugs, it could explain why some drugs were purchased from illegal sources (Stenson *et al*., 1998). These drugs were purchased at a lower cost common with these sources, and the regulatory system, including inspections, was weak at the time of the study (Stenson *et al*., 1997) and still is. In Lao PDR, the recording system is poor including incomplete information on the bill for drug purchased. It is thus not always possible to inspect the drug source. The weakness of regulatory control is common in many developing countries (Kumaranayake, 1997). The prevalence of substandard drugs is said to be higher in countries where drug regulation is ineffective (Po, 2001; Ratanawijitrasin and Wondemagegnehu, 2002).

People in remote and rural areas did express less concern about the drug quality compared to those in the urban area. They may understand that this is not their responsibility. It may also depend on their educational level, knowledge, social culture and economic status.

8.6 Research in context

The randomised controlled trial is considered to be the best method to evaluate the effectiveness of interventions, avoiding bias common in other methods. In the laboratory, the intervention is usually well defined and can be applied exactly as planned. However, this study was conducted in a real life situation in an environment with scarce financial resources and the ultimate aim being to generate knowledge to improve the quality of pharmacy services at a national level. This was planned to be conducted through an additional regulatory intervention to what was included in the process of the NDPP, to avoid an intervention at high cost, and to make it possible to generalise nationally, following the main HSR principles of problem and action-orientation and low cost of intervention (Varkevisser *et al*., 1991). The stronger effect than expected of the NDPP made the extra intervention of low intensity, it was thus not possible to see much of significant effect of the intervention in the active intervention group compared to the regular intervention group. Expensive and stronger intervention, if used, could have provided a more significant improvement in the active intervention districts, but would have been potentially less possible to deploy to the whole country. This is an example of real world research and a real life situation, which differs from the clinical research where the subjects in the laboratory can be controlled (Stephenson and Imrie, 1998).

All studies were carried out with an effective collaboration between researchers, policy makers and managers from the central to provincial and district levels, e.g., from the Director and Deputy Directors of the Food and Drug Department and the President of the National Institute of Public Health of the Ministry of Health, to the Heads of the Provincial Health Department and the Provincial and district Food and Drug Units of Savannakhet. The main findings from the studies have been reported to central health professionals, managers and leaders at different sessions. In the year 2000, the results were disseminated through a workshop in Vientiane, with the participation of more than 100 representatives from all provincial health departments and institutions, leading to more awareness about the quality of drugs and pharmacy practices among health staff, managers, policy makers and leaders. Furthermore, during the NDP seminar in 2001, opinions on the usefulness of the HSR results were collected from 90 decision makers from different health institutions across the country. The participants were knowledgeable regarding the NDP and ED concepts and supported their implementation. They prioritised “non-pharmacists as drug sellers” and “order in the pharmacy” as main problems followed by drug dispensing, information and drug quality. They found that knowledge and perceptions of drug quality among drug sellers and consumers was an important factor affecting the drug quality. Ninety three percent of participants stated willingness to use the research results into their daily work (Paphassarang *et al*., 2002a).

Based on achievement and progress in the pharmaceutical sector and the results from the HSR projects the NDP from 1993 was revised in early 2001 to update the issue. Three new main elements, operational research, human resources development (HRD) and management and overall coordination of the NDP, were included in the revised NDP. This is an indication that the Savannakhet study made policy makers aware of the usefulness of this type of research for a more evidence based NDP implementation. It also indicates an emphasis on human resource development for improving the pharmaceutical sector and the overall coordination of the NDP. Other health system research projects (Boupha *et al.,* 2000) have been carried out after the

completion of research reported in this thesis except study V. For example, a study on self-medication and media use in 400 household in two provinces (Oula *et al*., 2000) illustrated how people used antibiotics as self-medication after previous advice from a doctor as well as receiving health information from the radio. A survey on the use of traditional medicine in 600 households in the Champassack province (Sydara *et al*., 2002), showed that people often used TM together with modern medicines for curing diseases, because of its perceived effectiveness. A cross-sectional study on the effectiveness of the NDPP showing beneficial effects of NDPP in terms of knowledge of NDP concepts, availability of ED and rational use of drugs (Paphassarang *et al*., 2002b). A randomised controlled trial in 24 departments in eight provincial hospitals on the effectiveness of feedback based on STGs (Wahlström *et al*., 2002) found that the introduction of STGs has improved the treatment for some common diseases and that an intervention with feedback sessions gave further improvement. The National Drug Policy, which includes HSR, has not been a theoretical document, but a guide for action to improve the overall drug situation in Lao PDR in accordance with the health strategies and directions of the Ministry of Health.

9. Conclusions and recommendations

- The quality of pharmacy services was low in relation to the concept of Good Pharmacy Practice characterised by bad order in the pharmacy, the lack of some Essential Drugs and some Essential Materials, little information on drug use to customers, inadequate drug labelling and mixing of drugs in the same bag.

- Private pharmacy practices improved through the regulatory instruments both from the on-going National Drug Policy Programme and the active intervention. More regulatory enforcement intervention combining inspection and education is recommended.

- Drugs of low quality were common although a significant reduction of substandard drugs was found from 1997 to 1999, including a significant reduction of samples with too low or too high a content of active ingredient, and samples with weight variation outside the standards. It is likely that the Quality Assurance under the on-going National Drug Policy Programme contributed to this improvement through improved manufacturing practices as well as more accurate import procedures. The drug quality monitoring system should be strengthened.

- Limitations in knowledge and perceptions about drug quality have been demonstrated among drug sellers and consumers. Their improved knowledge and perceptions about drug quality are important in enabling them to choose the right drugs from the right sources with good information so that the risk of consuming low quality drugs can be reduced. The improvement of drug quality should be promoted by increased knowledge and awareness, not only among drug sellers, but also among consumers.
  - A basic training in pharmacology and rational use of drugs and a continuing professional development programme should be provided to drug sellers, including nurses and other health staff.
  - Elements of basic knowledge on the rational use of drugs and drug quality should be included in public education campaigns in order to increase the awareness of drug quality and rational use.
  - The enforcement of pharmacy regulations should be strengthened to be able to trace the sources of drugs in private pharmacies enabling sanctions when appropriate.

- Further research is needed and should include:
  - Knowledge and practice of drug sellers in management of diseases important for public health such as malaria, acute respiratory infection, diarrhoea, sexually transmitted diseases.
  - The quality of drug information given by drug sellers to customers in private pharmacies to improve rational use of drugs in communities in Lao PDR.
  - A more comprehensive study on the quality of some vital essential drugs in relation to their price, origin and registration.

10. Acknowledgements

First, I would like to thank all my colleagues and friends at the Food and Drug Department, Ministry of Health and the provincial Food and Drug Unit in Savannakhet, without whom this research would not have been made possible.

I would like to thank *Dr Vilayvang Phimmasone*, Director of FDD and his two deputies *Drs Somthavy Changvisommid* and *Savengvong Douangsavanh,* and *all related organizations within the MoH* for supporting my study and accepting my long leave from work, without whom my study would not have been continued.

During my study at IHCAR, KI, I have been very well received by the management and staff. I would like to thank Professor *Hans Rosling,* Professor *Staffan Bergström* and Professor *Bengt Höjer,* for their kind support, good hospitality and heading a creative research department in international health.

In particular, I would like to express my greatest gratitude to:

Göran Tomson, Associate Professor, my main supervisor, for all his intellectual advice, continuous support, never giving up, constructive suggestions and encouragement. I am deeply grateful to him for broadening my knowledge of public health and Health Systems Research, for helping me understand the forest and a tree, for being patient and teaching me the art of thinking and writing to be sceptical, analytical and scientific, and for his excellent guidance in the research and administrative processes.

Rolf Wahlström, MD, PhD, my supervisor, for being supportive and having time to listen, for his valuable comments on the scientific papers and cover despite his workload, for encouraging and guiding me through the research process. I also would like to thank him for arranging a fantastic visit to his magnificent place in Gnesta among more than a hundred fragrant flowers, for more time for supervision and joy.

Bo Stenson, the Swedish principal investigator in the Savannakhet project, and co-author, for his support and valuable inputs. Without whom this research would not have been possible!

Cecilia Stålsby Lundborg, Pharmacist, PhD*,* for her valuable comments, support and inputs, for her kindness and friendliness, not only having time to listen and read the cover many times, but also for socialising, for being cheerful and sharing our happiness together, for walking happily together to the brilliant fireworks in the evening of Labour Day.

Solveig Freudenthal, PhD, for her support and assistance, valuable comments and inputs, for teaching me qualitative analysis and how to write a qualitative paper through years, for her patience, kindness and friendliness and for arranging a visit to her wonderful summer house in Vallindal.

Bo Eriksson, PhD, Statistician at the Nordic School of Public Health, Göteborg, also co-author, for his assistance in data analysis, comments and valuable inputs.

Björn Lindgren, PhD, Chemist at Medical Products Agency at the time of this study, for his skilfulness and support in drug analysis as well as in writing a scientific paper.

Lynn Silver, visiting Professor at IHCAR, for her valuable comments and support, for being an acting opponent for the pre-disputation of the thesis.

Rolf Johansson, MD, for his role in the development of GPP indicators as part of the NDPP, as well as *Gösta Surén,* Senior inspector, MPA, for his valuable comments on GMP and inspection manual.

Torkel Falkenberg, PhD, for his valuable comments on the cover, for his moral support and encouragement.

Ann Sophi Eriksson, Kersti Rådmark, Birgitta Linnanheimo, Anna-Stina Ullrich, Bo Plansted for their kind assistance in all administrative matters; *Lars Hedlund* for providing convenience for the use of a computer, upgrading programs and virus scanning and *all staff members of IHCAR,* who have assisted me during my studies, for their friendliness and for creating a very friendly atmosphere at IHCAR. I would also like to thank *Vibeke Sparring*, administrator at Medical Management Centre, *Gunmarie Löfberg* and *Anders Norman* at the Division of Social Medicine for their kind assistance, and *Andres Orjuela,* for the language revision of the thesis.

My sincere thanks also go to *Dr Sivong Sengaloundeth,* NDPP manager, *Dr Bounxou Keohavong,* NDPP administrator and *Dr Chanthakhath Paphassarang* at NIOPH, for their various valuable support and contribution.

Nguyen Thi Kim Chuc, (soon to be PhD), for sharing our thoughts and experiences in the research study on pharmacy practices. We have been in the same boat in terms of completing the thesis close to one another. Her company during the 'boat ride' has been pleasant for me.

I am also grateful to *Klas Rasmusson,* First Secretary at the Swedish embassy in Vientiane, for his valuable comments and supports, as well as *his Exellency Phou Rasphone,* Ambassador, and all the staff at the Lao embassy in Stockholm*,* for their moral support, kindness and friendliness.

Without funding from the Department for Research Co-operation with the developing countries (SAREC) within the Swedish International Development Cooperation Agency (Sida) for the Savannakhet survey, Sida through the Lao NDP programme, and the Swedish Institute, this study would not have been possible. I am deeply grateful.

Last but not least, my warmest thanks to my family, especially my wonderful daughter and sons, and my husband for taking care of everything during my absence from home, for their love and understanding. This thesis is my gift to all of you.

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12. Appendices

Appendix 1: Classification of districts according to their socio economic status

District	Literacy rate* (%)	Travel time and distance from the provincial HQ		Economic status***
		Hours**	Kilometres	
Khanthabury	77	0	0	Rich
Songkhone	72	3	71	Rich
Champhone	57	2	55	Rich
Atsaphangthong	46	2	65	Medium
Outhoumphone	58	1	33	Medium
Sepone	28	5	195	Medium
Phine	39	4	161	Medium
Xonbury	43	3	85	Medium
Atsaphone	47	3	91	Poor
Xaybury	63	2	45	Poor
Thapangthong	43	6	147	Poor
Nong	17	8	265	Poor
Vilabury	39	8	240	Poor

Source:
* National Statistics Centre, 1995
** Travel time from the provincial Headquarters was estimated by the research team based on the real time of travelling to the district.
*** There was no statistical information on economic status at district level. This was decided through a consensus meeting with the experienced provincial government staff.

Appendix 2. Questionnaires/Data collection forms for studies I, II, III

I. DATA COLLECTION FORM FOR PRIVATE PHARMACIES

DISTRICT_____
VILLAGE_____
NAME OF PHARMACY_____
DATE OF INTERVIEW _____
INTERVIEWER_____

P 1. SEX OF THE INTERVIEWEE male female

P 2. WHAT IS YOUR STATUS?
1=licensee
2=owner
3=spouse
4=child
5=other

P 3. WHAT IS YOUR AGE?_____

P 4. WHAT IS YOUR LEVEL OF EDUCATION?
1=pharmacist
2=assistant pharmacist
3=lower level pharmacist
4=medical doctor
5=assistant medical doctor
6=nurse
7=low level nurse
8=other

P 5. HAVE YOU RECEIVED ANY TRAINING IN DRUG DISPENSING?
Yes; No
If yes WHICH YEAR DID YOU RECEIVE THAT TRAINING?_____
WHO ARRANGED IT? _____
(Name of organisation)
HOW MANY DAYS DID IT LAST?_____days

P 6. HAVE YOU RECEIVED ANY INFORMATION ON DRUG REGULATION?
Yes; No
If yes, WHO GAVE IT TO YOU _____
(Name of organisation)
P 7. PLEASE SPECIFY THOSE REGULATIONS YOU KNOW ABOUT.

Tick for those regulations that are mentioned

Temporary Regulation on Pharmacy No 1036/MoH dated August 23rd, 1988/regulation on pharmacy

Notice 272/MoH/notice on punishments

Regulation on banned drugs in Lao PDR No 740/MoH/ List of banned drugs/Instruction for Banned drugs

Other regulations/notices on drugs from FDD

Other notices/information sheets on drugs from the provincial health department

Regulation book

Book on NDP.

Yes, but I don't remember

No answer

P 8. PLEASE SHOW ALL YOUR AVAILABLE DOCUMENTS

(If the regulations are locked in or kept outside the pharmacy they have to be shown before the inspection is finished, if not tick the box "no regulation available".)

Tick for those regulations that are found

Temporary Regulation on Pharmacy No 1036/MoH dated August 23rd, 1988

Notice 272/MoH

Regulation on banned drugs in Lao PDR No 740/MoH/ List of banned drugs/ Instruction for Banned drugs

Other regulations

Regulation book

Book on NDP.

No regulation available

P 9. PLEASE SHOW YOUR INSPECTION BOOK

inspection book available; inspection book not available

P 10. CHECK THE INSPECTION BOOK AND RECORD THE INSPECTIONS MADE IN THE LAST YEAR.

The date of the latest inspection _____

The latest final score_____

The date of the next latest inspection_____

The next latest final score_____

The date of the inspection before that_____

The final score_____

The date of the inspection before that_____

The final score_____

P 11. INSPECTION MADE DURING THE SURVEY:
Indicator 1 _____
Indicator 3 _____
Indicator 9 _____

P 12. DRUG PRICE UNIT
Tetracycline 250 mg _____kips, Manufacturer_____, Country_____
Ampicillin 250 mg _____kips, Manufacturer_____, Country_____
Chloroquine 250 mg _____kips, Manufacturer_____, Country_____
ASA300 mg_____kips, Manufacturer_____, Country_____

II. DATA COLLECTION FORM FOR CUSTOMERS

DISTRICT _____
PHARMACY_____
CUSTOMER CODE_____
DATE OF INTERVIEW_____
INTERVIEWER_____

C 1. WHY DID YOU BUY THIS MEDICINE?_____
_____
Exclusion criteria: Buying in order to resell
C 2. SEX OF THE INTERVIEWEE male; female

C 3. WHAT IS YOUR AGE?_____
C 4. HOW MUCH DID YOU PAY FOR THE MEDICINES?_____Kips

III. DATA COLLECTION FORM FOR DRUGS

DISTRICT _____
PHARMACY _____
CUSTOMER CODE_____
DRUG CODE_____

M 1. WHY OR FOR WHAT DISEASE DID YOU BUY THIS MEDICINE?
PLEASE SPECIFY _____

ANSWER related to drug; unrelated; don't know

M 2. WHO DECIDED THAT YOU SHOULD BUY THIS MEDICINE?#

Medical doctor
Other health worker
Yourself
Drug seller

Somebody else (mark one of the alternatives)

M 3. DO YOU KNOW HOW TO USE THIS MEDICINE? yes; no

M 4. DID YOU GET ANY ORAL INFORMATION FROM THE DRUG SELLER ABOUT THIS MEDICINE? yes; no
IF YES, PLEASE REPEAT_____
_____M 5. DID YOU GET ANY WRITTEN INFORMATION FROM THE DRUG SELLER ABOUT THIS MEDICINE? Yes; No
if yes, copy below_____

Inspection of medicine bought

M 6. LABEL Yes; No

M 7. IF YES, NAME OF THE MEDICINE AS WRITTEN ON LABEL:_____

M 8. TYPE OF PACKAGING:
in original package
plastic bag
paper bag
bottle

M 9. MIXING OF DIFFERENT DRUGS IN THE SAME PACKAGE Yes; No

IV. DATA COLLECTION FORM FOR DISTRICT PHARMACISTS

DISTRICT:_____CODE_____
DATE OF INTERVIEW_____
INTERVIEWER_____

D 1. IS THE SAME PHARMACIST AS IN LAST SURVEY(FOR THE POST INTERVENTION STUDY ONLY)? Yes; No

D 2. SEX: female; male

D 3. WHAT IS YOUR NAME:_____

D 4. WHAT IS YOUR AGE_____

D 5. WHAT IS YOUR EDUCATION?
pharmacist
assistant pharmacist

lower level pharmacist
medical doctor
nurse
other background, PLEASE SPECIFY _____

D 6. FOR HOW MANY YEARS HAVE YOU BEEN WORKING IN YOUR PRESENT POSITION_____

D 7. HOW MUCH OF YOUR TIME HAVE YOU USED FOR DRUG INSPECTION SINCE LAST SURVEY?
less than half
more than half

D 8. HOW MANY INSPECTIONS HAVE YOU CARRIED OUT OF THE PRIVATE PHARMACIES IN YOUR DISTRICT SINCE LAST SURVEY?_____

D 9. ON AVERAGE HOW MANY HOURS DO YOU SPEND ON EACH INSPECTION?_____

D 10. DO YOU GIVE ANY INFORMATION TO THE PRIVATE PHARMACISTS?
Yes No
if yes, PLEASE SPECIFY
order in the pharmacy
banned drugs
essential drugs
drug quality
expiry date
dispensing
information on specific drugs
presence of professional staff

D 11. DO YOU THINK THAT THE PHARMACY SERVICES OF THE PRIVATE PHARMACISTS NEED TO BE IMPROVED? not at all; not so much; very much

D 12. DO YOU THINK THAT YOU COULD CONTRIBUTE TO IMPROVE THEIR SERVICES? not at all; not so much; very much
if yes,
HOW_____
_____
if no, WHY NOT_____
_____

Appendix 3: The details of 3 (out of 10) indicators selected for use in the study

Facility specific indicators:

1. Order in the pharmacy

How to score: 10 is the maximum score

- **Available advertising stickers for drug promotion:**
- No sticker =2; 1-2 stickers =1.5; 3-4 stickers = 1; 5-6 stickers = 0.5;
- more than 6 stickers = 0;
- **Keep drugs away from sun light, high temperature and humidity:**

Observe the front door of pharmacies if any curtains exist and can protect drugs from the sun light, high temperature and humidity and give the score:
Can protect from the sun light totally = 2; Can protect from the sun light partly = 1
Can not protect from the sun light = 0

- **Good order keeping:**
- Classified by pharmaceutical forms and by the therapeutic group or alphabetic order = 2
- Classified by pharmaceutical forms but not by the therapeutic nor alphabetic order = 1.5
- Classified by the therapeutic or alphabetic order but not by pharmaceutical forms = 1
- Keep drugs in a nice way but don't have any classification =0.5
- Not nice and no order = 0
- **Keep drugs in their original container:** Drugs kept in their original containers = 2;
- In different containers = 0
- **Cleanliness:** Excellent = everything is in order and very clean = 2;

Very good = very clean = 1.5; Good = presence of some dirt and spiders' web = 1;
Bad = much dirt and spiders' web = 0.5; Very bad = very dirty everywhere = 0

2. Availability of 10 essential drugs, up to five names (brand or generic) for each, are examined for INN and clear label

1.) ASA,
2.) Iron,
3.) Ampicillin,
4.) Chloroquine,
5.) Co-trimoxazol,
6.) Mebendazol,
7.) Paracetamol,
8.) Penicillin V,
9.) Violet de Gentiane and
10.) ORS

Definitions:

- International non- proprietary name (INN or Generic name): Refer to Lao NDP, INN must be bigger than 1/3 of its brand name.

- Correct Label (CL): should include all of the following: Name of drug, strength, formula, manufacturing date or expiry date, lot or batch No., indication for use, address of manufacturer.
- Essential Drugs (ED): All drugs with one active ingredient, according to the National Essential Drug List (NEDL), including Cotrimoxazol (Sulfamide+Trimetoprim)
Calculation: 10 is the maximum score.
Give 1 score for ED, 1 score for INN and 1 score for CL for each drug if it has all criteria according to the definitions and then divide by the number of drugs found (up to 5). Sum up and finally divide by three to get the average score for availability of ED with INN and CL.

3. Availability of essential materials

1.) Hygienic counter,
2.) Display cabinet in glass,
3.) refrigerator,
4.) regulation book,
5.) banned drug list,
6.) manual for ED use,
7.) ED list for three classes of pharmacies and list of available drugs,
8.) packaging materials,
9.) Facture book and
10.) monitoring book for pharmacy.

Calculation: 10 is the maximum score
Each available item result to 1 score, if not give 0

Appendix 4. Questionnaies/Data collection tools for study V

1. Drugsellers:

Pharmacy number ☐☐☐☐☐

Pharmacy class ☐

Pharmacy name:.....

I. General Information:

1. Pharmacy status: 1: owner ☐
2: licensee
3. owner + licensee
4: others

2. Sex: 1: Male ☐
2: Female

3. Permanent seller: 1: permanent seller ☐
2: Non-permanent seller

4. Professional education level: ☐
1: Pharmacist
2: Pharmacist assistant
3: Pharmacy technician
4: Medical doctor
5: Medical Assistant
6: Nurse
7. Auxiliary nurse
8. Other, specify.....

5. Do you think that your profession as drug seller is a good job? ☐
Very good=1, good=2, Don't know=3, Not good at all=0
Please specify.....
.....
6. Are you satisfied with how you are doing your job? ☐
Very much=1, Not very much=2, Don't know=3, Not at all=0
Please specify.....
.....

7. Is your business good or not compare to previous year? ☐
Very good=1, good=2, Don't know=3, not good=0
If yes or no, specify.....

.....

8. What are the major problems in your business?

0= Not thing ☐
1= Economic problem ☐
2= Illegal drugs ☐
3=No security about the Quality of drugs ☐
4= Lack of knowledge of drug sellers ☐
5= Don't know ☐
6= Other, specify.....

9. Where do you buy drugs from ?

1= Pharmaceutical companies ☐
2= Pharmaceutical factories ☐
3= Private pharmacies ☐
4= Trafickers ☐
5= Other sources ☐
Specify.....

II. Knowledge & Perception of Drug seller:

10. Do you know what a correct label is? Yes = 1; No= 2 ☐
If yes please tick, which information do you know?

Name of drug and strength
Lot number
Expired date/manufactured date
Manufacturer address
Indications

11. Do you know how to identify the expired drug? Yes = 1; No= 2 ☐
If yes, give an example (by random selecting a package of drug).....
..... ☐
Correct=1, incorrect=0

(IF THERE IS ONLY MANUFACTURED DATE, THE EXPIRY DATE SHOULD BE FIVE YEARS AFTER THAT, EXCEPT FOR ANTIBIOTICS, INJECTIONS AND SYRUPS)

12. Please specify what a good quality of drug is?

.....
.....

(A GOOD QUALITY OF DRUGS IS A DRUG WITH CORRECT LABEL, TO BE PUT IN AN ORIGINAL PACKAGING, REGISTERED AT FDD OR BEEN ANALYSED AT FDQCC, CONTAINED OF RIGHT AMOUNT OF ACTIVE INGREDIENTS AS MENTIONED ON THE LABEL)

13. Please specify what a low quality of drug is?

.....

.....

(A LOW QUALITY OF DRUG IS THE OPPOSITE MEANING OF THE ABOVE DEFINITION)

14. Do you know that some drugs sometimes have the low active ingredient or don't have as indicated on the label. Yes=1; No=2 ☐

15. Do you have a refrigerator in your pharmacy? ☐
Yes=1 , No=0

16. Specify the types of drugs to be kept in the refrigerator. ☐

.....

.....

Correct=1; incorrect=2 ☐

(DRUGS TO BE KEPT IN THE REFRIGERATOR SHOULD BE THE FOLLOWING: VACCINS, ATS, SUPPOSITORY, EYE DROPS ETC...)

If yes, specify in which temperature?.....

.....

Correct=1; incorrect=2 ☐

(VACCINS=2-8 C° , ATS= 2- 8 C°, SUPPOSITORY= 8-15 C°, EYE DROPS= 8-20 C°)

17. What do you think about the quality of drugs you sell ? ☐
1= very good, may be some are not good=2, don't know=0
3= other. specify.....

18. What do you aware about the quality of drugs?
0= Nothing ☐
1= substandard ☐
2= Not good manufacturing ☐
3= wrong storage ☐
4= No label ☐
5= don't know ☐
6= other, specify..... ☐

2. Exit-Customers:

Pharmacy number ☐☐☐☐|☐

Pharmacy class ☐

Pharmacy name:.....

Name.....Age.....Sex.....

1. What drug did you buy?
0= don't know ☐
1= analgetic ☐
2= for flu ☐
3= for malaria ☐
4= antibiotics ☐
5= antidiarrhoea ☐
6= other, specify.....

2. And for whom? 1= for my self, 2= for my family, 3= for someone else

0= don't know ☐
1= analgetic ☐
2= for flu ☐
3= for malaria ☐
4= antibiotics ☐
5= antidiarrhoea ☐
6= other, specify..... ..... ☐

3. Have you ever used these medicines before? Yes=1; No = 2

0= don't know ☐
1= analgetic ☐
2= for flu ☐
3= for malaria ☐
4= antibiotics ☐
5= antidiarrhoea ☐
6= other, specify..... ..... ☐

4. Are you satisfied with the drugs you bought? Yes=1; No = 0, don't know=2

0= don't know ☐
1= analgetic ☐
2= for flu ☐
3= for malaria ☐
4= antibiotics ☐

5= antidiarrhoea ☐
6= other, specify..... ..... ☐

5. Did the drug seller inform you about the use of these medicines? ☐
Yes=1; No = 2
If yes, specify

0= don't know.....
1= analgetic .....
2= for flu.....
3= for malaria.....
4= antibiotics.....
5= antidiarrhoea.....
6= other, specify..... ....
.
6. Do you think drugs are good? Yes=1; No = 0; don't know= 2
- Local product ☐
- French products ☐
- Thai products ☐
- other, specify..... ☐

7 What do you expect from pharmacy? ☐
1= can buy drugs we need
2= with good quality drugs
3= other, specify.....
0= don't know

8. What do you worry about drugs? ☐
1= quality of drugs
2= don't know
3= don't worry
4= other, specify.....

9. Do you know that some drugs we use have low active ingredient, or don't have, as indicated on the label? Yes=1 No=0 ☐
If yes specify.....

10. Do you use all of drugs you bought? Yes=1 No=2 ☐
If No, Please specify.....
.....
.....

3. Focus Group Discussions

Interview Guide for Community members

1. What do you do when somebody in your family get sick?
2. What do you know about drugs? What is important to you to know about drugs, e.g fake, substandard drugs?
3. What information do you get from the drug sellers?
4. The drugs you buy do they always have label or not?
5. Do you think that the label is important? Why? Have you ever read it? Who tell you? Which place (information) do you read?
6. What is your view on getting information and not getting information on label?
7. Please tell us more, how you use drugs. Do you stop when you are getting better or you take the whole dose?
8. How do you keep the remaining drugs? Have you ever put in refrigerator?
9. What do you know about the expiration date of drugs? And what effect do you think?
10. Do you know that some drugs have low active ingredients or do not have as indicated on the label?
11. What is a good drug for you?
12. What do you aware about the quality of drugs?

Interview Guide for drug sellers

1. What do you think about your job?
2. What is important for you to know when you dispense drugs?
3. Do you think that the label is important? Why?
4. What is your view on giving information and not giving information on label?
5. Do you think that people use all drugs they bought?
6. What do you know about the expiry date and lot number of drugs? And what effect do you think?
7. Do you think that low quality drugs are affected to health and society?
8. Do you know that some drugs have low active ingredients or don't have as indicated on the label?
9. Do you know what types of drugs to be kept in the refrigerator and in which temperature?
10. What is a good drug for you?
11. What do you aware about the quality of drugs?