CONTENTS

Contents ....................................................................................................................1
Abbreviations ........................................................................................................3
Introduction ...........................................................................................................4
  Primary care .........................................................................................................4
  Drug prescription .................................................................................................6
  Strengthening the role of the patient .................................................................9
  Perceived health .................................................................................................13
  Patient characteristics .......................................................................................15
  Assessment of health care conditions and patient characteristics ...............16
  Register-based research ......................................................................................18
  Factors influencing drug prescription ...............................................................21
Aim of the thesis .....................................................................................................22
Materials and methods .........................................................................................25
  Data sources .......................................................................................................25
  Outcome variables measures ............................................................................29
  Statistical analyses ............................................................................................35
  Ethical considerations ........................................................................................36
Main results (I-IV) .................................................................................................37
Discussion ..............................................................................................................42
  Methodological considerations .........................................................................51
  Practical implications and future studies .........................................................56
  Conclusion ..........................................................................................................58
Acknowledgements ..............................................................................................60
References .............................................................................................................62
ABBREVIATIONS

APSE  Pharmacy Services Limited (Apotekens Service AB)
ATC   Anatomical Therapeutic Chemical classification
DDD   Defined Daily Doses
GP    General Practitioner
HCC   Health Care Center
HAD-D Hospital Anxiety and Depression Scale-Depression
MPA   Medical Products Agency (Läkemedelsverket)
PIN   Personal Identification Number
SES   Socio-Economic Status
SPDR  Swedish Prescribed Drug Register
SRH   Self-Rated Health
SKL   Swedish Association of Local Authorities and Regions (Sveriges Kommuner och Landsting)
SS    Statistics Sweden
TLV   Dental and Pharmaceutical Benefits Agency (Tandvårds- och Läkemedelsförmånsverket)
WHO   World Health Organization
INTRODUCTION

In today’s healthcare, many patients are well informed, thus causing them to have higher expectations of their physician. There are several initiatives to strengthen the role of the patient, but the increasing number of elderly patients and patients with chronic diseases leading to more expensive treatments, particularly for medication, places a greater emphasis on reducing costs.

In a national drug strategy adopted to achieve more efficient and safer drug treatment and greater patient satisfaction, the aim is to get patients more involved and knowledgeable of their treatment [1]. Areas of priority for this is the development of knowledge and guidelines for drugs, and drug treatment for the patient group where this is most neglected, cost-effective use of drugs, generic prescription, and equitable care [1].

Primary care

Society demands primary care to provide good care at limited costs, including costs for drugs. In primary care, patients with chronic diseases constitute a large proportion of patients. However, it is currently difficult to know exactly what proportion the care of patients with chronic illness is in relation to patients with acute illness, due to missing patient registrations in primary care [2]. Missing data is due to a lack of adequate legislation, and that diagnosis classification is poorly adopted to primary care [2]. Drug treatment is common for chronic diseases, and an increasing proportion of the total volume constitutes drugs for the treatment of chronic diseases [3]. Non-hospital drug consumption has grown globally between 2000-2008 [3]. In 2012, the cost in
Sweden for subsidized drugs was 17,899 billion SEK, which constituted 74% of the total selling price for prescribed drugs [4], which corresponded to 5,725 SEK/person among those receiving subsidized medication. The cost for subsidized drugs has increased by 33% from 2000 to 2011. However, the cost decreased by 6% in 2012 compared to 2011 (Figure 1).

![Figure 1. Cost trend for subsidized drugs in Sweden 2000-2012 [4]](image)

**Cost responsibility**

Since 1998, the county councils of Sweden are cost accountable for subsidized drugs. Most county councils have further decentralized cost accountability as far as to the health care centers (HCCs) or other care units. The objective of decentralization was to place responsibility closer to prescribers, and motivate physicians to keep drug budgets balanced. However, county councils have organized this in several ways [5]. HCCs or other care units receive annual reimbursement for subsidized drugs from the county council. Cost estimations differ slightly between county councils but are generally based on age and sex.

The cost of subsidized drugs at HCCs is influenced by the number of prescribed drugs and their cost, i.e. the larger number of prescriptions and the more expensive drugs patients are prescribed, the faster the cost ceiling will be reached. The cost of subsidized drugs is higher for HCCs responsible for citizens with a lower socioeconomic status (SES) [6].
Drug prescription

Drug prescription in this thesis not only describes prescription but the use of drugs as well. Here, prescribed drugs are drugs prescribed for patients that can be dispensed at pharmacies. Patients decide whether drugs should be dispensed and also how to adhere the prescription. Thus, drugs which are dispensed are not necessarily consumed. Other words used here in similar meanings as drug prescription are medication, drug utilization, and drug treatment.

Drug utilization is a concern of both individuals and society concerning lives saved, complications prevented, diseases cured, and costs to the health care system. Medication is, in many conditions, the key to maintaining good health, and is important to the well-being of many patients. Thus, the aim of drug treatment is to achieve maximum benefit from the medication [1].

In the choice of prescribed drugs, the physician has several demands from society, based on the patient’s medical needs or the need to comply with the regulations and recommendations, some of which are presented below. However, physicians have the right to choose other options. On the other hand, physicians have a responsibility to the drug budget, and allocated funds must suffice for the year.
Figure 2. Illustration of how the physician balances societal requirements with the patient's needs when prescribing a drug. Laws: Generic Benefit reform, Health-Care law, Patient Safety law, LDTC=Local Drug and Therapeutic Committee, MPA=Medical products Agency and TLV=Dental and Pharmaceutical Benefits Agency.

Subsidized drugs and the Pharmaceutical Benefit scheme
In Sweden, a new pricing and reimbursement scheme was introduced in 2002 [7]. The scheme implies the use of cost-effectiveness analyses for determining the reimbursement status of new pharmaceuticals and mandatory substitution of the lowest cost generic alternative. The Pharmacy Benefit Scheme, a general insurance system for reduction of high drug costs, encompasses all Swedish citizens and implies that patients pay for medication only up to a certain level on an annual basis (Figure 2). In order to be reimbursed, i.e. included in the Pharmacy Benefit Scheme, prescribed drugs must be approved by the Dental and Pharmaceutical Benefits Board (TLV) [7].

Generic substitution is mandatory for pharmaceuticals containing the same substance, in the same formulation, and deemed comparable by the Medical Products Agency (MPA) (Figure 2). When a cheaper, therapeutically equivalent drug than the prescribed drug exists or if the pharmacy does not have the prescribed preparation in stock, the pharmacy will dispense the drug
with the lowest price (available at the pharmacy) as long as it is considered interchangeable by the MPA [7]. However, the physician has the right to choose the drugs, and can oppose substitution by ticking a box on the prescription form. The patient can also choose to pay extra for the more expensive alternative.

The Local Drug and Therapeutics Committee
Since 1996, all county councils in Sweden are required by law to manage a Drug and Therapeutics Committee. The committee provides prescribers with drug recommendations for many diseases and conditions based on cost-effectiveness for a desired effect [8] (Figure 2).

The Drug and Therapeutics Committee follows-up prescribing to provide feedback to HCCs. When receiving feedback by mail and through a single instructional session, general practitioners’ (GPs) awareness of their prescribing has been shown to improve [9].

Patient’s role in the choice of drug
The last step in the chain of drug utilization is controlled by the patient, i.e. how the patient adheres to the drug prescription. The terms adherence, compliance, and concordance are used when describing how patients follow treatment instructions. Recommendations for the use of these terms are provided in a report from the National Coordinating Centre for NHS Service Delivery and Organization R&D (NCCSDO). To describe patient medication use or “the extent to which the patient’s behavior matches agreed recommendations from the prescriber”, the term adherence is recommended. The term compliance denotes the role of the patient to passively follow the physician’s orders. In addition, the term concordance refers to a joint
agreement between the physician and patient who incorporates views and beliefs [10].

Adherence to drug treatment

Patient roles in context of drug utilization have in recent years received increasing attention concerning adherence to drug treatment. Patient participation and influence on their care and treatment has been discussed as a measure to increase adherence to drug treatment [11, 12]. A major problem, both in terms of health care quality and cost, is that approximately 50% do not take medication as prescribed [13, 14]. Several factors can predict non-adherence, such as not knowing what to do or why [15], negative attitudes toward medication and negative beliefs about the necessity [16], asymptomatic disease, side effects and inadequate follow-up [14] and multiple drug use [17]. A further consequence of non-adherence is not to buy the drug. Not to buy prescribed drugs are most common in people with the lowest disposable income, the unemployed, and those with the lowest educational level [1]. Conditions that promote adherence are perceptions of medication as an important treatment, higher personal control, reduction of symptoms [18], and controllability of illness [16]. These conditions can be directly related to the physician’s communication regarding the medication’s importance and its side effects [19].

Strengthening the role of the patient

Increasingly, the role of the patient is emphasized in health care. Patients are offered involvement in their treatment, supported in order to be able to influence their care, and should be given options when there are several alternatives [20, 21]; this also applies to drug treatment. Patients may therefore place expectations on the physician to be able to gain influence and
the desire to decide. However, patients cannot ask for more than what is warranted by medical necessity [20].

In Sweden, a forthcoming Patient law [22] will further support patient autonomy and the opportunity for patients to participate and influence their care and choice of treatment. Moreover, staff members have an obligation to support the patient in their participation in decision-making about treatment [23]. The concept of patient-centered care is increasingly advocated, particular in primary care, and usually refers to agreements made with the patient involved concerning participation in decision-makings [24]. A prerequisite for patient-centered care is strengthening the patient's belief in the ability to participate.

Patient empowerment
With the purpose of improving self-confidence, self-determination, and increased control of decisions affecting one's life, the concept of empowerment is used. Patient empowerment aims at enhancing their ability to influence their lives. The empowered patient develops confidence and beliefs in their capacity and capability to influence events. Empowerment can be viewed as an outcome or a process, and refers to increasing the individual's self-esteem and self-efficacy, and involves situational change [25]. One purpose of so-called situational change is that patients should be able to use her enhanced abilities [26], and is thus given a greater opportunity to influence her care and treatment. With the purpose of utilizing the patient's expertise as a tool to develop more patient-centered care, for example patients with chronic renal failure were asked to speak of how they regarded participation and involvement in their care and treatment. According to the study, areas of improvement were revealed that could be of value in facilitating the patient's influence in their care [27].
In a supplementary directive to the new Patient’s law, the government proposes to investigate how care providers can be more responsive to and learn more of patients’ experiences [22]. The directive also proposes the creation of a computer-based health account (Hälsokonto) in which it will be possible to exchange information between the patient and care providers. The proposal implies that patients will be able to enter their health data in the health account. Thus, to strengthen patient control over their health information, patients will be able to decide whether it should be accessible to care providers. On the other hand, patients should also have access their medical record [28]. A similar program with more patient-centered care has been launched by the Commonwealth Funds organization for primary care in the United States [29]. Measures should be taken to increase patient access to information, strengthen the patient’s position and power, and provide control over information about their health [30]. If the patients would like to increase their knowledge on their own, the National Board of Health and Welfare, the county councils and various patient communities provide general information about health, disease, and treatment for patients. Most of the information is available on the internet. In visions for health care in the future, it is likely that more complex IT-support will be developed to increase patient control in health care [31].

Shared decision-making

Shared decision-making is a method for greater patient-centered care and patient autonomy [32] to strengthen the role of the patient. The concept of shared decision-making can be described as a process in which at least two participants are involved, both parties taking steps to participate, information being shared between parties and finally, both parties agreeing on the decision [32] (Figure 3). Shared decision-making in an encounter includes “meeting of experts” with the physician as the expert in medicine and the patient the
expert on her life, values and circumstances [33]. Informed decision-making is a model of shared decision. This model incorporates the idea of information sharing and is an enabling strategy for empowering the patient toward greater self-determination. Both the patient and physician contribute information; however, the type and amount can vary but the outcome is to be shared and the decision agreed upon [32] (Figure 3).

Figure 3. Variations of information provision in the shared decision making process with the physician as the expert in medicine and the patient as the expert of her life, values and circumstances. a. The physician and the patient bring equal amounts of information. b. The patient brings most information. c. The physician brings most information.

The responsibility of the physician and other health care staff members is to create a relationship with the patient and communicate preferences in decision-making, to find out the patient’s beliefs and expectations, and identify the available choices and eventually agree upon an action plan or decision [34].

The patient encounter
The concept of encounter, for both medical and caring aspects, is used in this thesis, and refers to aspects on how to communicate with the patient: body language, greeting, eye contact, conversation and how to sit, move or stand in relation to the patient. A caring encounter is strengthening and supportive to the patient [35], and constitutes part of the efforts to strengthen the patient in her role.
Being seen, heard, and understood are important components of a good encounter [36, 37]. In a caring encounter, the patient’s existence is confirmed [36]. The central aspect of the philosophy of caring is a meeting [36] based on the encounter of two human beings in an event as I-Thou relating [38]. When meeting anyone (a patient), the encounter can be good, bad, cold, or warm. However, as an encounter is never empty, health care staff members need to be aware of what message is being conveyed to the patient at the encounter. When health care staff members are in a hurry, appear cold or are uninvolved, patients are depleted of energy and well-being [35].

The encounter in the health care context is to a large extent a communicative activity, and an important part is the language of dialogues and conversations. A caring conversation is characterized by talking with and not to the patient [39]. The encounter is particularly important in meetings with patients with chronic diseases within primary care.

**Perceived health**

All individuals have an idea of their health status. Perceptions of poor health may for many individuals be a reason to seek care. In addition, how health is perceived by the patient influences the establishment of the need for treatment, and can affect the desire to influence and determine the terms of treatment [40]. Determinants contributing most to perceived health are mental and physical health status such as symptoms, sickness absence, physical tiredness, physical mobility, minor psychiatric morbidity, number of prescribed drugs [41, 42], and age, to factors expected to influence future health such as behavior and genetics, knowledge of other peoples’ situations, earlier health status, and expected health development [42]. Perceived health can be measured as self-assessed or rated health.
Chronic diseases

Chronic diseases more or less affecting one’s life might initiate different decisions. Chronic disease refers to persistent, recurrent or incurable disease [43]. In this thesis, the chronic diseases depression and hypertension were chosen to study in relation to self-rated health. These diseases were chosen because they are common diseases, with different manifestations and impacts on health status. Furthermore, they might involve important choices in daily living. According to the World Health Organization (WHO), chronic diseases are diseases of long duration and generally slow progression [44]. The risk for chronicity in depression is around 20% after one incident, and a higher risk when the onset is after the age of 50 [45]. The estimated prevalence of depression is about 10% [46], and lifetime prevalence in western counties estimated to 17-18% [45]. Hypertension is considered by the WHO as a chronic disease [44]. The estimated prevalence globally of hypertension in an adult population ≥20 years of age is 26% [47].

Depression

Depression affects mood and how life is perceived [45]. The prevalence of depression is higher than for the clinical diagnosis [48], which implies that in the context of self-reported data collection by questionnaires facilitate, respondents probably reported illness of only what has been diagnosed by a physician. The Hospital Anxiety and Depression Scale (HAD) has been used to reveal respondents with depressive symptoms [49].

Hypertension

Hypertension can exist without symptoms, or cause symptoms such as headache, palpitations, and dizziness [50]. Hypertension is an important risk factor for cardiovascular disease [51]. How hypertension affects the perception of health may depend on the presence or absence of symptoms [42].
Patient characteristics

Aside from age and sex, patient characteristics here refer to socioeconomic factors. Health status can be related to socioeconomic factors, and theirs relationships have been investigated in a number of studies. Health care in Sweden is intended to be equal for all citizens regardless of SES, age and sex [20].

Socioeconomic status

Health is influenced by SES through multiple pathways, and socioeconomic factors are explained as fundamental causes of socioeconomic disparities [52]. To give a few examples; knowledge and life skills facilitates access to information, and resources to promote health and a better economy allows the acquisition of better nutrition, housing and schooling [52]. In a recent study, the relationship between specific psychosocial qualities that naturally contribute to physiological resilience has been discussed as an explanation as to why individuals with a low SES with these psychosocial qualities have avoided illness [53].

Inequalities in health among population groups have been explained by socioeconomic status (SES) [54-57]. Low SES is associated with poor health [54-64] and increased drug utilization [65]. Interestingly, if conditions change, risks change [66], but contradictorily, poverty during childhood is a potent predictor of a variety of adverse health outcomes during middle and late adulthood [67].
Assessment of health care conditions and patient characteristics

When assessing patient health there are a number of methods, e.g. the EQ-5D [68], the SF-36 Health Survey [69], and the Health Barometer (Hälsobarometer) [70]. A “simple” method is Self-Rated Health (SRH). In assessing patient health, there is a high degree of subjectivity involved, whereas assessing patient characteristics more or less involves objectivity, at least as far as content of different registers admit.

Self-rated health

Self-rated health (SRH) is a method for the assessment of how the patient perceives their health. In this thesis, a widely used measurement of perceiving current health was used, based on asking individuals to evaluate her health status with one single item; “In general, how would you describe your health?” SRH has demonstrated to be an independent predictor of morbidity [71] and mortality [72-75].

How people assess their health can be understood as a cognitive process affected by several underlying factors with considerable individual variation [41, 42]. However, assessment can also be intuitive [42]. In a model proposed by Jylhä, the process of self-rated assessment involves recognizing the meaning of health and identifying components that should be taken into account for one’s health [42]. How the identified components should be taken into account may then be considered. The assessment will finally be completed by deciding which of the response alternatives corresponds best to the patient’s perceived health [42].
**Socioeconomic status**

In this thesis, SES is used as both a variable and a concept. The term SES is used to designate economic and social well-being. Krieger et al. consider that the term socioeconomic position relates to class in a more complex way than the term SES, since it distinguishes between actual resources and status, implying prestige or rank-related characteristics [76].

SES is usually determined by education and income [76], or by education, income and occupation [52]. In this thesis, education, income, foreign background, unemployment, and assistance allowances are used as indicators for SES.

**Education**

Education as a proxy for SES can be measured in terms of credentials, or in number of years of education. However, since years of education might have different implications, academic degrees may be preferable [76]. On the other hand, there is an association between individuals aged 18 to 95, years of education, and perceived health and physical function, but not between college degrees, perceived health and physical function [77].

**Income**

Income as a proxy for SES indicates aspects of income levels and income dynamics. Further, effects of income on health are different for poorer than for more wealthy individuals [52, 76], and show a stronger association between income and health at lower income levels [78].

**Occupation**

Occupation as a proxy for SES has several aspects to consider. An important distinction is whether or not one is employed. Among those employed,
occupation affects prestige, job characteristics, physical and psychosocial risks, and control of the work [52]. In general, mortality risk is increased when moving from professional, highly skilled occupations to less-skilled and more labor-intensive occupations [79]. Assistance allowance is, in this thesis, used as an expression of unemployment in family members.

Other ways to measure SES

SES can also be measured on the basis of poverty, wealth and assets, material and social deprivation. As Krieger et al. stated, “no single factor accounts for links between socioeconomic position and health” and this may be measured by various parameters in relation to level (individual, household and neighborhood), time period, and in ethnicity and gender [76].

Register-based research

The Swedish national registers are referred to as a gold mine of data to be utilized in research and to follow up health care, e.g. epidemiological studies [80]. The Swedish Research Council encourages the use of these registers by e.g. organizing training for graduate students in register studies. A register stores reported data. Data collection from these registers can be done either automatically or manually. An example of a register with automatic data input is the Swedish Prescribed Drug Register (SPDR). For health research, a number of health data registers are administered by the National Board of Health and Welfare, and quality registers administered by the Swedish Association of Local Authorities and Regions (SKL); most of these registers are reported to manually.

Research by means of register-based data can be extended by linking different registers using the personal identification number (PIN). All registered residents in Sweden are given a PIN which is retained throughout life [81].
For example, by linking individual data from the SPDR with data from Statistics Sweden, drug utilization can be measured for different population groups. Results of such research can then be the basis for evaluating targets for drug utilization [1].

*The Swedish Prescribed Drug Register*

The Swedish Prescribed Drug Register (SPDR), a health data register, is individual-based and contains data from all dispensed out-patient prescriptions at all Swedish pharmacies from July 1, 2005. The register includes information on patient, drug, prescriber, and pharmacy [82], and can be linked to other registers by using the PIN. The register is regulated by legislation issued by the Swedish government, restricted to epidemiological investigations, research and the production of health care statistics [83]. Information from all dispensed prescriptions is administered by the Pharmacies Service Limited (APSE; Apotekens Service AB) to the SPDR at the National Board of Health and Welfare. All drugs are classified according to the Anatomical Therapeutic Chemical (ATC) classification system [84] (Figure 4).

*Statistics Sweden and municipality information*

Statistics Sweden is a state authority responsible for official and other government statistics [85]. This authority can process data in a variety of registers including people and housing censuses, education, income, capital, occupation and living conditions.

Based on Statistics Sweden, the municipality presents public information in residential areas containing data for age and sex distribution, average income, foreign births, information on assistance allowance for inhabitants between the ages of 20 and 64, and educational levels in aggregated data. This information
is available on the municipal website and aims to convey easily accessible information for local residents or anyone else interested (Figure 4).

Sales statistics

Before 2009, when the Swedish pharmacy market was deregulated, the National Corporation of Pharmacies (Apoteket AB) was responsible for process and store sale statistics for products sold in pharmacies. Since then, APSE administers sales statistics. The database X-plain, at the National Corporation of Pharmacies, contained aggregated data on e.g. dispensed pharmacy drugs presented as an ATC-code or DDD, the benefit cost or selling price. The data could be obtained for e.g. one HCC. Today, the statistical system Concise provides the raw data at APSE for county councils and for research and contains the same type of information [4] (Figure 4).

Local Registers on listed citizens

Citizens are free to choose HCC by a listing system. To be listed means to be registered at an HCC to receive primary care (Figure 4).

Figure 4. Illustration of resources used for supporting information exchanged between patient and physician, present and future (dashed marked) when drugs are prescribed. HA=Health account not presently available. APSE=Apotekens Service AB, ECR=Economic Care register, EHR=Electronic Health Record, HDR= Health Data Register excl. SPDR, SPDR=Swedish Prescribed Drug Register, QR=Quality Register and SS=Statistics Sweden.
Factors influencing drug prescription

Several factors influence drug prescription in addition to medical necessity. Demands to involve patients in treatment decision making and increase their participation are increasing [21, 22]. Today, patients are well informed, and many have an idea of how she/he wants to be treated. This can result in expectations that the physician respect the patient’s will. The treatment required might also be influenced by how health is perceived.

The prescription of interchangeable drugs might, for some patients, imply difficulties because the prices of competing drugs often change. Thus far, the generic reform requires the physician to prescribe the cheapest alternative of interchangeable drugs. The specific drugs that the physician and patient have agreed upon may not be available just then at the pharmacy. Furthermore, the patient may have preferences concerning interchangeable drugs. In addition, physicians have an obligation to maintain the budget for subsidized drugs, which implies that recommended and interchangeable drugs are to be prescribed.

Various factors may affect the physician in the decision of drug treatment such as patient characteristics, the patient’s economic situation, time constraints, and the physician’s competence. However, there may also be underlying factors affecting the decision unbeknownst to the physician.
AIM OF THE THESIS

The overall aim of this thesis was to describe the factors with an impact on drug prescription in primary care and perceived health.

The specific aims are summarized below.

- To compare reimbursement for pharmaceutical benefits in primary HCCs in one county council in Sweden with differing socioeconomic conditions in relation to actual drug costs (Paper I).
- To study how individual and care provider factors influence the prescription of drugs at different price levels (Paper II).
- To describe patients’ experiences of participation in decision-making when starting long-term medication (Paper III).
- To investigate self-rated health (SRH) for the elderly with emphasis on those with depression or hypertension, treated or untreated, and to investigate the correlation between educational level and depression/hypertension and in relation to age, sex and drug treatment (Paper IV).
**Table 1. Overview of the studies in the thesis.**

<table>
<thead>
<tr>
<th>Paper</th>
<th>Period</th>
<th>Research question</th>
<th>Subjects n</th>
<th>Design/analysis</th>
<th>Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>2008</td>
<td>To compare reimbursement for pharmaceutical benefits with actual drug costs at HCCs with differing socioeconomic conditions</td>
<td>33,483</td>
<td>Individual-based register study and aggregated data, descriptive statistics and linear regression</td>
<td>Age groups, sex, ATC groups, drug benefit costs, HCCs, income, education, assistance allowance, foreign born and employment</td>
</tr>
<tr>
<td>II</td>
<td>2010</td>
<td>Whether individual factors combined with care provider factors influence the prescription of drugs at different price levels</td>
<td>18,486</td>
<td>Individual-based register study, univariate and multivariate regression</td>
<td>Age groups, sex, education, income, foreign born, public or private care provider, ATC-groups</td>
</tr>
<tr>
<td>III</td>
<td>2011-2012</td>
<td>Patients’ participation in decision-making when starting long-term medication</td>
<td>9</td>
<td>Interviews, semi-structured; qualitative content analysis</td>
<td></td>
</tr>
<tr>
<td>IV</td>
<td>2012</td>
<td>The influence of educational levels on SRH in the elderly and particular in elderly with depression and hypertension. The correlation between educational level and depression/hypertension</td>
<td>6,659</td>
<td>Individual-based questionnaire, randomized cross-sectional sample, descriptive statistics, univariate and multivariate regression, ANOVA, Chi-square</td>
<td>SRH, age groups, sex, education, depression, hypertension and treatment for depression and hypertension</td>
</tr>
</tbody>
</table>
MATERIALS AND METHODS

Data sources
An overview of the different studies is given in Table I.

The Swedish Prescribed Drug Register (I, II)

Measurement of drugs in relation to number of individuals, individual factors and care providers

In Study I, we analyzed dispensed prescribed drugs at five HCCs in number of individuals, grouped in age and in sex respectively by using the SPDR. The extracted drugs were drugs selected from four groups in the ATC-registry, the remaining drugs and all drugs separately for the five HCCs. The data was extracted first for 2006 and later for 2007. The data comprised a total of 33,483 individuals in 2006.

For Study II, we analyzed the number of dispensed prescribed drugs in different price levels for four diagnoses. In addition, care provider; public or private were analyzed in relation to the number of individuals of the selected drugs. To avoid that the same individual would occur in several ATC groups, only individuals prescribed one of the investigated ATC-groups were included. For those who received prescriptions from both public and private care providers, the provider representing >50% of prescription for that individual was chosen for classification. Data were extracted from 30 June 2005 until 3 December 2007 comprising 18,486 individuals.

In Study II, individuals with the selected diagnoses were linked by the PIN to the SPDR.
Sales statistics (I)

Measurement of drug benefit cost
For each HCC, the drug benefit cost (SEK) regarding the selected dispensed drugs, the remaining drugs and all drugs grouped in 5-years age interval, were presented as aggregated data derived from sales statistics at National Corporation of Pharmacies.

Local Registers on listed and unlisted citizens (I)

Measurement of listed and unlisted individuals
The number of listed and unlisted individuals were extracted from a register at the central unit at the County Council of Kalmar, we analyzed the dispensed selected drugs, all others drugs, and the costs for the selected drugs per individual. The listed and unlisted individuals were presented in numbers per age groups.

At the time of the study, those who had not registered at any HCC were classified as unlisted and as belonging to the HCC corresponding to the catchment area they lived in. Today, no one is unlisted in the County Council of Kalmar; the individuals who have not registered have been passively registered at the HCC with the corresponding catchment area.

Public socioeconomic information about the municipality (I)

Measurement of the socioeconomic index
Public data on number of individuals, number of individual in educational levels, mean income in residential area and proportions of assistance allowance, foreign born and unemployed in living areas were extracted from a database at the municipalities where the HCCs were situated. A socioeconomic index was calculated for each HCC on these data. The
correlation between the socioeconomic index and the cost compensation for the subsidized drugs in the HCCs was estimated.

**Reimbursement from the county council to the HCCs (I)**
Data on reimbursement, i.e. cost compensation to the HCCs for the subsidized drugs, were obtained at the central unit at the County Council of Kalmar, presented by the individuals’ age and sex.

**Care data Warehouse of Östergötland (II)**
*Measurement of drugs in different price levels for the selected diagnoses*
Individuals with the selected diagnoses were extracted from the Care Data Warehouse of Östergötland which covers all health care consumption including medical diagnoses connected to the County Council of Östergötland. In the depression group, the diagnose numbers F32 and F33 only were selected.

**Statistics Sweden (II)**
*Measurement of drugs in relation to individual factors*
By linking the PIN of the individuals with the selected diagnoses to the Statistics Sweden, individual data on disposable yearly income, educational levels, and country of birth were extracted. Statistics Sweden had created a total population register for the County of Östergötland.

**Interviews from respondents (III)**
*Experiences of participation in decision-making*
Patients as had been prescribed long-term medication, identified by the secretary responsible for their medical record at the HCC, were invited between November 2011 and May 2012 by mail to participate in the study.
Nine respondents, five women and four men, aged between 55-74 years were included and interviewed in a semi-structured manner. Interviews were audio taped and transcribed verbatim. Respondents were invited to speak freely of their experiences, beliefs, feelings, and consequences of participation in decision-making when starting long-term medication.

A randomized cross-sectional questionnaire (IV)

Measurement of SRH among elderly and in relation to diseases, drug treatments of diseases, age, sex, educational levels and measurement of diseases and educational levels in relation to age, sex and drug treatments

Data were derived from a cross-sectional questionnaire study sent to a randomized Swedish sample of individuals aged 65-80 years (N=9,968) (IV). The response rate was 67% (N=6,659).

SRH was measured by the item: “In general, how would you describe your health?” This item was included in the survey. The item had five response alternatives: 1=excellent, 2=very good, 3=good, 4=fair and 5=poor. Depressive symptoms were measured by the HAD-D scale in 14 items. Each item has four response alternatives, ranging from 0-3. In this study, we have defined HAD-D≥8 as threshold for depression. Hypertension was measured with one item. The item had four response alternatives for each diseases where 1=no, 2=yes, but no problems, 3=yes, slightly discomfort, and 4=yes, severe discomfort. The individuals’ education was grouped into three levels; age was categorized and sex differences were measured.
Figure 5. Illustration of the studies (I-IV) in the thesis in relation to different information resources. APSE=Aptekens Service AB, ECR=Economic Care register, EHR=Electronic Health Record, SPDR=Swedish Prescribed Drug Register and SS=Statistics Sweden.

Outcome variables measures

Study I

Drugs studied in Study I were classified according to the ATC classification, as recommended by WHO [84]. This study investigated the following drugs: A02, A10, C01, C02, C03, C07, C08, C09, C10, N02, N05B, N05C, N06A, and R03 as well as all other dispensed drugs at each HCC. The drugs were studied with respect to cost-benefit and number of individuals having redeemed their prescriptions. The numbers of listed and unlisted individuals were used to compare drug use in relation to all individuals living within the HCCs area. The socioeconomic index for each HCC was a standardized value calculated as \((x - M_s)/SD_s\), where \(x\) is the actual parameter, \(M_s\) is its mean calculated for the five HCCs, and \(SD_s\) is the corresponding standard deviation. The socioeconomic index had a mean value of zero and was higher for municipalities with a lower SES. Reimbursement was presented for age groups at each HCC. The data was depersonalized; only sex and age were recorded.
Study II
According to the ATC classification, Study II investigated the following drugs R03BB01, R03BB04, N06AB03, N06AB04, N06AB05, N06AB06, N06AX11, N06AB10, N06AX16, N06AX21, A10AC01, A10AE04, A10AE05, M05BA04, M05BA07 and M05BB03. For the diabetes group, we chose intermediate and long acting basal insulin and excluded the biphasic preparations for the ATC group A10AD. For the osteoporosis group, only weekly tablets were included, and treatments for malignant processes with bone destruction were excluded. Only preparations dispensed in numbers >450 for the period were included.

The drugs were studied with respect to the number of individuals, sex, age group, education, income, country of birth, and care provider. Care providers were categorized as public or private. Individuals included in the study had the diagnoses COPD, depression (only F32, F33), diabetes, or osteoporosis.

The PINs were retained until the data was linked to all registers.

Study III
The semi-structured interview guide covered topics in three areas of Study III; the main area was participation in decision-making, and the other areas were knowledge of the disease and drug treatment, and the Pharmaceutical Benefits reform.

Study IV
In Study IV we analyzed the SRH in relation to age, sex, educational level, HAD-D, responses to the hypertension item, and individuals with or without treatment for depression and hypertension. The response values to the item measuring SRH were dichotomized into Good (1-3) and Not good (4, 5).
HAD scale is a self-assessment scale, developed for assessing changes in non-psychiatric patients’ emotional states and for assessing significant degrees of depression (HAD-D) and anxiety (HAD-A) [49]. HAD consists of 14 items, seven of which concern depression. Each item has four response alternatives, ranging from 0 to 3. The optimal balance between sensitivity and specificity has been defined by a score of 8 or higher on both HAD-D and HAD-A [86].

Measures were also taken to describe the proportion of depression, hypertension, and use of drug treatment for these diseases in relation to educational levels. Values applied were the numbers and proportions of individuals. The response values to the item for measuring the frequency rate of hypertension were dichotomized into No (1) and Yes (2-4).

**Main exploratory variables**

*Age*

Age was dependent on the material used in different age groups. Study I: 0-19, 20-44, 45-64, 65-74, and ≥75 years; Study II: 18-49 years, 50-64, 65-74, and ≥75 years); Study IV: 65-69, 70-74, and 75-80 years.

*Sex*

In Studies I, II, and IV measures were made in relation to sex.

*SES*

The SES of individuals was a variable in Studies I, II, and IV. The concepts below were used as a proxy for SES:
Education
In Studies I and IV education was divided into three levels.
Study I: Primary school <12 years school, Upper secondary school =12 years, Higher education=college graduate, university.
Study IV: Lower educational level = not completed primary school, Medium educational level = primary school or equivalent, professional educational education, residential college for adult and baccalaureate, and Higher educational level = college graduate, university and post-graduate.

In Study II education was divided into six levels.
Study II: Below 9 years compulsory, 9 years compulsory, High school, Tertiary <2 years, Tertiary ≥2 years and postgraduate.

Income
In Study I income was presented as mean income and in Study II presented as quartiles; 1st <12 257€; 2nd 12 257-15 113€; 3rd 15 114-20 452€, and 4th ≥20 453€.

Country of birth
In Studies I and II country of birth was separated into born in or outside Sweden.

Socioeconomic index
The socioeconomic index was calculated by using the population’s educational levels, mean income in the residential areas, unemployment/market measures, assistance allowance and foreign born. Educational levels of the population and unemployment/market measures were presented as the number of individuals 18-64, and proportionately for those in this age group within a residential area. Assistance allowance was measured per family in amount and
proportion of all families within the residential area. Foreign born was presented numerically and proportionately for all individuals in the residential areas.
Statistical analyses

Study I, II, and IV

The statistical analyses were in Studies I, II, and IV performed by means of two statistical software programs; Statistica, version 9.0 and 10, and SPSS statistical packages, version 20, respectively.

A linear regression was used to analyze the correlation between cost compensation and socioeconomic index (Study I) [87].

Univariate and multivariate logistic regressions were used to analyze the interrelationships between drugs at different price levels with individual and care provider factors and couplings between SRH with individual factors, depression and hypertension, and their respective drug therapies (Studies II, IV). The results of the logistic regression, were presented as odds ratios (OR) as an estimate of the relative risk in comparison to a reference group [87].

Confidence intervals (CI) were used to estimate differences between educational levels by comparing proportions, and were tested for statistical significance for the differences on the basis of a 95% CI (Study IV) [87].

Analysis of variance (ANOVA) was used to test differences in means between the three educational levels (Study IV) [87].

Chi-square ($\chi^2$) test was used to test the differences in the proportion of subjects for the educational levels (Study IV) [87].

P-values <0.05 were considered statistically significant.
**Study III**

In Study III, a descriptive design with a qualitative approach was applied and the content analysis was inspired by Graneheim and Lundman [88]. Content analysis is a method for making replicable and valid inferences from data to their context, with the purpose of providing knowledge, new insights, representation of facts, and a practical guide for action by grouping similar statements together [89]. The method focused on manifest content, i.e. what the text expresses with the purpose of a descriptive result of visible and obvious components [88]. The manifest analysis also provides a description of the underlying meaning of the text [90] and deals with interpretation [88, 89].

**Ethical considerations**

According to the Helsinki declaration, clinical investigations must be carried out in accordance with this declaration, which implies the protection of human dignity and human life, protection of personal data, and privacy [91]. The use of data from the Swedish Prescribed Drug Register for research is regulated by Swedish law (SFS 2005; 363) in order to protect personal integrity. Further, the use of personal data in research must be protected so that identity cannot be disclosed (SFS 1998:204). Informed consent is crucial for clinical studies and was obtained from all respondents in Study III. Only unidentified data was used in this thesis and Studies I-IV were approved by the Ethical Review Board of the University of Linköping (I-III) and the Karolinska Institute (IV), respectively.
MAIN RESULTS (I-IV)

Paper I

Economic compensation from the County Council to the HCCs for pharmaceutical benefit cost was lowest for HCC_A and HCC_B, and highest for HCC_E with HCC_C and HCC_D in between. The weighted mean for reimbursement of the total cost was at the HCC_A 85%, at the HCC_B 94%, at the HCC_C 120%, at the HCC_D 124%, and at HCC_E 137%. The total cost compensation related to the socioeconomic index of the HCC’s almost linearly (Figure 6).

Figure 6. The relationship between the total cost compensation to the health care centres and socioeconomic index. The relationship is virtually linear, the regression equation is as follows: cost compensation 1.12-0.062 socioeconomic index (n=5; r=-0.99; p=0.001; batched line).

HCC_A had the highest and HCC_C the lowest proportion of individuals with dispensed drugs from the selected groups relative to all dispensed drugs in all age groups, with the exception of those aged ≥75 years, but differences were small. Although costs for the selected drugs, expressed as costs to the HCC per citizen (listed and unlisted), were highest at HCC_A in all age groups except for the age group ≥75 years, the differences between the HCCs were small.

When comparing the number of individuals redeeming dispensed drugs with the total number of individuals, HCC_A was in the middle of the five HCCs.
Paper II

Differences for prescribing drugs between the lower and higher price levels were found in all diagnostic groups regarding gender, age, education, income, country of birth, and care providers.

Men were more often prescribed drugs at higher price levels in the COPD (OR 1.08) and depression (OR 1.25) groups than women, but women more than men in the diabetes group (men: OR 0.83).

Individuals <50 years of age redeemed more drugs at a higher price level for depression than individuals in the age groups 65-74 and ≥75 years (Figure 7). In the age group 50-64 years, the proportion of drugs at the higher price level was greatest. In the diabetes and in the osteoporosis groups, individuals <50 years redeemed more drugs in the higher price level than individuals ≥50 years. In the COPD group, individuals ≥50 years received more drugs at the higher price level than individuals <50 years of age. An association between higher educational level and drugs in the higher price level was found in the diabetes group.

In the COPD group, the proportion of drugs at the higher price level was larger in relation to higher income up to the 4th quartile (OR 1.28). In the diabetes group, less drugs at the higher price level were prescribed to individuals born outside of Sweden (OR 0.6). In the COPD group, private care providers (OR 1.25) prescribed more drugs at the higher price level than public care providers. In the diabetes group, less drugs at the higher price level were prescribed to individuals mainly visiting private care providers (OR 0.63).

<table>
<thead>
<tr>
<th>Depression group</th>
<th>Age years</th>
<th>OR (95%CI)</th>
<th>p</th>
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<tr>
<td></td>
<td>&lt;50</td>
<td>1.00</td>
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<td></td>
<td>50-64</td>
<td>0.73 (0.68-0.78)</td>
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<tr>
<td></td>
<td>65-74</td>
<td>0.53 (0.46-0.61)</td>
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<tr>
<td></td>
<td>≥75</td>
<td>0.38 (0.31-0.48)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
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Figure 7. Depression group, drugs prescription in higher price level in relation to age.
Paper III

Three categories were found in the interviews concerning patient experiences of participation in decision-making when starting long-term medication; knowledge as a prerequisite for the patient, trust in the physician, and patient's adherence to medication.

Knowledge as a prerequisite

Knowledge of the disease and drug treatment was a major precondition for participation in decision-making. Without sufficient knowledge, the respondents felt they had to simply accept and trust the physician’s knowledge; you could neither question nor argue, only hope that what the physician said was correct. Respondents obtained knowledge in the relevant area not only from physicians, but from nurses and pharmacists as well. In addition, information was obtained from other patients, friends, the internet, books, and physiotherapists. Knowledge of the generic substitution system, benefit drugs, and high cost insurance was related to decision-making. Respondents felt no influence in drug selection, neither for generics nor brand names.

Trust in the physician

To share decision-making, respondents felt it essential to be able to trust both the physician's knowledge and judgment. When the physician displayed thoughtfulness, it facilitated shared decision-making, as it demonstrated awareness of the importance of the person behind the patient. The respondents regarded a good encounter (caring and medical) as characterized by being seen, being respected, and that their needs were recognized. It was important that the physician listen in a trustful way and providing necessary time for dialogue. For better comprehension, information should be provided in a manner suited to individual needs. Respondents appreciated when the physician, nurse or pharmacist made information understandable, such as by writing or drawing
pictures. Respondents given opportunities to receive information in a calm and tranquil atmosphere from nurses regarded this information as highly beneficial (Figure 8).

![Patient participation in decision-making](image)

*Figure 8. Patient participation in decision-making*  

**Patients adherence to medication**  
Respondents found it important to understand the treatment selected, i.e. to understand the need for the drug and be motivated for treatment. The motivation for drug treatment was influenced by the decision-making process. The better explanation for drug treatment the respondents received, the better they understood the purpose, thereby increasing their motivation towards adherence to the prescribed drugs. Respondents expressed that adherence to medication was their own responsibility, affected by their own will. If they did not follow a prescription and something happened, they alone were to blame. Respondents spoke of the responsibility to adhere with respect to the drug’s effect. No one spoke of responsibility for drug costs or medical expenses as a cause of poor adherence.
Paper IV

**Self-rated health (SRH)**
The SRH determined as good decreased with higher age and a higher proportion in men rated their health as good. SRH as good increased with higher educational levels. There was a positive association between good SRH and not being depressed (OR 8.9) compared to being depressed as well as for not being hypertensive (OR 2.2) compared to being hypertensive. Among those with drug treatment for depression, 18% rated their health as good compared to 30% among those unmedicated. Corresponding values for respondents with hypertension were 62% and 77%, respectively.

**Depression and educational level in relation to age, sex and treatment**
The proportion of depressed respondents decreased with higher educational levels and in relation to age at higher educational levels, but not at lower and medium levels. There was no difference in depression at the educational levels for women and men or between antidepressant treatments for depression.

**Hypertension and educational level in relation to age, sex and treatment**
The proportion of respondents with hypertension decreased with higher educational levels. The prevalence of hypertension decreased with older age in medium and higher education but not at the lower educational level. The use of antihypertensive drugs treatment among those with hypertension was similar at all educational levels and without difference between sexes.
DISCUSSION

The overall aim of this thesis was to describe the factors with an impact on drug prescription in primary care and perceived health. The thesis shows that drug prescription is, in addition to medical necessity, influenced by patient characteristics and desires, and controlled by economic constraints. Drug treatment will influence perceived health. Economic constraints limit the physician in supporting patients in their efforts to influence the choice of drug, which in turn may influence their adherence to medication (Figure 9).

Figure 9. Summary of what affects drug prescription. SES=Socioeconomic status with examples of important factors, MPA=Medical products agency, LDTC=Local Drug and Therapeutic Committee, TLV=Dental and Pharmaceutical Benefits Agency, Laws; Generic Benefit reform, Health-Care law, Patient Safety law. Dashed line=Factors that can influence the decision.
Economic constraints and conditions

Effect of SES on the costs of subsidized drugs

The cost of the prescription of subsidized drugs at HCCs increases with multiple prescriptions [92]. Multiple prescriptions result in higher cost for subsidized drugs for HCCs by affecting the Drug Benefit Scheme, and the cost limit is reached faster. These were the findings of Study I and were supported by previous findings [6]. The exceeded drug budgets (I) were explained by the large number of individuals with multiple prescriptions, which in turn can be explained by a greater number of individuals with a low SES in the catchment area [65]. It is reasonable to assume that the cost of prescription drugs at an HCC influences prescription patterns (Figure 9). When the drug budget shows a surplus, the price of a drug might be less important than when the drug budget has a deficit. If a patient wants a more expensive drug, it may be time saving to prescribe what the patient wants rather than argue for a cheaper alternative. This in turn will leave more time to handle a greater number of patients and consequently generate more revenue [93]. The respondents assumed that public funds finance the subsidized drugs, but were not aware that cost influenced the drug budget of the individual HCC (III). This information can better the patient’s understanding that the budget must cover all drug prescriptions at the HCC.

The system for estimating reimbursement of drugs was found to include the SES of the citizens in the catchment area of the HCC (I) in agreement with a previous study [6]. The exceeded drug budget at two of the HCCs could have been even larger due to cost-related underuse of medication in individuals with a low SES [94]. There is a risk that expending effort and time in maintaining the drug budget may result in less time and effort for patients. Nowadays, many diseases are lifestyle-related. To inform of preventive
measures and implement the benefit of lifestyle change, sufficient time is needed for dialogue between physician and patient.

**Understanding of generic prescription**
The respondents knew of the generic reform with its impact on the cost limit for subsidized drugs. They regarded the system of prescribing drugs at the lowest price for therapeutically equivalent drugs as reasonable, since subsidized drugs are largely financed by public funding, and were therefore motivated to help keep costs down (III). This finding is in agreement with a Finnish study in which a majority considered the generic reform as good [95]. Keeping costs down is of interest to society, and money should be spent as efficiently as possible. Therefore, the physician must explain the generic reform for patients not aware of it (Figure 9).

**Medication providing the greatest benefit**
We found that there were large differences in price between cheaper and more expensive drug alternatives (II). Therefore, the price may be decisive in the choice of certain drugs. To choose the cheapest option is reasonable, but there can be several reasons to choose a more expensive drug, e.g. poor results, ineffectiveness, unacceptable adverse effects, or other aspects of the cheaper medication. We also found that the factors of age, sex, income, education, foreign origin, and care provider could influence the choice of drugs at different price levels (II), and this influence can come either from the physician or the patient (Figure 9). If treatment is not completed as in some cases due to poor adherence to the prescription, it costs anyway. There are several reasons for non-adherence, but an open dialogue between physician and patient, and easy access to the physician when questions and problems arise, can probably increase non-adherence.
Patient involvement

The primary purpose for patient participation and involvement in decision-making is to strengthen the patients’ position, enhancing autonomy and the ability to influence their lives. However, the patient has limited opportunity to influence the choices of a drug. On the other hand, the patient can usually decide whether to commence or stop drug treatment.

Participation in decision making

Respondents showed a will to participate in decision-making (III). However, participation did not mean the same to all respondents. Some felt that participation could be achieved even without participation in decision-making, whereas others felt that participation was more or less the willingness to become involved in decision-making. This might have been due not only to differing knowledge of the subject, but on the type of drugs as well (III).

Based on the views of the respondents (III), the line between participation without decision-making or sharing decision-making is becoming unclear. In addition to a good encounter and trust in the physician, respondents desired adequate information by means of dialogue, and for the physician to understand and decide what was best for them. Therefore, participation to these respondents implied an impact on decision-making, provided the physician identified and met the needs of the patient when information was provided.

Respondents that wanted to share decisions also wanted a good encounter, to trust the physician, receive adequate information by means of the dialogue, and have the opportunity to share decision-making (III).
It is reasonable to believe that participation in decision-making might imply too much of responsibility to some patients. It is not the intention to make the patient feel they must share in decision-making [23]. A previous study found that 12% of respondents wanted to decide themselves compared with 46% that wanted to share responsibility equally with the physician, and that 23% wanted the physician to decide [96]. The importance of shared decision-making was less among individuals with little education than in individuals more educated, and it was less important for men than for women [97]. This is in accordance with results from another study which also showed that younger individuals were more interested in shared decision-making than older individual [40].

*Information as a cornerstone for involvement and participation*

Gaining information is a way to achieve knowledge, and knowledge is a prerequisite for involvement and participation in decision-making, according to the respondents (III). The informed decision-making model implies increasing the patient’s knowledge of e.g. alternative therapeutic options and their effectiveness [32], thereby enabling patients to make decisions reflecting their preferences and knowledge. The respondents wanted the physician to provide relevant information even if they received information from other sources, in agreement with previous studies [98-100]. However, physicians seem to underestimate the amount of information that patients want [100]. Interestingly, one study showed that patients who preferred their physician to make the decisions were also those who highly rated the information from their physician [100]. Consequently, it is unclear whether patients who prefer their physician to make the decisions do not want too much information, or just received the information they wanted. Under Swedish law, the patient has the right to receive individualized information, and for patient participation information is necessary [20]. Information to the patient should be given
priority. By asking the patient questions and listening to the answers the physician can form an idea of the patient’s knowledge and desires. In this way, information can be individualized.

**Importance of patient characteristics and care provider**

Patient characteristics showed, to a varying degree, an influence on drug prescription (II) (Figure 9). In another study, higher education was shown to have a positive influence on drug utilization. The association between higher education and larger drug use was explained by the fact that when the patient and physician were on an equal socioeconomic level, the physician could be more inclined to prescribe drugs [101]. However, we found no differences in drug treatment for depression and hypertension between educational levels, nor between the sexes in relation to educational levels (IV). The association between drugs at a higher price level and higher educational attainment was found only in the diabetes groups (II).

It is difficult to draw any conclusions from the prescription pattern of public and private care providers (II). Private care providers prescribed more of the expensive options in patients with COPD, and prescribed less of the expensive options for patients with diabetes. We do not know whether these findings were due to the influence of the patients or the physicians. There may be an entirely different explanation for this, but one study showed that physicians were influenced by patient satisfaction in regard to listing [93].

**SRH as a valuable tool**

By asking patients to rate their health, the physician shows that he feels patient’s perception of their health is important, whereby time should be taken to discuss the rating with the patient. If the patient has previously rated their health, that rating might also be discussed in relation to the current rating. In
addition, if health is rated as poor or has become worse, it should be followed up if it is not to lose its value. Furthermore, poor perceived health might be a reason for seeking care. For those patients, it could be particularly useful for the physician to know how health is rated.

The analytic process by which health is assessed is constituted by such conditions as states and sensations [42]. However, objective clinical or physiological status can only be taken into account in self-assessment if known to the individual. This fact indicates the measurement’s main limitation, namely that it is comprehensive, inclusive, and absolutely non-specific [42]. Respondents, who were judged depressed by the survey, might not have consulted a physician about their status and, therefore, had not received a diagnosis (IV). Depression is an under-diagnosed condition [48] and physicians need to be trained to better identify and treat depression [102], because the perception of health is so negatively affected by depression [42]. The assessment of their health may have been influenced by the perceived symptoms only. The fact that symptoms are not always felt in hypertension or that the consequences of hypertension are unknown can explain why individuals with hypertension perceived their health as better compared to those who were depressed (IV). Therefore, the prognostic value of SRH increases if it is substantiated with objective physiological states [42]. This emphasizes that SRH needs to be supplemented by relevant information on diagnosis and treatment.

The physician’s role
The physician’s role is defined by medical expertise while at the same time taking consideration to both the patient’s preferences and the HCC’s budget.
Responsibility of physicians

The increase of patient involvement in decision-making in drug treatment must be the responsibility of the physician and not of the patient. Patients have the right to choose to what extent they want to be involved in decision-making. However, physicians do not have this as an option but are required to provide the patient this opportunity. A commentary paper advocates patient-centered decision-making, on the basis of the patient’s understanding and desires. [103]. This view does not contradict the results in this thesis.

Preconditions and barriers for involvement and participation

One precondition for involvement and participation in decision-making is, that a shared decision requires patient as well as physician to be motivated to share in decision-making [32]. When respondents perceived that it was impossible to be involved because of the physician’s attitude, they were disappointed, and experienced powerlessness rather than empowerment (III).

Another precondition is to have sufficient time for dialogue [100]. In primary health care in Sweden, there is a shortage of GPs [104], and those that are active feeling constraint by time [105]. The system of hiring physicians for shorter periods of time (weeks) is a common way to solve the problem. However, such conditions counteract the establishment of confidence and trust in the physician, making it harder for both parties to get to know each other, which is important for participation in decision-making (III).

Information is a prerequisite for involvement and participation in decision-making [32] (III). Therefore, the physician needs to adapt information each patient.
Providing information takes time and consequently, lack of time becomes a barrier to participation. Providing information involves skills that requires training. Good educational skills of the physician make it easier for patients to absorb information and enhance understanding. Such skills have also been shown to increase drug adherence [62]. However, empowering training must be based on the desire to enhance patient decision-making [25]. The patient is in a vulnerable position making it difficult for them to absorb information during such circumstances.

The existing system of prescribing drugs is influenced by generic substitution. It seems important for the patient to trust the choice of drugs, and that the physician has the necessary knowledge concerning interchangeable drugs (III). Although patients in a Norwegian study had great confidence in the knowledgeability of generics of both physicians and pharmacists, they found that physicians sometimes did not support substitution at the following visit [99]. When the physician indicated such attitudes to substitution the patient may have interpreted it has not having received the most appropriate medicine at the previous visit.

It is also important that the physician has adequate knowledge of generics and interchangeable agents. For example, in a study among Italian pediatricians, the majority felt their knowledge of generic medicine was “sufficient” or “fairly good” [106].

Limited by possible language barriers, dialogue will be restricted in communicating terms of treatment, consequences and conditions. Those who have Swedish as their mother tongue experience better care and communication than those who do not [104]. In dialogue and when information is conveyed, the physician forms an impression of the patient’s
knowledge. The physician needs to gain an understanding of the patient’s knowledge to ensure that the patient has sufficient knowledge for decision-making as the choice implies risks that the patient may not be aware of [23]. Language barriers might be an aggravating factor even for physicians.

Drug prescription may be influenced by both conscious and unconscious factors. The physician is required to have knowledge of the regulations, directives and recommendations that control and regulate drug prescription. Unconsciously, the physicians may be influenced by the patient’s way of communicating, behavior, background and socioeconomic situation. If the physician is aware of patient characteristics and the aspects of the cohort the patient represents, choices then become conscious ones (Figure 9).

**Methodological considerations**

The quality of the conclusions in this thesis is based on the internal validity, statistical inference [107] and credibility [88, 107] of the quantitative approach.

*Internal validity and generalizability*

Internal validity in study I, II, and IV refers to whether the results are true, i.e. the extent to which the result can be attributed to the action of the independent variable causing or influencing the dependent variable, and not something else [107]. The use of data from registers and surveys means that the data is already collected with possible shortcomings. Sweden is unique with a wide range of data in several registers, and the Swedish Research Council encourages their use in research. The Swedish Prescribed Drug Register has a great advantage since all dispensed prescribed drugs are registered there [82]. Statistics Sweden may miss some data depending on
whether data is registered. We found that data for education could be missing. The missing data for education in study II might have affected the results, but this was somewhat compensated for by using income and country of birth as a measure of SES. Education has, in all three studies, been used to measure SES, but was also combined with other factors associated with socio-economy, increasing the reliability of the results.

In study I, data from the municipality was aggregated, originally by Statistics Sweden, and presented as numbers and proportions. People not listed at the investigated HCC could not be excluded from this data and were nevertheless included in the calculation of the index. This applied mainly for HCCs, and we believe that most of those listed at another HCC were individuals with a higher SES. If true, it affected the socio-economic index as the calculation results were lower.

The internal validity in investigating SRH in relation to depression and hypertension in study IV could have been affected by co-morbidity of which we know nothing about. In addition, the results may have been affected by selection bias, whereby the respondents in the questionnaire were healthier. Self-reported data, as used in study IV, have several limitations such as in reporting blood pressure. The response rate of 65% can be considered as satisfactory and similar to a recent cross-sectional study of socio-economic inequalities in health care utilization where SRH responses were 65.7% [108]. Despite a high response rate, we cannot be sure that our sample represents the entire population because some groups were more likely to participate in populations surveys, such as women, those who were married, and individuals of a higher SES [109]. A failure analysis revealed that there were more respondents among married people compared to those unmarried, and among
respondents with higher income. There was no difference in the response rate between men and women.

Education was used as a proxy for SES. Education has been suggested as a variable for SES in terms of degrees and diplomas rather than years of education [76]. We have used both years of education and attained degrees and diplomas. However, years of education or attained degrees can be more meaningful to use for older individuals than for younger since education varied more before. Income was also used as a variable for SES. Almost all individuals in the studies had information on income. To increase the reliability of income levels as variables for SES, it should be considered that income can fluctuate. Furthermore, that education and income, as well as other factors used to assess SES, should be both at the individual, household, and neighborhood level, and considered over time [76]. However, we were unable to obtain that kind of information. In study IV, only education was used for SES. Therefore, we split education so that there were differences between the three educational levels, and to reduce the effect of possible misclassification. However, for some professionals that had not graduated from college or university, but had obtained professional training outside the usual system, we suspect they may have indicated the highest educational level.

In study IV, we studied perception of current health, which was included in the survey, by a widely used measurement [49]. The question has been validated for Swedish conditions [69]. The single item; “in general, how would you describe your health” is included in other measurements of self assessed health in combination with other different follow-up question. The fourteen HAD-items have shown acceptable validity and internal consistency [69].
The results of Study I can be used as an example of the economic impact of SES on the drug budget of the HCCs. The results in study II can be used as a reminder to prescribers that individual factors have influenced the prescribing of drugs at different price levels, although we cannot determine if it has been an active choice or not. Further, we do not know whether the patient influenced the choice. The results of Study IV showed a strong association between depressive symptoms and perceiving health as poor in the elderly. SRH can be an indicator of patients’ perceived need for help.

Sex in this thesis is mainly intended as a biological concept and therefore the concept of sex should have been consistently used in the studies.

_Credibility and transferability_

In qualitative research, the confidence in truth of data and true interpretation of data is labeled credibility [107]. Credibility includes how well the sampling of data and the analysis process focuses on the research question. In study III, semi-structured interviews were used to gather data. The interviews were transcribed verbatim. To enhance credibility, the analysis involved repeated reading and reflecting during the entire analytical process. Two of the authors read the text, discussed and revised the coding. The content of subcategories and categories was then checked and discussed with the co-authors. The respondents related similar experiences and described both positive and negative experiences, indicating credibility.

There was little interest to participate in study III, and subjects who announced interest were included. Respondents represented a rich variety of experiences from the studied area to strengthen credibility. The respondents consisted of both women and men represented various professions, educational levels, and received differing pharmaceutical treatments.
We believe that other patients that have been prescribed long-term medication will probably recognize these findings, and the results from this study are transferable to other groups prescribed long-term medication, but may be limited to a similar age group.

Other concerns

The medical need for drug treatment was not examined, and therefore the choices of drugs in relation to that cannot be determined. In terms of participation in decision-making, discussion is limited to drug treatments with emphasis on long-term medication.
Practical implications and future studies

By providing patients the opportunity to influence important decisions about their lives, the possibility of achieving more satisfaction with the decision will increase. In this way, patient’s autonomy will be enhanced, and thereby ensure that the patient’s voice will be heard. Sufficient time must be available to provide information and to discuss the condition and its treatment. A valuable tool to emphasizing the patient’s role can be to ask the patient to rate their health. SRH can be useful as a basis for discussing the patient’s perceived need for help and might serve as a valuable complement to other criteria on which the physician bases his assessment.

It may be difficult for the patient to gain knowledge from the information provided at the visit to the physician for several reasons. First, the patient may be tense and worried about their condition. Second, it might be difficult to remember what has been said, even if the patient understood what was said at the moment the information was given. Besides the oral information, the physician might facilitate the patient’s understanding by making drawings for the patient. In addition, the physician might take advantage of modern IT and print appropriate pages together with internet-links. In this way, the patient can deepen understanding of their condition. Time is needed concerning information about important decisions affecting a patient’s daily life: time to consider what has been said, and process and acquire knowledge about the choices that it brings. Opportunity for repeated dialogues and meetings with the physician is then a prerequisite to reach the best choice for the patient.

Ideas for future studies

- Interventions with adapted information for different patient needs to study how it influences involvement in decision-making.
• The Swedish Ministry of Health and Social Affairs has submitted a proposal to the government to extend the patient registry to data for primary care patients. When individual data (with PIN) from primary care on consultations, diagnoses, external causes of diseases, mortality, and measures are collected, it will be possible to study the problems that drug use causes primary care patients.

• To study how SRH in patients with chronic disease and at HCCs have been influenced to convey their perceived health, and how the assessment has affected the conversation with the physician.
Conclusion

There is a conflict between different interests in drug prescribing. Society’s demands that drugs be selected based on their cost-benefit, and at the same time, patients should be welcomed to influence their treatment such as in choice of drug. Nowadays, patients are better informed and consequently have increased expectations of treatments and physicians. The physician is expected to be responsive to the patient’s needs. Here, physicians have to reconcile their medical expertise with patient preferences, wills and existing conditions in order to keep costs down. However, in the choice of drugs, the physician can be consciously or unconsciously influenced by the SES of the patient.

A prerequisite for patients to be involved in decision-making is information and education. Furthermore, providing information must be based on the desire to enhance the patient’s decision-making capabilities. Time with patients needs to be given greater priority by physicians. A suggestion would be to free more time for patients by facilitating administrative work with more tailored IT-based program support.

- HCCs responsible for citizens with lower SES appeared to be disadvantaged by prevalent reimbursement system in Sweden, thereby increasing differences in the state of health of the citizens (Paper I).

- Certain individual and provider factors appear to influence the prescribing of drugs of different price levels. Since the average price for cheaper drugs vs. more costly drugs in each diagnostic group was between 19-69%, there is a risk that factors other than the medical needs are influencing the choice of drug (Paper II).
• Patients sought participation in the decision-making of long-term medication and wished for adequate time needed for this dialogue. If they lacked sufficient knowledge, they wanted relevant and useful information from the physician. To experience trust in the physician through a good encounter increases the possibility for participation and enhancement of medication adherence. In order to participate in decision-making, the patient needs the physician’s encouragement (Paper III).

• SRH was affected by depressive symptoms, educational level, hypertension, and sex. Therefore, SRH can be considered a valuable tool in the health care of the elderly for identifying individual needs, whereby the assessment also covers important factors beyond the current problem (Paper IV).
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REFERENCES


33. Tuckett D, Boulton, M., Olson, C., Williams, A. Meetings between experts. An Approach to Sharing Ideas in Medical Consultations. London: Tavistock Publications; 1885.


