# Damm Sokkor[1]!

# Identifying, exploring and testing the factors influencing the care of patients with diabetes in primary care in Tunisia

**Hugh Alberti**

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Newcastle University, United Kingdom

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[1] *Damm* is literally translated in Tunisian Arabic as *blood*, but is used to describe *hypertension*. *Sokkor* is literally translated as sugar but is used to describe *diabetes*.

# Abstract

## Background

Quality of diabetes care is variable and sub-optimal worldwide. Few studies have been undertaken in the developing world to identify factors that influence care.

## Objectives

To identify, explore and test the patient, health professional and organisational factors associated with the quality of care of patients with diabetes in primary care in Tunisia.

## Methods

A multi-method study within an ethnographic framework. Qualitative methods include participant observation, semi-structured interviews and focus groups with health professionals and patients with diabetes. Content and ethnographic analyses were undertaken. Quantitative data were collected from a random sample of medical records of patients with diabetes from a nationwide sample of 48 randomly-selected health centres. Multivariate regression analyses were undertaken to identify associations with fifteen quality indicators and 57 potential explanatory factors.

## Results

The mean age of the study population (n=2160) was 62.4years, mean duration of diabetes 8.4years, 62% were female and 94% had type 2 diabetes. The standard of care varied but some improvements were apparent since 2000. The three most important factors to emerge from the qualitative data were also significantly and independently associated with higher quality of care: availability of medication, clinician motivation and chronic disease clinics. Other important factors were financial, gender and adherence issues. The predominant theme that emerged from the ethnographic analysis was the perception that access to medication at the health centre is "the only thing that matters".

**Conclusion**

This study has provided a detailed, unique picture of diabetes care in primary care from a low/middle income country. Important themes that need to be addressed in order to successfully implement culturally-appropriate, quality improvement interventions are accessibility to medications, clinician motivation, patients' health beliefs and gender issues. It is recommended that strategies, such as the development of the role of paramedical staff, be implemented within the context of culturally-adaptable national programs.

# Dedication

*This thesis is dedicated to the wonderfully generous, hospitable and kind people of Tunisia.*

يعطيكم الصحة

# Abbreviations / Glossary

| | |
|---|---|
| **ACE-I** | Angiotensin-converting enzyme inhibitors |
| **BA** | Dr Ben Alberti, anthropology lecturer with an archaeological background; assisted in collaborative ethnographic analysis |
| **BP** | Blood pressure |
| **BMI** | Body mass index |
| **CDC** | Weekly chronic disease clinics recommended within the Tunisian national program |
| **CVD** | Cardiovascular system |
| **DBP** | Diastolic blood pressure |
| **DSMR** | Disease-specific medical records |
| **DSSB** | Direction du Soins de Santé de Base; the department within the Ministry of Health who oversee the national programs in primary care |
| **ECG** | Electrocardiogram |
| **FG** | Fasting glucose |
| **HbA1c** | Glycosylated haemoglobin |
| **HC** | Public sector, primary care health centre |
| **IDF** | International Diabetes Federation |
| **LLM** | Lipid-lowering medication |
| **NP** | National program of diabetes and hypertension management |
| **NWPOC** | Non weighted process of care score |
| **PHC doctors** | Primary health care doctors (general practitioners) |
| **QOC** | Quality of care |
| **SBP** | Systolic blood pressure |
| **TC** | Total cholesterol |
| **TD** | Tunisian dinar: Exchange rate approximately 2TD = £1.00 (2002) |
| **WHO** | World Health Organisation |
| **WPOC** | Weighted process of care score |
| **2vOOC** | Two variable outcome of care score |
| **4vOOC** | Four variable outcome of care score |

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# Chapter 1: Introduction

*"Medicine is a craft that studies the human body in its illness and health. The physician attempts to preserve health and to cure illness with the help of medicines and diets, but first he ascertains the illnesses particular to each limb of the body and the reasons causing them. He also ascertains the medicines existing for each illness. Physicians deduce the (effectiveness of) medicines from their composition and powers. They deduce (the stage of) an illness from signs indicating whether the illness is ripe and will accept the medicine or not. (These signs show themselves) in the colour (of the patient), the excretions and the pulse. The physicians in this imitate the power of nature, which is the controlling element in both health and illness. They imitate nature and help it a little, as the nature of the matter (underlying the illness), the season of the year, and the age of the patient may require in each particular case. The science dealing with all these things is called medicine."*

Ibn Khaldoun, 14th century, Tunis[1]

## 1.1 Diabetes mellitus

Diabetes mellitus is a chronic disease defined by the International Diabetes Federation (IDF), the global advocate of diabetes care, as a state of raised blood glucose (hyperglycaemia) associated with premature mortality.[2] It comprises a group of disorders with many different causes, all of which are characterised by a raised blood glucose level as a result of lack of insulin and/or an ability to respond to insulin. There are four known subtypes of diabetes.[3] Type 1 diabetes accounts for 5-10% of all diagnosed cases of diabetes and is caused by a failure of pancreatic beta cells to produce insulin. Type 2 diabetes accounts for around 90% of diagnosed cases and is typically linked with being overweight and is associated with insulin resistance. Gestational diabetes develops in 2-5% of all pregnancies but disappears postpartum. Other specific types of diabetes result from various causes such as genetic syndromes and malnutrition and account for 1-2% of all diagnosed cases.

### 1.1.1 Prevalence of diabetes worldwide

Diabetes is a worldwide epidemic of the 21st century. There are nearly 200 million people in the world with diabetes and this figure has been predicted to rise to 366 million by 2030.[4] This number may be an under-estimate as it does not take into account the increasing epidemic of obesity and urbanisation in the developing world; the most recent figures from the IDF suggest a figure of 380 million by 2025.[2] The developing world in particular is facing a major epidemic in diabetes. The increase in prevalence is predicted to approach 200% in developing countries compared to

45% in developed countries, due to population ageing, urbanisation, unhealthy diets, obesity and a sedentary lifestyle. The highest increases are anticipated to be in the Middle East and North Africa region. This region, along with South Asia, has also been shown to have the highest mean fasting glucose levels (age-standardised).[5] Worldwide, four fifths of all deaths from chronic diseases now occur in low and middle-income countries.[6]

### 1.1.2. Impact on health

Diabetes has a huge impact on the well being of both individuals and the population as a whole. Relative mortality in people with type 1 diabetes is between 10 and 30 (equal to a 5-10 year reduction in life expectancy). Type 2 diabetes is associated with an overall age-adjusted mortality twice that of non-diabetic populations; also equivalent to a reduction in life expectancy of 5-10 years in middle aged patients.[7] Diabetes and high blood glucose ranks in the top five major determinants of worldwide mortality, accounting for 3.16 million deaths a year; this translates into one death every 10 seconds.[5] It is the most common reason for renal replacement, the most common cause of blindness in the under 65s and the most common cause of non-traumatic amputation worldwide. The risk of coronary heart disease is two to four times higher in people with diabetes and the risk of stroke or peripheral vascular disease also increases markedly.[8] The sudden development of short-term complications, such as ketoacidosis and severe hypoglycaemia can lead to coma and if untreated, to death. It can also threaten the successful outcome of pregnancy.

The economic impact of diabetes at a societal and national level is enormous. In 2007, global health expenditure on diabetes and its complications will total at least US$232 billion[5] and this is set to increase over the coming years. The World Health Organisation (WHO) predicts that in the 10-year period from 2005 to 2015, net loss in national income as a result of diabetes, stroke, and cardiovascular disease will total US$557.7 billion in China alone.[6]

### 1.1.3 Diabetes care

There is increasing evidence to confirm that meticulous metabolic control can prevent or delay the onset of the complications of diabetes. The impact of these complications can also be greatly reduced if they are detected early and appropriately managed.

Several studies have confirmed that strict glycaemic and blood pressure control can reduce microvascular complications.[9,10,11] The association between glucose control and cardiovascular disease is weaker but still significant. The Diabetes Control and Complications Trial and the UK Prospective Diabetes Study have reported reductions in the risk of cardiovascular disease from lowering glycaemia.[12,13] In view of the high risk of cardiovascular disease in people with diabetes, particularly those with type 2 diabetes, the careful management of other cardiovascular risk factors, including smoking, physical inactivity and especially hypertension, is also essential. In addition, regular surveillance for and early diagnosis of the complications of diabetes are vital. Prompt intervention may prevent or delay the emergence of end stage disease such as blindness, the need for renal replacement, or amputation.

### 1.1.4 Interventions to improve care

However, despite this evidence, the care of patients with diabetes has continually been shown to be variable and sub-optimal wherever it has been studied; the United Kingdom,[14,15,16,17] North America,[18,19,20,21,22] Australasia[23,24,25] and elsewhere.[26,27,28,29,30,31,32,33,34]

Systematic reviews of interventions to improve the management of diabetes in primary care have been undertaken. The most recent review was based on a report by the US Agency for Healthcare Research and Quality (AHRQ) of strategies for improving the quality of care of patients with type 2 diabetes. They concluded that most strategies produced small to moderate improvements in glycaemic control, but no one particular type of quality improvement intervention was clearly superior to another.[35] Employing two or more strategies was more successful than single interventions. However, the reviewers noted that most studies were not underpinned by any theoretical framework to explain the causes of inappropriate variations in care, why particular interventions were chosen or why interventions were successful. A previous review by Renders *et al*[36] concluded that complex professional interventions improved process of care, but patient outcomes were rarely assessed. Despite the large number of intervention studies published very few have been undertaken outside of the western world. Only two of the 66 studies included in the AHRQ review were undertaken outside of Australia, Europe and North America.

### 1.1.5 The Chronic Care Model

The Chronic Care Model (CCM) and its WHO extension, the Innovative Care for Chronic Conditions (ICCC) framework, are tools for generating improvements in the delivery of health care in countries throughout the world.[37,38] The CCM comprises four components: self-management support, delivery system design, decision support and clinical information systems. The ICCC expands the CCM to include community and policy aspects of improving health care for chronic conditions. Both models have successfully changed healthcare practices for chronic conditions such as diabetes in a variety of contexts.

## 1.2 Quality of care

Quality of care is a complex and multi-dimensional phenomenon and, inevitably, a variety of definitions have been described. The Institute of Medicine defines quality of care as "the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge".[39] Campbell *et al*, in a thorough discussion of the term and its definition, describe it as "whether individuals can assess the health structures and processes of care which they need and whether the care received is effective".[40] In essence they suggest there are two dimensions to quality; access (do users get the care they need) and effectiveness (is the care effective when they get it).

### 1.2.1 Measuring quality of care

In line with this definition of quality of care, there has been much debate about whether process or outcomes should be assessed as measures of quality. Processes are common, under the control of health professionals and may more rapidly be altered. However, it is important to remember that low process of care scores can either reflect poor care or poor recording. There has also been concern that data abstraction from records underestimates quality of care due to omission of recording and records not being sensitive enough to measure all that goes on in a consultation.[41] There is some evidence that recording of care is positively correlated with increased quality of care[42] but others have shown a lack of association between recording of data and control of glycaemia and suggested that improved recording is not a valid indicator of good quality of care.[17,23] For process measures to be suitable to measure quality, they must clearly be linked to evidence of improved outcomes.

Outcomes, though in theory the ideal measure of quality, are often rare, may follow a change in process by many years (as in the case of diabetes) and may be dependent on factors outside the control of the individual health professional. In particular, some authors feel that outcome measures are not good comparative measures of quality due to the problem of case mix and it is suggested that well supported processes are a better guide to quality.[43,44]

For these reasons most researchers recommend the use of a combination of processes and outcomes measures, usually intermediate rather than long-term, as proxy indicators of quality of care.

### 1.2.2 Quality indicators

A quality indicator has been defined as "a measurable element of practice performance for which there is evidence or consensus that it can be used to assess the quality, and hence change in the quality, of care provided".[45] Quality indicators should be based on rigorous scientific evidence if possible. However, evidence in health care is often absent, necessitating the use of other methods of development including consensus techniques, which combine expert opinion and available evidence and indicators based on clinical guidelines. While it may never be possible to produce an error free measure of quality, measures should be, as far as possible, acceptable, feasible, reliable, sensitive to change, and valid. It has also been stressed that the way in which indicators are applied is as important as the method of development.[45]

### 1.2.3 Use of quality of care indicators in diabetes care

There is currently no international agreement on what the quality indicators of diabetes care are or should be. In practice, a large number of indicators have been used to attempt to assess the quality of care of patients with diabetes. In the United States in the late 1990s, the Diabetes Quality Improvement Project was initiated to develop and implement a comprehensive set of national measures for evaluation and quality improvement[46] and has been used in various contexts.[19,20,33] More recently this has been updated as the National Diabetes Quality Improvement Alliance.[47] The measure set from the medical records or electronic data includes the recording of care (HbA1c, eye examination, lipid profile, assessment of diabetic nephropathy, blood pressure and foot examination), attainment of targets and distribution of values

(HbA1c, lipids and blood pressure). There is also a patient survey, which measures smoking cessation counselling, self-management, nutritional education, satisfaction, interpersonal skills of the health care team and functional status.

In the United Kingdom authors have used indicators for diabetes taken directly from the general medical services contract for UK general practitioners as quality of care indicators.[16] These include recording of care (BMI, smoking habit, HbA1c, blood pressure, creatinine, cholesterol, retinal screening, foot pulses examination, neuropathy examination, microalbuminuria test), attainment of targets (HbA1c, blood pressure, cholesterol) and prescribed treatment (ACE-I prescribed in the presence of proteinuria or microalbuminuria, therapeutic intervention for poor glycaemic and blood pressure control). These correlate closely with the indicators used in America and have been used to derive cumulative quality scores.[48,49] More recently, the use of quality of care indicators has taken a central place in UK primary care since the introduction in 2004 of the Quality and Outcomes Framework (QOF). Up to a quarter of a general practitioner's income now depends on practice performance measured against 146 clinical and organisational indicators, of which 18 are related to diabetes care. It similarly incorporates processes (such as recording of retinal screening), outcomes (such as proportion of recorded HbA1c levels <7.5) and treatment (ACE-I prescribing). Authors using this data do stress that quality, as measured by QOF, may reflect quality in data recording as much as quality in delivered care.[50,51]

Elsewhere, Gulliford *et al* in their work in Trinidad and Tobago used recording of care, intermediate outcomes (blood pressure, glucose, proteinuria and weight) and drug use as quality of care indicators.[26] Others have also used a combination of processes of care, intermediate patient outcomes (control of glycaemia and blood pressure) and clinical interventions, such as appropriate use of medications for control of glycaemia, ACE inhibitor use, lipid lowering and recommended vaccines.[23,52,53] Alternative sources of quality criteria have been expert panels using similar combinations of documentation of care and treatment.[40]

As well as the recording and outcome of data from medical records, researchers have used patient questionnaires to assess patients' satisfaction and health status,[54] although others argue that patient assessments are not a reliable indicator of quality of care.[55]

## 1.3 Tunisia

Tunisia is a low/middle income country of 10 million inhabitants situated on the North African coast. Tunisia was a protectorate of France until independence in 1956 and the legacy is clearly apparent: the school, legal and health structures are all similar to the French system. All Tunisians speak Tunisian Arabic and a large proportion, especially professionals and the younger age groups, are also fluent in French. Indeed, many French words have been incorporated into the Tunisian Arabic dialect. French is the language of all technical subjects including medicine. Unlike other North African countries there are few pure Berbers in Tunisia; 99% of Tunisians are Muslim Arabs.

*Figure 1.1 A map of Tunisia showing the 24 government regions and major cities.*

Tunisia covers 154,630 square kilometres, similar to the size of England. The majority of the major cities are located on the east coast, such as Tunis, Sfax and Sousse (see map in Figure 1.1). The urbanisation rate is 65%, a dramatic rise from 22% in 1956. The population growth rate is low relative to other Arab nations at 1.1%, predominantly due to the introduction of contraception, abortion and women's rights by the first president, Habib Bourghiba.

### 1.3.1 Tunisian economic status

Tunisia's Gross Domestic Product (GDP) is US$26,683 million (0.23% of US GNP), placing it 67th in a list of 183 countries in the world according to the World Bank.[56] However, the human development index (HDI) is considered to be a more informative measure of economic status as it is a composite measure of life expectancy, education and income. Tunisia's HDI is 0.760, giving it a rank of 87th out of 177 countries with data. This places Tunisia's economic status between Jordan and Saint Vincent and similar to countries such as Egypt, Malaysia and Mexico. On a broad scale, Tunisia lies economically below Western Europe, North America and Australasia, on a par with Latin America and the Caribbean, and above Sub-Saharan Africa, South and East Asia.

Adult literacy rate is high relative to nearby countries at 78% of adults with a gender discrepancy to a less significant extent than other Arab nations (86% in men and 69% in women). 97% of children enrol to primary school and three quarters attend secondary school. The official unemployment rate is 14%. According to the United Nations (2002 data), over 90% of the population have access to sanitation and clean water sources.

### 1.3.2 Tunisian health status

According to 2004 figures, total life expectancy for Tunisians is 73.4 years (71.4 for men and 75.3 for women). Infant mortality rate is 20.6 per 1000 live births, child (under five) mortality rate is 30 per 1000 and maternal mortality rate 48 per 1000. 5.4% (409$ per capita) of Tunisia's GDP is spent on health, which is just under half (45.7%) of the country's total health expenditure; the remaining comes from private health insurance. According to WHO statistics (2004 data), Tunisia has 13,330 physicians, 28,537 nurses, 2,452 dentists and 2,909 pharmacists and approximately 18,000 hospital beds. Official figures state that 95% of the population have access to local health services, antenatal coverage is 92% and one-year old immunization rates are 98%.

A recently published review on mortality statistics in Tunisia reported diabetes as the leading cause of death (8.3%), followed by hypertension (6.3%), cerebrovascular disease (5.8%) and myocardial infarction (5.6%).[57] Cardiovascular diseases are the leading group of diseases to cause death (28.2%).

### 1.3.3 Tunisian health system

Tunisia ranks 52nd out of 191 countries in a WHO report (2000 data) of the overall performance of their health systems.[58] This is higher than would be expected relative to its economic ranking and only one country in Africa has a higher ranking (Morocco). Tunisia has two major health sectors, public and private, intended to be complementary rather than competitive. There are also semi-private institutions including polyclinics and military hospitals in the capital and less commonly, the other major cities. There is an imbalance in the distribution of health care facilities in favour of the coastal areas, illustrated by the fact that all four medical schools are located on the coast (Tunis, Sousse, Sfax, Monastir; see Figure 1.1). The exact proportion of people who attend private versus public facilities is difficult to ascertain due to the lack of statistical data from the private sector. It is clear that the majority of people in the capital and major cities attend private rather than public facilities whereas the opposite occurs in the rural areas and smaller towns. In general, the poorer sections of society attend public sector facilities. The general opinion of health professionals is that the numbers attending public and private sector institutions is roughly equal at a national level.

Funding for health care is currently being restructured. At present, most people in employment pay for health insurance, which covers most, but not all, of health expenses within the public sector and some aspects of the private sector. For example, with insurance, a consultation at a primary care health centre costs 1.5 Tunisian Dinar (TD) (≈£0.75), at a secondary care facility 3TD (≈£1.50), a simple Xray 5TD (≈£2.50) and blood tests between 2TD and 10TD (≈£1.00 - £5.00). Without insurance these figures are increased five-fold. Some families out of employment classify for either free care ('type 1 indigent') or care for charges as if they had insurance ('type 2 indigent'). In contrast, a typical private consultation costs 30TD (≈£15.00).

### 1.3.4 Primary care in Tunisia

Tunisia has a relatively well-advanced public sector, primary care health system with 2074 health centres scattered across the country (2006 data).[59] This number has more than doubled in the last 25 years (979 centres in 1982). The majority of these centres are small, nurse-run health posts that offer consultations with a physician once or twice per week. A minority (567) offer medical consultations four or more times per week. According to the latest data, there are 1,297 primary care physicians working in health centres with 402 others working in local hospitals, giving a ratio of 5,922 people per doctor. There are in addition, 1,246 midwives, 9,211 nurses and 1,807 health assistants. For the remainder of the thesis, the terms 'primary care health centre', 'health centre' and 'centre' will be used interchangeably. The terms 'doctor', 'physician' and 'clinician' are also used interchangeably and always refer to a primary care doctor unless otherwise stated.

### 1.3.5 Training of doctors

Modern medical schools have existed in Tunisia since 1960; previously medical students had studied in France. There are now four medical schools in Tunisia situated in Tunis, Sousse, Sfax and Monastir (see map in Figure 1.1). Places at medical school are highly competitive and high scores at the 'Baccalaureate' examination after high school are required. Some students who do not achieve sufficiently high grades train elsewhere (such as other Arab countries like Morocco) and on return they must pass an examination of re-orientation. In Tunisia, students study at university for five years and then complete one or two years of internship, covering specialities of medicine, surgery (general, orthopaedics and/or gynaecology) and paediatrics. All students complete a thesis during and/or shortly after their internship. After the first year, those students who desire to be hospital specialists take an examination and the choice of speciality is decided by the grade attained. A high score gives a student a wide choice of specialities whereas a low score limits a students choice. Failure in the examination limits a student to being a general practitioner. These students, along with those who choose general practice, complete two years of internship and then they are able to work; no further training is required for general practitioners. The choice is then to work in the governmental health centres, to open a private practice or to work in a few alternative institutions (such as a military hospital or company clinic). Due to a current excess of doctors, most newly qualified graduates must wait up to a few years to be offered a post at a government health centre. It is usually required to work in a rural area for at least two years initially and sometimes this period can last longer. Women with families tend to be given more favourable posts. Most doctors aspire to work in the capital or the more affluent coastal regions. Specialist training is for four years followed by an examination, after which secondary care doctors choose between remaining in the public sector and working in the more lucrative private clinics or alternative institutions.

Plans are underway to introduce some form of vocational training for general practitioners, such as a third year of internship, which would include time in a health centre.

### 1.3.6 Diabetes in Tunisia

Few population-based prevalence surveys of diabetes have been undertaken in Tunisia or indeed, North Africa. The earliest survey, based upon a fasting plasma glucose level of greater than 7.8mmol, was undertaken in Tunisia in the late 1970s and early 1980s.[60] The study was undertaken in two regions, one urban and one rural, and demonstrated a low prevalence rate of diabetes in rural areas (0.6%) compared to urban areas (4.6%). A study conducted in 1991 of a random sample of a suburban adult community of Tunisian's Sahel area reported a prevalence of diabetes of 6.5% using WHO criteria.[61] Similarly, a study from one region in the Northeast of the country among 35-50 year olds in 1988-90 reported a prevalence of 7.2%.[62] The only national, diabetes prevalence study to be undertaken in Tunisia was the National Nutrition Survey in 1997.[63] The overall prevalence of diabetes mellitus was found to be, according to the American Diabetes Association (ADA) criteria, 9.9% with an age-adjusted prevalence of 8.5%. Comparison with Papoz's previous study demonstrated that over a period of 15 years, the prevalence of diabetes mellitus had doubled in both men and women; with a particular increase among women living in rural areas. As expected, increasing age, urban residency and high body mass index were each found to be significantly and independently related to diabetes prevalence. Although direct comparison of data with other epidemiological reports is difficult, it appears that the prevalence of diabetes in Tunisia is at an intermediate level relative to the rest of the world.

WHO estimates that there were 166,000 people with diabetes in Tunisia in 2000 and that this number will reach 388,000 in 2025.[64] Estimates based on the National Nutrition Survey[63] give corresponding figures for known cases, yet the true figure may be two- or three-times this number.

The cause of the increasing prevalence of diabetes in Tunisia, as in most other corners of the globe, is the so-called 'epidemiological transition'; rapid ageing of the population, progressive urbanisation and socio-economic transition. Over the last half century, life expectancy has risen from 50 years to 73.4 years, infant mortality rate has fallen from 150 to 48 per 1000, urbanisation has risen from 22% to 65% and the per-capita income has increased five-fold in real terms.[65] Nutrition patterns are also changing making Tunisians more susceptible to non-communicable diseases. Obesity is becoming more prevalent.[66] This, coupled with less physical activity, has increased the risk of morbidity and premature death, particularly from cardiovascular disease.

### 1.3.7 The national program of diabetes and hypertension in Tunisia

In response to the rising prevalence of non-communicable diseases, the Tunisian Ministry of Public Health, with a committee of local experts, has introduced a national program of diabetes and hypertension management (NP). Such national programs have been recommended by the WHO for the management of chronic diseases in primary care. The NP was introduced in 1993 in a few regions initially, and then spread throughout the country in 1998.[67] It is one of many programs in primary care that are co-ordinated by the *Direction du Soins de Santé de Base* (DSSB), a department of the Ministry of Public Health. The general objective of the NP is to assure the regular, standardised and appropriate management of diabetes and hypertension in primary care in order to reduce degenerative complications. There are four intermediate objectives:

- to reduce risk factors of diabetes and hypertension
- to screen for the onset of diabetes and hypertension in high risk groups
- to assure regular follow-up of patients with diabetes and hypertension
- to provide health education to patients, their families and the general population.

The strategy of the NP is based on health education, evaluation, supervision and training.

1. The aim of the health education is to improve patient self-management, adherence to diet and medication and to provide education to patients and their families. This is achieved through individual and group education sessions, through use of the media (radio, television, newspapers), through educational programs in schools, through celebrating events such as World Diabetes Day and through the annual production of educational materials such as brochures, leaflets and posters based on alternating themes.

2. Various components of the program are evaluated by means of an annual report completed by the nurse/doctor at each centre including information on disease prevalence, incidence, incidence of new cases with complications and the proportion of patients managed at the centre. The reports are collected regionally and sent to the DSSB who use the national data to write a summary report for the Ministry of Health.

3. Supervision for the program is provided at the national level by the DSSB who monitor the activities of doctors, paramedical personnel and the dieticians. At the local level, regional medical co-ordinators are appointed to

- visit health centres to assess the application of the program, identify insufficiencies, find local solutions and correct errors.
- arrange doctor training sessions at the nearest university hospital (as described below).
- encourage health education and the use of educational materials.
- take responsibility for the completion of the annual report and in addition report on supervision visits completed and events celebrated.

4. A week-long training program is offered to primary care doctors at the university hospitals and includes both the theoretical teaching of diabetes and its complications and practical instruction in the use of the documentation of the national program. This documentation includes disease-specific medical records for patents with diabetes and hypertension, chronic disease registers and patient-held records. The primary care doctors are then given the responsibility to train the paramedical staff at their health centre. A training module on diabetes and brochures on the different degenerative complications of diabetes are provided.

In addition to the initial components, the NP is continually being upgraded. For example, the program has encouraged the introduction of 'Consultation Individualisée' at the primary care centres, equivalent to a chronic disease clinic. These centres dedicate one day a week to seeing primarily patients with diabetes and hypertension in which the whole primary care team, including a dietician if available, work together to provide education and care for the patients. Another example is the development of a referral form that contains space for the secondary care doctors to report back results of any investigations preformed. Other developments have been the provision of specific supplies introduced in to the program, such as glucometers and glucometer strips and micral test strips. Training of the primary care health doctors has evolved and seminar workshops have replaced the more didactic hospital teaching. Instruction has also been offered to some primary care physicians in the use of ophthalmoscopy, as patients are currently required to attend a secondary care specialist at a local hospital for their annual eye examination.

## 1.4 Thesis beginnings and presentation

Although foreign to quantitative research, most qualitative research textbooks recommend authors to describe their personal journey towards undertaking their research and their personal worldview and beliefs.[68] I am therefore including a brief narrative of my journey towards this research project and a discussion on how I have chosen to present my thesis.

### 1.4.1 Thesis beginnings

I am a general practitioner (GP) and have always been interested in the care of patients from developing countries since living in Tanzania prior to studying medicine. During my years as a junior doctor and GP trainee I made several visits, for up to three months at a time, to Guyana, South America, running clinics and training health workers in rural areas of the rainforest. I commenced work as a GP but remained interested in working abroad. In addition to my work as a GP, I became involved in academic work; diabetes research with Professor Bilous and primary care research with Professor Oswald (both of whom became my supervisors). I took a course in qualitative methodology and began to wonder about the possibility of undertaking a doctorate degree. Around this time, I was asked to review a book called *Diabetes in Africa*[69] and was interested in reading about the national program of diabetes care in Tunisia, particularly as I knew that the author of this chapter, Professor Nagati, was a family friend. We also had other friends living in Tunisia, so my wife and I arranged a visit to the country. We met up with Professor Nagati and the co-ordinators of the national program who were all extremely hospitable and very keen on my idea of researching diabetes care in primary care. We therefore moved to Tunisia in order to undertake the study. Alongside the formal undertaking of the study, my broader experience of learning about Tunisian culture and language from many generous, patient and hospitable Tunisians has added immeasurable value to this research study and indeed, my life.

The broad area of the research initially came from my own personal belief that too much research is invested in gaining an understanding of what good quality health care is (the 'theory'), whereas very little is invested in discovering why this knowledge is rarely translated into improved care (the 'practice'). The more specific objectives were developed from a wide reading of the literature and discussions with my supervisors, my colleagues at the primary care department on Teesside and the coordinators of the national program in Tunis.

### 1.4.2 Personal worldview

I have a Christian worldview and believe strongly in bringing peace and understanding between religions, and between the Arab world and the western world. Although I have no other strong theoretical or philosophical position, I have been profoundly influenced by post-colonialism and the writings of Edward Said[70,71]. I have always had an interest in the social and cultural context of disease and patient care and during this study I have read North African anthropology literature by authors such as Rabinov[72] and Abu-Lughod.[73]

### 1.4.3 Thesis presentation

This thesis combines qualitative and quantitative methodology and this results in a peculiar dilemma regarding the presentation of the thesis. Should the thesis be presented in a quantitative research style, such as using the third person and citing references with the number system; or in a qualitative style, using the first person and citing references with the name-year system? In order to maintain some consistency and clarity the majority of the thesis is written in the third person with the exception of sections, such as this one, which describe personal experiences or decisions. All references are cited in the number system as all articles thus far published from this work have used this system. I have chosen to talk about patients with diabetes rather than people with diabetes because the context of my study is the care of people within a health system in which they are considered to be 'patients'. Overall, I have attempted to combine and integrate the quantitative and qualitative work; for example, quantitative data concerning the health centres selected for the qualitative work are presented, and some qualitative data are collected from the centres selected for the quantitative work.

One problem in presenting qualitative analyses objectively is the sheer volume of data available and the relatively greater difficulty faced by the researcher in summarising qualitative data. It has been suggested that a full transcript of the raw data should be made available on disk.[74] Another option is to present a quantitative summary of the qualitative results, as I have done in the tables in chapters 6 and 7.

### 1.4.4 Ibn Khaldoun

A note of explanation concerning the quotes by Ibn Khaldoun dispersed throughout this thesis is necessary. Ibn Khaldoun has been described as the most important figure in the field of history and sociology in Muslim history. He was a historian and historiographer and is often considered to be the forerunner of modern day historiography, sociology and economics. Born in Tunis in 1332, his influence in North Africa continues to this day. Numerous streets in Tunisian cities continue to be named after him and Figure 1.2 depicts him on a recent postage stamp. He is best known for the *Muqqadimah*,[1] which in fact, consists of the original preface and Book One of his epic history of the world, from which the sayings quoted in this thesis are taken. Arnold Toynbee, the British historian, called the Muqaddimah "undoubtedly the greatest work of its kind that has ever yet been created by any mind in any time or place." It is said to be the first attempt to present a philosophy of history. His writings, views and thoughts seem to be poignantly relevant 600 years later.

*Figure 1.2 Ibn Khaldoun portrayed on a Tunisian postage stamp.*

### 1.5.1 Rationale of the thesis

The management of patients with diabetes mellitus is complex. Good control significantly reduces the risk of complications, yet studies from around the world consistently demonstrate sub-optimal and inappropriate variations in care. Efforts to improve the quality of care should be informed by knowledge of which factors influence care and how they act as barriers or facilitators. Previous research around diabetes care has grouped such factors under the general headings of patient, health professional and organisational factors. Ideally, quality improvement efforts should be underpinned by more specific knowledge of modifiable factors amenable to change. Furthermore, factors identified in much of the previous work from Europe and North America may not be transferable to other cultures. Few studies have been reported from the developing world, despite the knowledge that 80% of all chronic disease deaths worldwide now occur in low/middle income countries. An understanding of the factors that influence care in a developing country could potentially aid the implementation of culturally appropriate, quality improvement interventions in many parts of the globe, and significantly improve the care of many millions of people with diabetes.

### 1.5.2 Aims and objectives of the thesis

The overall aim of the thesis is to identify, explore and test the factors that influence the care of patients with diabetes in Tunisia. The expected outcome is the identification of the factors that enhance or prevent good management of patients in a low/middle income country, in order to improve the quality of care within the nation of Tunisia and potentially within other similar countries. A description of diabetes care in Tunisia is an essential prerequisite. An appreciation of the context is necessary to interpret and understand the factors discovered to be influencing care, in order to successfully implement the findings in alternative settings.

The objectives are:

1. To describe, on a national scale, the management of patients with diabetes in primary care in Tunisia.
2. To describe, on a health centre level, the management of patients with diabetes in primary care in Tunisia.

3. To explore the culture of caring for patients with diabetes in Tunisia within primary care health centres.
4. To determine the standards of care of patients with diabetes in primary care in Tunisia and to assess any improvements over time.
5. To identify and explore the factors, both barriers and facilitators, that influence the care of patients with diabetes in primary care in Tunisia (hypotheses generating).
6. To test potential factors that are associated with the quality of care of patients with diabetes in primary care in Tunisia (hypotheses testing).

The corresponding methodologies used, and a reference to presentation of the results for each objective, are listed in Table 1.1.

***Table 1.1*** ***How the six objectives correspond to the various methodologies used and the presentation of the results***

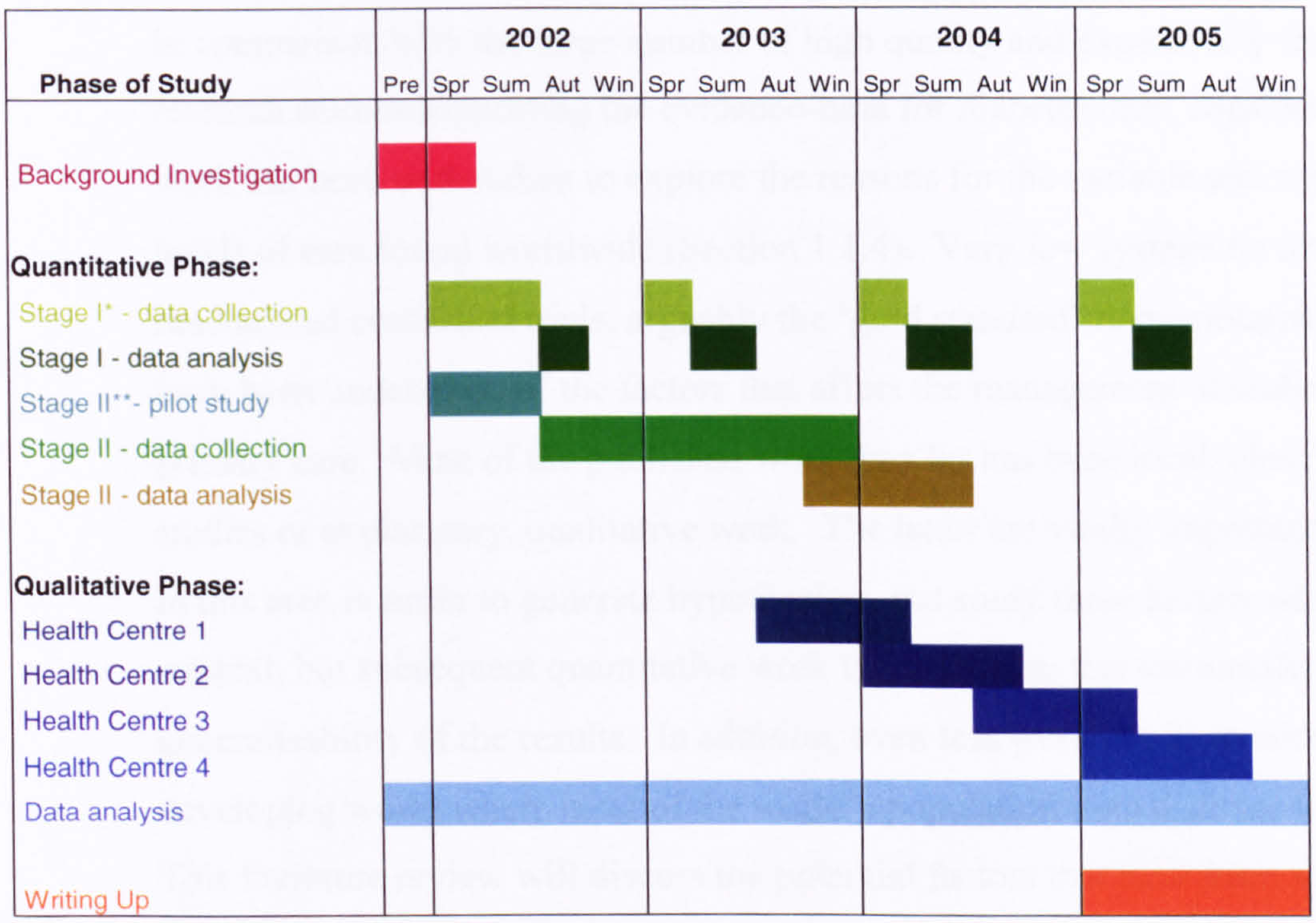
| Objective | Methodology | Presentation of results |
|---|---|---|
| 2 | Qualitative: Descriptive | Chapter 5 |
| 3 | Qualitative: Ethnographic analysis | Chapter 6 |
| 5 | Qualitative: Content analysis | Chapter 7 |
| 1 | Quantitative: Descriptive (national level) | Chapter 8 |
| 4 | Quantitative: Descriptive (centre level) | Chapter 9 |
| 6 | Quantitative: Multivariate analysis | Chapter 10 |

## 1.6 Outline of the thesis

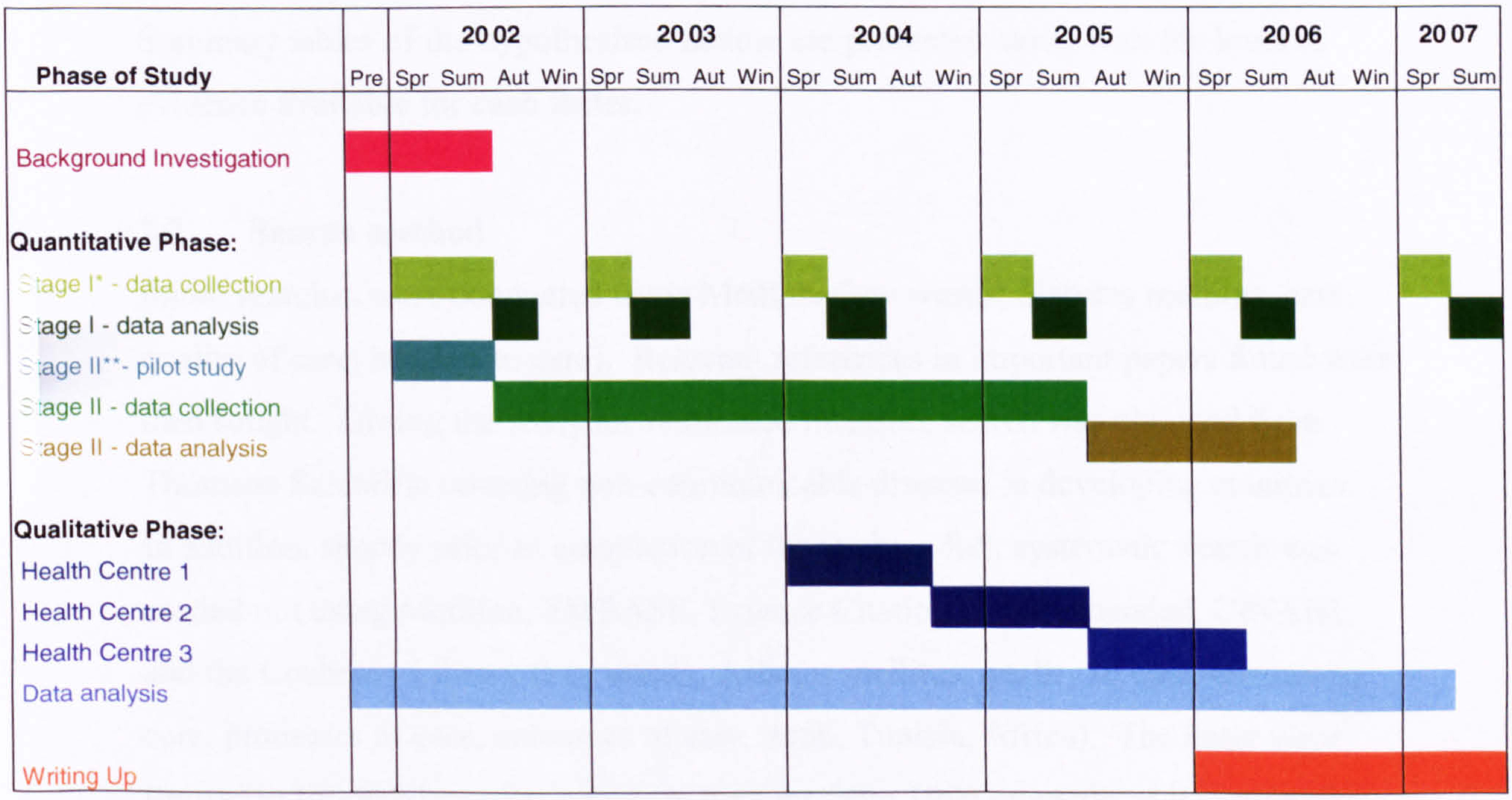
This introductory chapter aims to present the background of diabetes care in primary care in Tunisia, along with key concepts such as quality of care. The aims, objectives and rationale for the thesis have been presented. Chapter 2 is a literature review of the factors that have been suggested to influence the care of patients with diabetes, focussing particularly on previous work from developing countries. The methodology chapters cover the rationale for choosing the varied and multiple methods employed including both qualitative (chapter 3) and quantitative (chapter 4) approaches. The results are presented in six chapters corresponding to the six objectives of the thesis (see Table 1.1). Three chapters describe the findings of the qualitative work incorporated within a descriptive account (chapter 5), an ethnographic analysis (chapter 6) and a content analysis (chapter 7). The following three chapters report the findings of the quantitative work based on descriptive analyses from a nationwide (chapter 8) and health centre perspective (chapter 9) and a multivariate analysis (chapter 10). Chapter 11 summarises and integrates the results of the qualitative and quantitative analyses. Finally, the discussion chapter (12), concludes the thesis with a summary of the main findings and a discussion of the contributions made by this thesis, comparison with other work, strengths and limitations of the research, implications for clinical practice and directions for further research.

## 1.7 Research timetable and modifications

### Planned timetable of expected key milestones



### Actual timetable of expected key milestones



** Data from annual reports*

*** Data from health centres*

# Chapter 2: Literature Review

## 2.1 Introduction

In comparison with the large number of high quality and expensively funded research studies supporting the evidence-base for diabetes care, considerably less work has been undertaken to explore the reasons for the variable and sub-optimal levels of care found worldwide (Section 1.1.4). Very few systematic reviews and/or randomised controlled trials, arguably the 'gold standard' in quantitative research, have been undertaken of the factors that affect the management of diabetes in primary care. Most of the published work thus far has been local, observational studies or exploratory, qualitative work. The latter are vitally important initial steps in this area in order to generate hypothesises and study these factors within their context, but subsequent quantitative work is essential to test the transferability and generalisability of the results. In addition, even less work has been undertaken in the developing world where most of the world's population with diabetes live.

This literature review will discuss the potential factors that have been suggested to influence the care of patients with diabetes, particularly emphasising work from developing countries and published systematic reviews. The aim is to identify potential barriers and facilitators to care that could be explored within this study. Summary tables of the hypothesised factors are presented along with the level of evidence available for each factor.

## 2.2 Search method

Initial searches were conducted using Medline (key words; diabetes mellitus, care, quality of care, barriers to care). Relevant references in important papers found were then sought. During the study an automated literature search was obtained from Thomson Scientific covering non-communicable diseases in developing countries. In addition, shortly prior to completion of the study, a full, systematic search was carried out using Medline, EMBASE, Science Citation Index expanded, CINAHL and the Cochrane Library (key words; diabetes mellitus, quality of care, barriers to care, processes of care, outcomes of care, Arab, Tunisia, Africa). The latter were limited to English language papers in humans from 1990 onwards. All systematic reviews, and papers from developing countries, have been referred to, along with significant (positive or negative) findings from other publications.

## 2.3 Outcomes

Most studies on the quality of diabetes care have used surrogate, rather than direct outcomes as discussed in Section 1.2. Indicators used are usually intermediate outcomes of care (most commonly glycaemic control based on mean HbA1c results), processes of care, or less often, cumulative scores of processes or intermediate outcomes. All references in this chapter to 'quality of care' refer to quality of processes of care and/or intermediate outcomes, rather than long-term outcomes or mortality data. A comparison of studies is often difficult due to varied outcome measures employed. This also makes meta-analyses problematic as trials typically score outcomes with varying measures.

## 2.4 Studies from developing countries

Little work on the factors that influence the care of diabetes has been undertaken outside of Europe, Australasia and the United States. One notable exception is work undertaken by Gulliford and others in Trinidad and Tobago.[26,75,76] Longitudinal, observational studies have shown large variations of care, based on processes, outcomes and medication prescribing, in government health centres in a low/middle income country, not dissimilar to Tunisia. Their work has shown associations of larger practice teams and the amount of equipment available with higher processes of care, but not outcomes. They have also demonstrated improvements in quality of diabetes care during the 1990s.

A large, population-based study from Delhi, India, demonstrated strong associations between income-related factors and quality of care, despite restricting the study to higher socio-economic groups.[33] They also demonstrated poorer quality of care in women.

A limited number of studies have been reported from the Arab World. A comprehensive review of primary health care in Saudi Arabia, not specific to diabetes care, identified six barriers to quality of care that appear to be generalisable to many settings: poor management, organisational obstacles such as workload and lack of resources, inadequate implementation of evidence-based medicine, problems at the interface with secondary care, physician dissatisfaction and inadequate professional development strategies.[77] Khattab *et al*[78] reported an observational study from primary care in Saudi Arabia showing diabetes control to be closely associated with adherence to diet and appointments. A questionnaire study from the United Arab Emirates of patients with diabetes attending primary and secondary care, showed an association between a positive family history of diabetes and good glycaemic control suggesting that diabetes in the family may encourage better care, at least within an Arab context.[79] A recently published report of a quality improvement program for diabetes care from Dubai revealed a large number of obstacles to care from three physician focus groups grouped into the following areas: no structural system of care, poor continuity of care, poor teamwork and lack of staff experience, lack of time and absence of a system for continuous performance improvement.[80]

Very few studies have looked at the process of diabetes care in Africa, indeed few studies on any aspect of diabetes have been reported. A full review on the delivery of health care for patients with diabetes in Africa by Whiting *et al*[81] in 2003 found only 209 papers related to diabetes in Medline from 58 countries in Africa since 1990. Of these only 31 (eight countries) were related to health care delivery and there were no reported anthropological or ethnographic studies. A summary of the published reports concluded that the main barriers to care were; poor attendance, short consultation times, inadequate numbers and training of staff, poor control of blood pressure and glucose and inadequate referral systems, patient education, record keeping, organisation of services and monitoring of complications. The majority of the published work in primary care comes from South Africa where qualitative and observational studies have highlighted lack of structured care[82], lack of education[83], ambivalence of health professionals to guidelines[84], poor attendance[28], a weak referral system and short consultation times[85] as potential barriers to improved quality of care. Since the above review was reported, Aikins has published extensive ethnographic studies on the experience of diabetes in Ghana.[86] His work has suggested a number of other barriers to care; namely, high cost of prescribed drugs and recommended foods, poor psychological support and unregulated ethno-medical and faith healer treatments. It is not known if these results are transferable to other similar settings, although ethnographic work in Cameroon among patients with diabetes has also highlighted the issues of adherence, health beliefs and use of traditional healers.[87] Authors from Sudan have suggested that Islamic beliefs and practices such as fatalism, fasting and pilgrimage, may have negative influences on diabetes care[88] but these have not been formally tested. A recent review by Mbanya *et al*[89], again based on limited published evidence, suggested that the main barriers to care in Africa were cost, lack of availability of medication, scarce or inadequate equipment or facilities, lack of trained staff and health systems being geared towards the management of infectious rather than chronic disease.

Only one other paper has been reported in the literature concerning predictive factors of glycaemic control in primary care in Tunisia.[90] It was a recent retrospective study of 404 type 2 patients from one region over a two-year period with a limited number of patient-related factors tested. The factors associated with poorer glycaemic control in a univariate analysis were body mass index (BMI) under 30kg/m$^2$, patients taking insulin, patients who judged their health centre to be far away and those who did not have family help to manage their diabetes. The multivariate analysis showed only low BMI and distance from the health centre to be significantly related to poorer HbA1c.

In general, research published from developing countries has tended to focus on relatively small, simple audits of standards of care rather than identifying barriers to or facilitators of care, and very few have been undertaken in primary care. Few have been tested in either prospective or retrospective studies and no systematic reviews have been published.

## 2.5 Systematic reviews from the developed world

A number of systematic reviews from the developed world have been published on the care of patients with diabetes in primary care and the factors that influence care. A systematic review of randomised controlled trials of diabetes care in primary care by Griffin *et al*[91] concluded that unstructured care in the community was associated with poorer follow up, worse glycaemic control, and greater mortality than in hospital care. In contrast, central computerised, prompted recall and review of patients in primary care achieved outcomes as good as or better than follow up in hospital. However, the author stressed that the review was based on a few small trials and therefore the results should be treated with caution.

A systematic review of diabetes disease management programs showed their effectiveness in moderately improving glycaemic control and increasing screening for retinopathy and foot complications.[92] However, the diabetes programs studied were extremely diverse and it is difficult to ascertain which are the effective elements of such programs.

A systematic review of adherence to medications for diabetes showed that adherence to oral medications ranged from 36% to 93% and reported that depressed patients and those on polytherapy had even lower rates.[93] This confirms a rigorous review by Haynes in which he found that adherence to therapy among patients with chronic diseases to be only 50%.[94] In conclusion, Haynes declared "increasing the effectiveness of adherence interventions may have far greater impact on the health of the population than any improvements in specific medical treatments".

Two systematic reviews of self-monitoring of blood glucose have been published. A review of six randomised controlled trials (RCTs) comparing self-monitoring of blood glucose with standard care, self-monitoring of urine glucose, or both, showed that self-monitoring of blood glucose may be effective in improving glycaemic control in patients with type 2 diabetes who are not using insulin.[95] In contrast, a further meta-analysis of self-monitoring including eight RCTs showed no difference and concluded that further work is needed to evaluate self-monitoring so that resources for diabetes care can be used more efficiently.[96]

A meta-analysis of studies linking depression and poorer glycaemic control confirmed the association, although as the authors point out, further work is needed to clarify the directional nature of the association.[97]

Advances in information technology are thought to have the potential to improve patient care of chronic illnesses such as diabetes. A systematic review of interactive computer-assisted technology in diabetes care showed that some trials demonstrated significant improvements in HbA1c levels and most studies reported overall positive results, with improved health care utilization, behaviours, attitudes, knowledge, and skills.[98] Systematic reviews of the use of telemedicine and telemonitoring in North America showed possible benefits in glycaemic control and other outcomes.[99,100]

A systematic review of provider-patient interaction in diabetes care[101] including eight RCTs, tentatively suggested that focusing on patient behaviour may be more effective than focusing on provider behaviour. However, no conclusions could be drawn from the limited studies regarding which patient-related factors significantly influence diabetes care.

Systematic reviews have also been published on the evidence of the use of community health workers[102] and social support[103] in the care of patients with diabetes. Both reviews tentatively supported their use but failed to show improvements in hard outcomes due to the small number of studies involved. Like all the published reports, they conclude that more research is needed.

Other systematic reviews regarding quality of patient care in general have been reported. For example, a systematic review of the relationship between consultation length and process and outcomes in primary care showed that longer consultations increase patients satisfaction, are more comprehensive and more responsive to patients needs.[104] However, most systematic reviews of quality of care highlight the lack of research in this area. A systematic review of studies of the quality of clinical care in primary care in the UK, Australia and New Zealand[105], arguably countries with some of the most developed primary care research programs, concluded that "further work is required to evaluate the quality of clinical care in a representative sample of the population, to identify the reasons for substandard care, and to test strategies to improve the clinical care provided in general practice."

In addition, systematic reviews on the effectiveness of interventions to improve diabetes care referred to in Section 1.1.4 reveal potentially important factors influencing care. The finding that most interventions show mild to moderate improvements in glycaemic control confirms the impression that diabetes care is complex and multiple factors are involved.[35] Organisational interventions, patient education and enhanced role of nurses have been highlighted in particular as effective interventions[36] suggesting that they are all significant facilitators of good diabetes care.

In conclusion, systematic reviews have revealed that patient adherence to medication and structured recall systems are associated with improved quality of care. Reviews of other potential factors, such as self-monitoring and the use of information technology, show equivocal results. Extrapolating from intervention trials and studies of quality of care in primary care in general, suggests that length of consultation, patient education and health professional roles may be important factors. It is important to note that systematic reviews, like all research, have their flaws. Most of the reviews described above include only a small number of trials and therefore the conclusions are tentative. Some authors also argue that meta-analyses may not be the most appropriate means of assessing diabetes care; as one leading primary care researcher put it; "meta-analysis is a blunt and potentially misleading instrument for analysing models of service delivery".[106] Therefore other types of studies, both quantitative and qualitative, are necessary to support or generate hypotheses of factors influencing diabetes care.

## 2.6 Other studies from the developed world

Factors proposed as potential barriers or facilitators to care have usually been categorised into patient, clinician and organisational factors.[107,108,109,110] Although it has been shown that there is a dynamic interplay between these three categories[109], and some factors may arguably be placed in more than one group, this classification will be used for further discussion of the literature. It is important to stress that good evidence for any of the factors comes from work in developed countries only and how far these can be generalised to countries such as Tunisia is uncertain.

### 2.6.1 Patient factors

*Adherence*

A number of studies have confirmed the importance of adherence, at least to medications, in the care of patients with diabetes. A large, well-conducted population-based study from Scotland showed that only one in three patients with type 2 diabetes adhered to their medication schedule and those on multiple tablets had even poorer adherence.[111] The same authors demonstrated an adherence rate of 70% to insulin and a significant relationship between adherence and glycaemic control.[112] Unlike most adherence studies based on self-reporting by patients, these studies used more accurate data on medication dispensing from community pharmacies using the extensive Tayside Medicines Monitoring Unit (MEMO) for pharmacovigilance. Smaller studies elsewhere have shown associations between improved adherence with medications and appointments with improved glycaemic control.[113,114] Adherence to diet and other components of diabetes care have rarely been analysed because of their complexity and the difficulties in measuring these variables quantitatively. Improved outcomes have been associated with increased frequency of attendance at health care facilities.[107,115,116] However, failure to attend may be as much due to organisational barriers (such as the distance to the nearest health centre) as patient adherence to clinic appointments.

Surveys and interviews of patients and health professionals have also highlighted adherence issues and their causes. A survey of nearly 1,000 American doctors revealed that patient non-adherence to treatment was perceived to be the most common barrier to care[117], and other surveys have confirmed this perception.[109,113,118,119] No variables have been shown consistently to be associated with adherence in quantitative studies.[120] Qualitative interview and focus group studies of patients from various countries cite the commonest causes of non-concordance with medications to be patient health beliefs, such as reservations about drugs, a lack of understanding of their illness, unsatisfactory clinical encounters with their physicians and high out-of-pocket costs.[121,122,123,124] Although complex, the issue of patient adherence is a crucial one, as more than 95% of diabetes care is undertaken by the patient.[125]

Potentially related to the issue of patient adherence is the use of alternative, traditional or complementary medicines. Their effect on the care of patients with diabetes has been rarely studied but it seems that their use is not necessarily a barrier to the use of conventional medical services.[126,127,128] Many patients in both the developed and developing world use traditional, herbal or complementary remedies[86,126,129], but the effect of using alternative treatment on quality of care remains unknown.

*Demographic variables*

Many patient demographic variables have been tested as potential barriers to or facilitators of care, perhaps because of the relative simplicity of measuring these variables. The majority of these studies are retrospective medical record reviews, with some population-based or cross-sectional surveys, from various primary care settings usually relying on mean HbA1c results only as the proxy for quality of care. Perhaps not surprisingly, given the diversity of study designs and contexts, the results have been inconsistent. Although longer duration of diabetes is usually associated with poorer glycaemic control[107,108,130,131,132], younger age[115,132,133,134,135] as well as older age[108,131] has been linked with poorer control. The effect of gender on glycaemic control is also inconclusive but there appears to be increasing evidence that women have poorer access to care than men.[16,108,136,137,138] High body mass index is sometimes, but not always[135,139], associated with poorer glycaemic control.[131] Other patient-related factors that have been associated with poorer diabetes care based on a variety of outcome measures are treatment with insulin[20,25,32,107,132,134], co-morbid diseases[10,140,141] and smoking.[110] However, most authors agree that even when patient demographic variables are associated with glycaemic control, they explain only a small proportion of the variation in care. Socio-economic factors appear to have a significant effect on diabetes care. In the United Kingdom the quality of care of patients with diabetes in deprived areas is consistently poorer than those in more advantaged areas[14,16,49,142,143,144] and in the United States, uninsured patients receive lower quality of care than insured patients.[19,20,132,145] Unlike other patient demographic variables described above, these findings come from a variety of study designs and settings and generally produce consistent results. Other related factors less thoroughly studied but found to be associated with poorer glycaemic control are lower educational levels[134] and higher rates of illiteracy.[137] Patients from racial and ethnic minorities have been shown to receive poorer quality of care, based on a variety of outcome measures, in the United States[20,131,133,139,141,146,147] and the United Kingdom[16,148,149]. For example, using the NHANES surveys in the US, major differences are apparent in health care access and utilisation between Caucasians, African-Americans and Mexican-Americans.[139] However, the author stresses that the magnitude of the differences pale in comparison with the sub-optimal health status of all three groups relative to established targets. Qualitative work has also highlighted culture and language differences as potential barriers to the provision of good diabetes care.[137,150,151,152,153,154]

*Other patient factors*

Other potentially important patient-related factors are complex and difficult to measure, such as health beliefs, knowledge of diabetes and psychological factors. Consequently, research that has suggested these issues as factors influencing care has tended to be smaller, qualitative studies. An exception to this is extensive work done by Simmons *et al* in New Zealand. In the 1990s they followed an exploratory, qualitative study of patients with diabetes with a large, population-based survey in order to identify and then quantify barriers to diabetes care.[150] The most important barriers were found to be perceptions of self-care, lack of community-based services, a limited range of services available and unsatisfactory education and knowledge of diabetes. Many of the other important barriers were psychological, such as perception of the importance of diabetes, self-motivation, health beliefs and a sense of disempowerment. More recently, the same group have undertaken a cross-sectional questionnaire survey of nearly 4,000 patients with diabetes and several hundred health professionals.[155] Psychological barriers (including health beliefs) were the most important barriers reported, although there were some major differences in perceptions between patients and primary and secondary care professionals.

Other smaller studies, usually based on patient and health professional interviews, have also reported the importance of patient health beliefs, perceptions and psychosocial factors on diabetes care in the western world.[109,156,157,158,159] It is difficult to know how transferable many of these findings are to other contexts and health systems.

### *Summary of patient factors*

A number of potential patient-related barriers to and facilitators of good diabetes care have been proposed, predominantly from developed countries, and the principal ones are presented in Tables 2.1. The evidence base for each listed factor is shown, using modified criteria from the North of England evidence-based guidelines.[160] Also indicated in the table are those factors that were tested in the quantitative analysis of this study. Complex factors that were unable to be tested quantitatively, but would be expected to emerge from the qualitative work, are also noted.

*Table 2.1* ***Proposed patient-related factors influencing the quality of care of patients with diabetes***

| Patient factor | Association with quality | Evidence base[1] | Tested in this study | References |
|---|---|---|---|---|
| Adherence to medication/diet | Positive | A | Yes | 78,93,94,109,111-114,117-119 |
| Self-monitoring | Positive[2] | A | N/A[3] | 95,96 |
| Depression | Negative | A | No[4] | 97 |
| Education / knowledge of DM | Positive | B | Qual | 36,81,83 |
| Adherence to appointments | Positive | C | Yes | 28,78,82,113,114 |
| Frequency of attendance | Positive | C | Yes | 28,82,107,115,116 |
| Longer duration of diabetes | Negative | C | Yes | 107,108,130-132 |
| Age | Variable[2] | C | Yes | 108,115,131-135 |
| Female gender | Negative[2] | C | Yes | 16,33,108,136-138 |
| Higher BMI | Negative[2] | C | Yes | 131,135,139 |
| Treatment with insulin | Negative | C | Yes | 20,25,32,107,132,134 |
| Co-morbid diseases | Negative | C | Yes | 110,140,141 |
| Smoking | Negative | C | Yes | 110 |
| Deprivation | Negative | C | Yes | 11,14,16,33,49,132, 142-145,157 |
| Lower educational level | Negative | C | Yes | 134 |
| Illiteracy | Negative | C | Yes | 137 |
| Racial/ethnic minority group | Negative | C | N/A[5] | 16,20,131,133,139, 141,146-149 |
| Family history of DM | Positive | C | Yes | 79 |
| Psychological factors | Variable | D | Qual | 150,155,156,158 |
| Health beliefs | Variable | D | Qual | 28,88,107,109, 156-159 |
| Use of alternative medicines | Uncertain | D | Qual | 86,87,126-128 |

[1] Best evidence available from:
A: Systematic reviews of diabetes care
B: Other systematic reviews
C: Other quantitative studies
D: Qualitative studies
[2] Inconsistent finding
[3] Self-monitoring is not undertaken at present by patients in Tunisia within primary care
[4] To test patient depression, additional methods of data collection such as patient questionnaires would have been required
[5] All Tunisians are from one racial, ethnic group
DM: Diabetes mellitus, BMI: Body mass index, Qual: Explored in the qualitative work, N/A: Not applicable.

### 2.6.2 Health professional factors

Potential health professional factors predominantly revolve around the areas of physician characteristics, clinical inertia, clinician attitudes and beliefs, the doctor-patient interaction and the practice team.

*Doctor characteristics*

One prospective and a number of cross-sectional studies have investigated the effect of doctor characteristics on quality of care, using a variety of outcome measures, in primary care. Once again the results are inconsistent: younger and female physicians have sometimes, but not always[108,161,162,163], been shown to be associated with higher quality of care indicators.[107,110,164,165] Differences in style between male and female GPs have been demonstrated in their care of patients with diabetes but whether this influences the quality of care is uncertain.[166,167] Some studies have shown an association between doctors' interest in diabetes with improved glycaemic control in their patients[108,165,168] but this is not always the case.[161] More consistently, no association has been shown between glycaemic control and doctors continued medical education attendance.[161,168] Although most would agree that continual medical education of health professionals is vital, studies demonstrate that even with appropriate knowledge, clinicians do not always follow suggested advice and guidelines.[150,169] Simply providing health practitioners with written material has been acknowledged to have little effect on clinical practice rather than knowledge deficits.[170,171]

*Clinical inertia*

One proposed reason for the sub-optimal care given by physicians is the idea of clinical inertia. In a comprehensive review, Phillips *et al*[172] have highlighted the importance of clinical inertia of health care providers as a limitation to managing all chronic diseases. They define clinical inertia as a failure of health care providers to initiate or intensify therapy when indicated and this has been demonstrated in studies of diabetes care and shown to be a major impediment to attaining glucose and blood pressure goals.[145,147,173,174] Three major causes of clinical inertia are suggested; firstly, an overestimation of care provided; secondly, the use of 'soft' reasons to avoid intensification of therapy; and thirdly, a lack of education, training and practice organisation focused on achieving therapeutic goals. Further evidence is required to validate these proposed ideas and to ascertain the extent to which clinical inertia influences care.

*Physician attitudes and beliefs*

Physician attitudes to and beliefs about diabetes are increasingly receiving attention. As with patient health beliefs, this complex issue has usually been addressed by exploratory work and has not been tested quantitatively. Interview studies and surveys have shown that health professionals themselves claim that contextual factors, usually related to organisational factors, are more important barriers to good care than their knowledge or attitudes.[109,118,119,151,156,157,175,176] Factors quoted are lack of peer encouragement, time and financial pressures and a lack of support staff and a team to work with. Studies have reported that doctors rate diabetes as harder to treat than other chronic disorders due to lack of effective medication, the complexity of treatment, the behavioural changes required by the patients and the inevitability of future complications.[156,170] Other physician attitudes that have emerged as potential barriers to care are judgemental attitudes to patient obesity[177], and considering diabetes to be a 'mild' disease compared with other health care problems.[178]

*Patient-provider interaction*

Some work has been done around the area of patient-provider interaction. Qualitative studies have identified discordance between the attitudes of patients and their clinicians, which can potentially jeopardise patients ability to self-manage their diabetes and adhere to treatment.[121,151,170,179] Clinicians tend to view their own management as scientific truth and to focus on managing blood glucose numbers, without attempting to understand the patient's concept of the disease and its treatment. This has been shown to lead to clinician frustration as well as patient non-concordance with the clinician's advice. The patient's view of their medical care provider has also been identified as a reason for patients not responding to diabetes care intervention.[158] Continuity of care with a primary care provider has been proposed as a facilitator to care but results of observational studies have thus far been unconvincing. Studies seem to show an association between continuity of care and improved patient satisfaction[180,181] but not always with improved outcomes.[181,182,183,184]

### *The clinical team*

Positive perceptions of teamwork and team climate within the primary care team and positive practice motivation have been associated with improved quality of chronic disease management in primary care[15] and are often cited in qualitative studies as facilitators of good diabetes care.[107,157,185] The composition of the team may also be important. For example, a large, population-based study in Australia linked quality of care, particularly based upon care processes, with the involvement of a diabetes care educator in patient management.[25] Other studies have proposed a link between access to a dietician with quality of diabetes care.[107,108] Finally, although more relevant to developing countries, health professionals in the United States have reported shortage and maldistribution of physicians to be barriers to care.[157]

### *Summary of health professional factors*

A summary of potential health professional factors is presented in Table 2.2. Each factor listed is presented with its evidence base and whether the factor was tested quantitatively or qualitatively in this study.

*Table 2.2 Proposed health professional-related factors influencing the quality of care of patients with diabetes*

| Health professional factor | Association with quality | Evidence base[1] | Tested in this study | References |
|---|---|---|---|---|
| Poor patient-provider interaction | Negative[2] | A | Qual | 101,121,151,170,179 |
| Enhanced role of nurses | Positive | B | Qual | 36 |
| Female clinician | Positive[2] | C | Yes | 109,110,161,162,165 |
| Younger clinician | Positive[2] | C | Yes | 107,108,161,164 |
| Clinician interest in diabetes | Positive[2] | C | Yes | 107,108,161,165 |
| Clinician training in diabetes | Positive[2] | C | Yes | 83,150,161,162,169 |
| Clinician inertia | Negative | C | Yes | 145,147,173,174 |
| Continuity of care | Positive[2] | C | N/A[3] | 180-184 |
| Access to dietician/educator | Positive | C | Yes | 25,107,108 |
| Clinician attitudes/beliefs | Variable | D | Yes | 77,84,118,119,151,157 |
| Teamwork | Positive | D | Qual | 15,80,107,157,185 |
| Shortage of staff | Negative | D | Qual | 81,89,157 |

[1] Best evidence available from:
A: Systematic reviews of diabetes care
B: Other systematic reviews
C: Other quantitative studies
D: Qualitative studies
[2] Inconsistent finding
[3] Differences in continuity of care could not be assessed as all patients were managed within the same health centres
Qual: Explored in the qualitative work, N/A: Not applicable.

### 2.5.3 Organisational factors

The systematic review of randomised controlled trials of diabetes care in primary care by Griffin *et al*[91] reported above, supports the idea that structured, recalled care leads to improved patient outcomes. A wide range of other organisational factors have been analysed in large, cross-sectional observational studies, but many appear strongly dependent on the local context and may not be transferable to other settings. Possible transferable factors that have been demonstrated to affect the quality of diabetes care are the equipment of health care facilities[108], availability of treatment and resources[149], the presence of a structured diabetes clinic[107,108], structured records[186], a diabetes register[17,175], practice guidelines[21,107,175], structured educational programs[133] and proximity of ophthalmologists.[151] Access to health care services appears to be a consistent factor, whether the barrier be a limited range of services or the distance to the available services.[150,151] Longer distances from home to the site of primary care have been shown to be associated with poorer care of chronic disease in rural[187] but not urban areas[188] in the United States but once more, this finding is unlikely to be applicable to other contexts even within the developed world.

A number of other organisational factors have been proposed as barriers to or facilitators of good diabetes care, but the studies are few and have used a variety of outcome measures. Larger health centres with a larger number of doctors and nurses have sometimes been associated with improved quality of diabetes care[15,48,107,108] whereas smaller centres have been associated with improved access to care and patient satisfaction.[15] There is a suggestion that urban practices provide a higher quality of care than rural areas.[140] The issue of lack of cooperation across the primary/secondary care interface has also been suggested as a barrier to quality of care in some health systems.[189] Finally, observational studies specifically of diabetes care, seem to support the finding that length of consultation is linked with improved quality of primary care.[15,162]

Historically, the traditional health care system has been designed to provide a symptom-driven response to acute illnesses, and may be poorly configured to meet the needs of those with chronic illnesses, such as diabetes.[190] The focus of primary care internationally on acute illness has been identified as a major barrier to improved diabetes care[178], highlighted by the fact that patient visits for diabetes are unlike visits for acute illnesses. Consultations for patients with diabetes take time, deal with a broad range of topics and problems and cover behavioural and lifestyle issues.[191] Many health systems have not adapted to cater for chronic disease management.[37]

### *Summary of organisational factors*

A summary of potential organisational factors is presented in Table 2.3. Each factor listed is presented with its evidence base and whether the factor was tested quantitatively or qualitatively in this study.

***Table 2.3 Proposed organisation-related factors influencing the quality of care of patients with diabetes***

| Organisational factor | Association with quality | Evidence base[1] | Tested in this study | References |
|---|---|---|---|---|
| Structured recall system | Positive | A | Yes | 36,80,82,91,109,175 |
| Information technology | Positive[2] | A | N/A[3] | 98,99 |
| Use of CHWs | Positive[2] | A | N/A[4] | 102 |
| Social support | Positive[2] | A | Qual | 103 |
| Length of consultation | Positive | B | Yes | 15,81,85,104,162 |
| Equipped health centres | Positive | C | Yes | 75,81,89,108 |
| Availability of treatment | Positive | C | Yes | 86,89,150 |
| Structured diabetes clinic | Positive | C | Yes | 107,108 |
| Structured records | Positive | C | Yes | 186 |
| Diabetes register | Positive | C | Yes | 17,175 |
| Practice guidelines | Positive | C | N/A[5] | 21,107,175 |
| Structured educational programs | Positive | C | Yes | 133 |
| Proximity of ophthalmologists | Positive | C | Yes | 151 |
| Longer distance to PHCC | Negative[2] | C | Yes | 187,188 |
| Larger health centres | Positive[2] | C | Yes | 15,48,75,107,108 |
| Urban centres | Positive[2] | C | Yes | 140 |
| Lack of co-operation with SHC | Negative | D | Qual | 77,85,189 |
| Acute illness focus of PHC | Negative | D | Qual | 89,178,190,191 |
| Lack of resources | Negative | D | Qual | 77,81,89 |

[1] Best evidence available from:
A: Systematic reviews of diabetes care
B: Other systematic reviews
C: Other quantitative studies
D: Qualitative studies
[2] Inconsistent finding
[3] Information technology such as computers, are not widely available in primary care in Tunisia
[4] Community health workers do not exist in Tunisia
[5] Health centres in Tunisia do not have practice guidelines as such, although they are all encouraged to follow the standard national guidelines within the national program
CHW: Community health workers, PHCC: Primary health care centre, SHC: Secondary health care, PHC: Primary health care, Qual: Explored in the qualitative work, N/A: Not applicable.

## 2.7 Conclusion

The following conclusions can be drawn from this literature review of the factors that influence diabetes care in the primary care setting:

1. Few studies have been undertaken in low/middle income countries.
2. Few potential factors have been formally tested and those that have often show inconclusive results.
3. Many of the factors tested lack evidence for their association with quality of care.
4. Few studies have described the context of care in sufficient detail to allow any significant findings to be thoroughly assessed in other settings.
5. Most studies use limited outcome markers, focussing either on processes or intermediate outcomes of care.
6. Only one published study has incorporated multiple methods (using qualitative and quantitative methods) to validate the findings.[107]

Only when these shortcomings are addressed can culturally-appropriate quality interventions be instigated to improve the care of patients with diabetes. This study seeks to address these omissions by:

1. Undertaking a study in Tunisia, an example of a low/middle income country.
2. Quantitatively testing and analysing a large number of potential factors proposed by exploratory, qualitative work in Tunisia and elsewhere.
3. Qualitatively generating new factors that may be relevant to diabetes care.
4. Fully describing the context of diabetes care in Tunisia, including standards and trends in care, a nationwide perspective and a detailed ethnographic study of primary care health centres.
5. Using a variety of quality of care indicators based on processes, outcomes and medication prescribing.
6. Combining multiple methods within one study.

Incorporating all of these six components make this study unique.

# Chapter 3: Qualitative Methodology

## 3.1 Introduction

The following two chapters present the methodology employed in the study, commencing with the qualitative work. The aim of the qualitative methodology is to describe the care of patients with diabetes in primary care health centre, to explore the culture of caring for patients within primary care health centres and to explore and identify the factors, both barriers and facilitators, that influence the care of patients with diabetes in primary care in Tunisia. This chapter explains the rationale and use of qualitative methods and data analysis along with common concerns in qualitative methodologies, namely sampling, access, linguistic, ethical and validity issues.

### 3.1.1 Why qualitative research?

The Handbook of Qualitative Research[192] describes qualitative research as "multi-method in focus, involving an interpretive, naturalistic approach to its subject matter. This means that qualitative researchers study things in their natural settings, attempting to make sense of, or interpret, phenomena in terms of the meanings people bring to them". Qualitative research methods are strategies for the systematic collection, organisation, and interpretation of textual material obtained from talk or observation, which allow the exploration of social events as experienced by individuals in their natural context.[193] They are designed to yield detailed and holistic views of the phenomena under study.[194] The goal of qualitative research is the development of concepts which help us to understand social phenomena in natural settings, giving due emphasis to the meanings, experiences, and views of all the participants.[195]

There are several potential strengths of qualitative research that are applicable to the primary health care setting:[194,195,196,197,198]

- An understanding of the patient's and others perspective, such as identifying what really matters to patients and care providers.
- Studying previously unexplored topics or those that are poorly understood or ill defined.
- Exploring issues of process and the functioning of systems.
- Generating hypotheses in addition to testing them.

- Enabling access to areas not amenable to quantitative research, such as attitudes and beliefs.
- Helping bridge the gap between scientific evidence and clinical practice, for example, exploring why the findings of randomised controlled trials are often difficult to apply in day-to-day practice.
- Understanding the barriers to quality of care and evidence based medicine and identifying obstacles to change.
- Complementing other research by explaining or implementing findings.

Historically, qualitative and quantitative approaches to research tended to be portrayed as antithetical (Table 3.1). More recently, many now argue that the either/or debate about quantitative and qualitative research needs to move forward to a fusion of the two approaches so that their respective strengths might be reaped.[193,195,199,200] The two strategies are complementary rather than contradictory and by combining approaches, the shortcomings of both strategies can be offset.

> "What is involved is not a crossroads where we have to go right or left. A better analogy is a complex maze where we are repeatedly faced with decisions, and where paths wind back on one another. The prevalence of the distinction between qualitative and quantitative method tends to obscure the complexity of the problems that face us and threatens to render our decisions less effective than they might otherwise be".[201]

***Table 3.1*** ***A comparison of qualitative and quantitative methods***[195,202]

| | Qualitative | Quantitative |
|---|---|---|
| Social theory | Action | Structure |
| Methods | Observation, interview | Experiment, survey |
| Question | What is X? (classification) | How many Xs? (enumeration) |
| Aim | To explore complex human issues | Aims to be detached and objective |
| Reasoning | Inductive, holistic | Deductive, reductionalist |
| Sampling method | Theoretical | Statistical |
| Researcher | Integral part of research process | Aims to be detached and objective |
| Strength | Validity | Reliability |

We undoubtedly need a range of methods to better understand the complexities of modern health care.

### 3.1.2 Why ethnography?

*Definition*

Ethnography has been defined as "a method used to describe a cultural group or to describe a phenomenon associated with a cultural group".[203] It takes a holistic approach, using a mixture of research methods, in order to attempt to understand human behaviour within a group setting. Historically, ethnography was adopted by anthropologists who went to live in and study tribal communities in far off lands. Nowadays, ethnographic studies take place in various settings, particularly schools, prisons and other institutions, including health care settings. It is a detailed way of witnessing human events in the context in which they occur and can thereby help healthcare professionals by increasing our understanding of patients' and clinicians' 'worlds'.[204] Typically, the main defining feature of ethnographic research is its use of participant observation, but it often includes quantitative methods in addition to various qualitative methods. It is viewed as contextual and reflexive, emphasising the importance of context in understanding events and meanings, and takes into account the effects of the researcher and the research strategy on findings. Ethnography seeks to discover the 'emic' perspective (the insider's view) while acknowledging the importance of the 'etic' perspective (the outsider's framework); most ethnographers collect data from the emic perspective of their informants and then try to make sense of it in terms of their own etic, or scientific, analysis.[205]

*Rationale*

Ethnography is being used more and more to study the organisation of health care and the health care setting.[206] Ethnography has been particularly highlighted as useful in primary care research, and the experience of an ethnographer has even been shown to be parallel to the experience of a general practitioner.[207] Previous studies of diabetes care within varied cultural settings, such as Indians in Canada, have taken a similar ethnographic approach.[208]

Ethnography was chosen because:

- It gives an insightful description of a particular cultural entity (in this instance, the Tunisian primary care centre), in order to develop further theories and to explore in depth, previously suggested theories.[200]
- It is holistic in nature, incorporating multiple methods, quantitative and qualitative, essential for the study of the complex issue of diabetes care in an original

setting. It is also holistic in perspective: It aims to provide an emic perspective (the description that the members of the group give about their own culture) and an etic perspective (the researcher's interpretation of the culture) in order to produce a complete picture of the entity being studied.[203]

- It is also reflexive, taking into account, and exploiting, the role of the researcher.
- It makes central use of participant observation, which seemed particularly applicable to the research question and a previously non-researched setting.

On a personal level, I was attracted to the idea of ethnography while studying qualitative methodologies for a number of reasons. I appreciated its scope of incorporating both qualitative and quantitative methods, I have always felt strongly that we must acknowledge the part that we as the researcher play in our work, I easily grasped the step-wise approaches to ethnographic analysis (Section 3.5.1) and in particular, I wanted to study the cultural aspects of health care: All forms of ethnography aim to "produce a cultural portrait: an overview of the entire culture that is obtained by pulling all of its parts together while respecting the nuances and complexities of its systems".[209]

Other methodology approaches were considered, in particular, grounded theory. This commonly used approach in qualitative work is based on work by Glaser and Strauss in which theory is 'grounded' in data rather than presumed at the outset of a research study.[210] It takes a purely inductive approach in which coding categories reflect only the content of data collected with no relation to previous ideas or findings. Like other researchers[192,211], though I appreciate the value of an iterative approach and place importance on developing theories and concepts from the data, I have problems with the purest from of grounded theory. As Miles and Huberman[192] state, "any researcher, no matter how unstructured or inductive, comes to fieldwork with some orientating ideas, foci and tools." That is, it appears impossible to start with a completely clear sheet of paper. In addition, it seems foolhardy to ignore the cumulative body of knowledge previously built around a particular area of study. Instead, the reflective approach to ethnography acknowledges the researchers background and preconceived ideas, and ethnographic analysis makes use of the predetermined categories and frameworks from previous work as well as identifying new themes and ideas from the data. Other methodologies, such as a narrative approach and conversation analysis, similarly appeared less applicable to the research question and setting than ethnography.

Many types of ethnography are recognised, including classical or holistic, cross-sectional, ethno-historical and particularistic.[206] The type used in this research is a form of the latter, often called focused ethnography,[206,212] used to describe the topic-orientated, small-group ethnographies commonly used in health care research. Whereas ethnography in general seeks to discover the cultural knowledge people are using to organise their behaviour and interpret their experience, focused ethnography narrows this to one or more aspects of life known to exist in the community. In this case, the community studied is the primary care health centre, with the focus on the care of patients with diabetes at these centres.

Ethnographers take various philosophical positions and there are varying views as to the importance of the influence of the epistemological foundations of ethnography. I approached the research without a strong theoretical viewpoint, possibly because of my medical rather than sociological background, and followed closely Hammersley and Atkinson's approach to ethnography because of its clarity, its appropriateness to my research context and its reliance on reflexivity.[74] Regarding the emic-etic dichotomy, with the underpinning theories of ethnoscience versus cultural materialism, I sought to take a balanced view, typified by using two, widely disparate, forms of qualitative analysis (ethnographic and content).[205]

## 3.2 Sampling

*Purposive sampling*

Qualitative research aims to reflect the diversity within a given population, rather than aspiring to be statistically generalisable or representative. Purposive, or theoretical sampling is a specific type of non-probability sampling in which the objective of developing theory or explanation guides the process of sampling and data collection.[213] The researcher actively selects the most productive sample to answer the research question. It can involve developing a framework of variables based on the researcher's practical knowledge of the research area, the available literature and evidence from the study itself.[202] Purposive sampling is usually recommended for studies involving participant observation[214] and is ideal for the qualitative aspects of this study.

*Health centre selection*

The selection of the health centres for the qualitative work evolved during the course of the study; this was to be expected given that the framework of identified variables progressed over time. The original proposal was to visit one urban centre in an affluent area and one rural centre in a less affluent area for 12 months each, based on the initial presumption that milieu and deprivation were thought to be strong influencing variables. After discussion with the co-ordinators of the national program it was suggested that 12 months, though theoretically more ideal for ethnographic work, would be too long practically for the staff at the health centres. It was therefore decided to visit four health centres for six months each. After the pilot study the factors that appeared to be the strongest influencers of care were doctor motivation and how well organised the health centre was. After discussion with a qualitative research expert, the following grid was used to select the four health centres:

| | Motivated Doctor | Less Motivated Doctor |
|---|---|---|
| Organised Centre | x | x |
| Less Organised Centre | x | x |

To be able to select the centres using these criteria, they would clearly need to be centres that I was acquainted with, most likely as part of the quantitative data collection. Selecting an organised centre with a motivated doctor and a less organised centre with a less motivated doctor was relatively easy. By this point of the study it was apparent that doctor motivation and health centre organisation were closely related variables and finding the other two health centres was challenging. The third centre was found providentially; a highly motivated doctor from a centre used in the pilot study had moved to a new centre. Although I had not visited the new centre, I was informed that it was not well organised and so appropriate for my sampling strategy. It proved very difficult to find an appropriate fourth health centre. Firstly, my selection was limited to the relatively small number of health centres that I had previously visited, with the exception of the third centre as described above. Secondly, the close association between motivated doctors and organised centres. Thirdly, the aim was to limit the selection to health centres that held weekly chronic disease clinics in order to maximise exposure to patients with diabetes. Less motivated doctors appeared less likely to initiate these clinics. For these reasons, as

well as other practical reasons (time) and theoretical reasons (data saturation), it was decided that three health centres would be sufficient for the qualitative work.
I will describe these health centres from now on as the 'three qualitative health centres' to clearly indicate when I am referring to them.

*Other sampling issues*

In addition to the selection of the health centres to be visited, sampling was required within the cases selected[74] to determine which consultations and situations to observe and on which days. The aim was to observe all of the health professionals involved in the care of patients with diabetes in every setting and context within the health centre. Ideally, centres with a weekly chronic disease clinic were selected and the centre was visited on this day of the week. Criteria employed for sampling were made as systematic and explicit as possible.

### 3.3 Access issues

Although not exclusive to ethnography, the issue of obtaining access to data is a notoriously complex issue in this type of research.[74] Access is wider than the simple granting or withholding of permission for research to be conducted and it is not simply a matter of physical absence or presence. In my case, my association with the DSSB and thus the Ministry of Public Health was a significant advantage in gaining 'formal' access to the health centres I was visiting, both for the quantitative and qualitative work. Ethical approval was granted for the study by the Tunisian Ministry of Public Health who act as the ethical board for research in public care in Tunisia. I therefore had official permission to visit health centres and although further permission was requested from the regional director of each region, this was done for reasons of etiquette. However, once I arrived at a health centre to commence my work, the issue of access was far from over. My aim was to observe all events at the health centre, including potentially delicate areas such as doctor-patient consultations, and only through good relationships and understanding could this be achieved. Beyond the physical access to places, I wanted to observe 'normal' life at the health centre and to discuss common everyday issues with staff and patients; at each step, informal 'access' was required. Thus, there were a large number of gatekeepers involved. Identifying relevant gatekeepers has been described as an important, though not always straightforward step, in ethnographic work.[74] The 'formal' gatekeepers in my research were the national and regional officials. I also discovered that each health centre had an 'informal' gatekeeper who was not one of the physicians that I was initially introduced to; this was the 'surveillant' or lead nurse, at each health centre. Once I had befriended this person, I not only had physical access to all areas of the health centre but help and assistance to set up focus groups and interviews. This was an important early stage of visiting each of the qualitative health centres.

*Researcher's perceived identity*

The issue of the researcher's perceived identity plays an important role in access. To the official gatekeepers at the regional level I was formally introduced as a doctor from the United Kingdom, researching the management of diabetes care in Tunisia. From then on in, it was left to these gatekeepers to introduce me to the clinicians at the health centre, who sometimes, but not always, introduced me to the other staff and patients. At various times I was described as working for the World Health Organisation, a diabetes specialist, a visiting doctor, a researcher and an English man who speaks Arabic. When opportunities allowed, I denied my role as an 'evaluator' and 'specialist' and presented myself as a learner of the culture of the health centre. Researchers can vary from being 'outsiders' to 'insiders'. Outsiders assert that they alone possess the needed objectivity and emotional distance to conduct valid research on a given group without presenting the group in an unrealistically favourable light. Analogously, insiders assert that only they are capable of appreciating the true character of the group's life.[215] In my case, I felt that I was an outsider with an insider's perspective, enabling me to benefit from both positions. As a foreign visitor with an obvious accent, I was easily perceived as an outsider; a learner whom people were quick to educate and inform. Conversely, I was also a general practitioner, and other doctors in particular, seemed to take me under their wing and include me as 'one of them', an insider.[198] As one ethnographer has described it, my aim was to become 'a part of the furniture'.[216]

## 3.4 Methodology

*Why use multiple methods?*

The delivery of care to patients with diabetes is complex, reflected in the number of potential factors affecting quality of care identified in the previous chapter. It is therefore unlikely that one sole research method will allow evaluation of all the proposed factors, in addition to generating other possible hypotheses. Multiple methods would be expected in this type of exploratory research. Khunti[107] has previously shown the feasibility of using multiple methods to determine factors affecting the quality of care of patients with diabetes and demonstrated that each method provided unique data, which could not otherwise be easily obtained. I have incorporated the majority of the methods used in his study. It is acknowledged that some pure qualitative researchers consider that the use of multiple methods is disadvantageous.[68] They believe that it does not allow for sufficient depth in analysis, that the research methodologies are complex, that combining and interpreting data is difficult and in addition, that the researcher may have limited methodological training in certain areas. However, other authors such as Robson[217] highlight the importance of research in the 'real world', which must encompass use of all appropriate methods. I considered the principal advantages of using multiple methods to be; firstly, the fact that this is a new research context so we have no foreknowledge of which methods may be helpful, secondly, the use of triangulation of methods, and thirdly, the appropriateness of multiple methods for exploratory research of a complex issue such as diabetes care.

### 3.4.1 Participant observation

*Definition and rationale*

Qualitative observation methods involve the systematic, detailed observation of behaviour and talk, i.e. watching and recording what people say and do. The aim is to gather first-hand information about social processes in a naturally occurring context. It is recommended that, in order to learn about a social group, one should "submit oneself in the company of the members to the daily round of petty contingencies to which they are subject".[214] The role of a participant observer involves becoming involved in the activities taking place, to a greater or lesser extent, while also observing them in an attempt to minimise the impact on the environment. Participant observation is the typical feature of ethnographic research. The ethnographer "participates overtly or covertly, in peoples' lives for an extended period of time, watching what happens, listening to what is said, asking questions: in fact collecting whatever data is available to throw light on the issues that he or she is concerned".[74]

### *Method*

I visited each of the three qualitative health centres for six months each, on the day of the weekly chronic disease clinic. I spent time observing all events at the health centre, including consultations with the doctor and nutritionist, the various roles of the nurses, the pharmacy, the waiting room and the reception area. In all situations, I remained aware of the potential influence I might be having on the observed behaviours and actions – the so-called 'Hawthorne effect'.[218] It has been argued that it is never possible to exclude entirely this potential effect, and in fact, it is more important to be aware of the possible effect rather than attempt to exclude it. This is particularly relevant in reflexive ethnography in which the researcher him/herself is considered a research instrument.[74]

### *Use of fieldnotes*

Fieldnotes are the traditional means in ethnography for recording observational data: "In accordance with the ethnographer's commitment to discovery, fieldnotes consist of relatively concrete descriptions of social processes and their contexts. The aim is to capture these in their entirety, noting their various features and properties, though what is recorded will clearly depend on some general sense of what is relevant to the foreshadowed research problems". [74] Although it is impossible, even with video and sound recording, to collect all available data one is observing, the aim is to record as close as possible what is happening, including the researcher's own feelings and responses to the situations witnessed.[214] Only a sample of observations and conversations can be recorded, but the aim is to record those thought to be potentially pertinent to the research question. Although this may appear to be open to bias, the subjective nature of this type of research is a crucial component of the process of analysing qualitative research data.

My aim was to record all observations and discussions witnessed relevant to my research question, i.e. the factors influencing the care of patients with diabetes. I kept a research diary within my fieldnotes to not only detail events and conversations but also to detail my own personal reactions to events and changes in my views over time. All tentative hypotheses, systems of classification and potential models were recorded and reviewed regularly with the input of new data. The primary use of my fieldnotes was to record my findings during participant observation, but findings from other methods were also recorded in the diary, for example, observation of relevant meetings, and recording of trace documents.

One debatable issue in the recording of fieldnotes is when to write them. It is usually recommended to record them as soon as possible after the observed action and ideally during actual participant observation, as the quality of note recording diminishes rapidly with the passage of time.[74] After some initial experiments I discovered a successful manner to observe behaviour in the health centre and simultaneously take notes without causing disruption or embarrassment. I would set up my laptop in the reception area and take out a few medical records in which to input data as I had done in the quantitative part of my study. I could then observe and listen and type freely; any spare time was also used efficiently to continue input of quantitative data. This somewhat 'covert' nature of observation is discussed further in Section 3.7. However, this technique was not always possible, such as at health centres where an electrical current was not always available and during observation in places other than the reception area. In these cases I would write observations in a notebook and type them up in my laptop as soon as possible after. Although not ideal, an advantage of this was that it gave me additional time to reflect on the observations made while typing up my notes. Occasionally, I did not have the opportunity to write observations at the time, such as during informal discussions in corridors or cars. In these cases, I would rely on my memory and type up a summary of the observations and discussions as soon as possible after the event.

In summary, as suggested by Spradley[212], my fieldnotes included the following:

1. Condensed (summary) accounts of observations and discussions at health centres
2. Expanded (complete) accounts of some events and comments that seemed particularly pertinent
3. A field work journal of my personal experiences of doing the research
4. Analysis and interpretation of the data

### 3.4.2 Semi-structured interviews

*Definition and rationale*

Semi-structured interviews are a form of qualitative interviewing that allows detailed exploration of participants' ideas about the topic being discussed.[196] They are conducted on the basis of a loose structure of open questions, which define the area to be explored, at least initially, and from which the interviewer or interviewee may diverge in order to pursue an idea in more detail. Characterised by an interactive approach, a basic structure is employed which defines the topic, but is flexible enough to discuss ideas and understandings that may not be expected by the researcher. This type of interview is also responsive since the interviewer attempts to take on the language that the participant uses. The use of key informants is a well-recognised technique in qualitative research.[219]

### *Method*

#### *Lead physician*

The lead physician at each of the three health centres was interviewed based on a loose interview schedule developed around the central question: 'What are the patient, clinician and organisational factors that influence the care of patients with diabetes in Tunisia?' (Appendix 3.1). The topic framework was initially developed from the literature search and then later adapted according to ongoing data input and analysis. Additional centre-specific questions were asked based on observation and discussions at each individual health centre. The interviews were conducted in a mixture of French and Tunisian Arabic, taped onto a Minidisk and fully transcribed. A summary of the interview was discussed with the interviewee at a later date to validate the findings (Section 3.8) and additional comments and/or corrections were also included in the transcript.

#### *Key informants*

Seven key informants were interviewed using the same interview schedule.

- The two co-ordinators of the national program. They were intentionally interviewed early in the study in order to reduce any potential bias from their knowledge of my research findings.
- One of the leading diabetologists in the country who was involved in the initial development of the national program.
- Three European health professionals (two general practitioners, one nurse) who all had first-hand experience of working in Tunisian primary care health centres.
- One secondary specialist who, atypically, consulted patients twice a week in a primary care centre and also worked as a regional co-ordinator for the national program.

These informants were selected as 'outsiders' who all had experience of managing diabetes in primary care health centres. The interviews were conducted in Tunisian Arabic/French or English, recorded and partially transcribed. Respondent validation (Section 3.8) was undertaken where feasible (in six of the seven cases).

### 3.4.3 Focus groups

*Definition and rationale*

Focus groups are a form of group interview that capitalises on communication between research participants in order to generate data. They are not simply a quick and convenient way to collect data from several people simultaneously, but rather explicitly use group interaction as part of the method. Instead of the researcher asking each person to respond to a question in turn, people are encouraged to talk to one another: asking questions, exchanging anecdotes and commenting on each others' experiences and points of view.[220] Patton sees the focus group interview as a "highly efficient qualitative data-collection technique (which provides) some quality controls on data collection in that participants tend to provide checks and balances on each other that weed out false or extreme views...and it is fairly easy to assess that extent to which there is a relatively consistent, shared view...among the participants".[221] They are commonly used to construct the 'patient's view' by the participants' sharing, acquiring and contesting knowledge within the social space of the interview.[222] It is suitable where the interviewer has a series of open questions and wishes to explore the issues of importance to them, in their own vocabulary, generating their own questions and pursuing their own priorities. In addition, it is often used in cross-cultural work as it is particularly sensitive to cultural and social variables. It is particularly appropriate in cultural settings, such as Arab society, where more emphasis is placed on group discussions and decisions than individual ones.[223,224] Researchers in other Arab countries have highlighted that focus groups appear to fit well with the oral traditions and patterns of socialisation in an Arab setting.[225]

*Method*

Focus group interviews were undertaken with staff (one) and patients (four) at each of the three health centres.

The lead nurse at each health centre was asked to invite the interviewees after being given an explanation of the aim of the focus groups. The optimum time and location of the focus groups were agreed on in advance with the lead nurse to allow staff and patients to participate without disrupting clinical care. For the staff focus groups, the nurse was asked to invite all available paramedical staff on duty at the time of the planned focus group. Ideally, at least one representative of each type of health professional was present (receptionist, pharmacist, nurse and dietician). For the patient focus groups, around six patients were chosen per group.[220] The lead nurse was asked to invite a sample of six patients with diabetes, including both men and women of various ages, attending the health centre on the day of the planned focus group.

An open interview schedule was developed around the central question: 'What do you think about the management of patients with diabetes here?' (Appendix 3.2). Additional centre-specific questions were asked based on observation and previous informal discussions at the health centre. The focus groups were undertaken in Tunisian Arabic, recorded onto a Minidisk and fully transcribed (Section 3.6). A summary of the staff focus group was discussed with each participant individually at a later date to validate the findings (Section 3.8) and additional comments and/or corrections were also included in the transcription. Following each interview and focus group, I purposefully spent some time reflecting on the interview and its technique, in an attempt to improve my own skills at interviewing.

### 3.4.4 Other methods

*Participant observation at other locations*

My primary use of participant observation was at the three health centres sampled for the qualitative research. However, I experienced many other situations in which I observed actions and discussions relevant to my research question and I viewed these occurrences as 'informal participant observation'.

During the quantitative data collection I visited sixty health centres. Although the principal reason for these visits was to collect data from the patient records, I used all opportunities available to observe care and discuss issues with staff and patients. While asking staff quantitative details regarding the health centre I also asked for their views on diabetes care at the health centre. I was sometimes invited to observe consultations and I always took up these opportunities.

In addition, I shared an office at the DSSB with the co-ordinators of the national program and over the period of the study we had many informal discussions, as well as the formal interviews, about the national program and care of patients generally. I also had the opportunity to attend a number of relevant meetings related to diabetes care, usually organised by the DSSB, such as annual 'World Diabetes Day' educational meetings, meetings of the regional co-ordinators of the national program and educational workshops for general practitioners.

All of these observations and discussions were included in my fieldnotes and later included in the content, but not the ethnographic, analysis.

### *Personal reflection*

As recommended in all qualitative research, and in particular the reflective approach of Hammersley and Atkinson to ethnography[74], I spent a significant amount of time reflecting on the data during collection and analysis. I found the most conducive time to do this was during participant observation, when I was situated in a health centre and was experiencing what I was studying. All constructive reflections were recorded in my fieldnotes.

### *Structured patient questionnaire*

Soon after commencing visits to the second qualitative health centre, I was discussing the common use of herbal medicines with one of the clinicians. He suggested that I interview patients individually, in addition to the focus groups, to ask them specifically about their use of herbal medicines. I quickly agreed to the idea as I was aware that collecting groups of patients at this health centre might prove difficult because they no longer had a specific day of the week for seeing patients with diabetes. With input from the clinician, we wrote a ten question structured questionnaire focussing on areas that were appearing relevant (Appendix 3.3), such as the use of herbal medicines and gender differences, in addition to more generic questions, such as suggestions for improving care. The questionnaire was administered as an interview because many older patients attending the health centres are illiterate. Twenty patients were interviewed in the time and circumstances available. The questionnaire proved a helpful addition to the focus groups and was repeated with the same number of patients in the third health centre.

*Other documents*

Other documents that were potentially relevant were incorporated into the study. Some were freely available and were retained for future use, such as documents related to the national program. Other documents were copied for future use, such as consultation data at health centres not systematically collected. Photographs were also taken at each of the three qualitative health centres. The health centre staff granted permission for the collection of all trace documents, including the photographs, and all data were stored anonymously.

## 3.5 Data analysis

In contrast with quantitative methods, the analysis of qualitative data is a continual process commencing during data collection and continuing throughout the time of the study. It is an iterative process in which theory is developed out of data analysis. All steps in the data collection, from recording, storing and retrieving data, were viewed as part of this process. For example, the interview transcripts were read several times during the transcription process, prior to the formal analysis procedure. Each of these steps was seen as an opportunity to immerse myself in the data further and to develop and test explanations and theories.

Emics and etics are common terms used within ethnography and ethnographic analysis[203,205]. The emic perspective is the description that the members of the group give about their own culture. It is the informant's perspective on reality, the 'insider's view'. The insider's view of what is happening and why is essential in order to describe and understand situations and behaviours, in this case the care of people with diabetes. The etic perspective is the researcher's interpretation of the culture. It is the 'outsider's framework', the researcher's abstractions or scientific explanation of the reality. Both views are important in order to understand why people do what they do and to develop conceptual or theoretical interpretations. In line with this holistic approach to the study, two contrasting analyses were undertaken with the aim of seeking both perspectives: a 'pure' qualitative approach that takes an emic perspective (ethnographic analysis) and a mixed quantitative/qualitative approach with a predominant etic perspective (content analysis).

### 3.5.1 Ethnographic analysis

*Definition and rationale*

Ethnographic analysis is "the search for patterns in data and for ideas that help explain the existence of those patterns".[205] Underlying this form of analysis is ethnoscience, which emphasises the emic perspective, i.e. the insider's perspective. One of the best-known and widely used ethnographic analyses is that described by Spradley in *The Ethnographic Interview*[212] and its companion volume, *Participant Observation.*[226] His 'Development Research Sequence' aims to discover cultural themes, defined as "any cognitive principle, tacit or explicit, recurrent in a number of domains and serving as a relationship among subsystems of cultural meaning". The aim of this type of analysis was to gain an understanding of these themes in the context of managing patients with diabetes in Tunisian primary care health centres.

*Data included*

Ethnographic analysis is characteristically used for analysis of texts of participant observation and interviews and so only the 'formal' qualitative data from the three health centres were used:

- Fieldnotes from participant observation
- Transcripts of semi-structured interviews of the lead clinicians (3)
- Transcripts of staff focus groups (3)
- Transcripts of patient focus groups (12)

*Method of analysis*

The transcripts were analysed based on Spradleys' Development Research Sequence[212] consisting of the following stages:

1. Domain analysis. All symbolic categories were listed along with their cover term (title), semantic relationship (how the terms fitted into a cover term) and included terms.
2. Taxonomic analysis. The data were searched again to discover the full internal structure of the domains listed.
3. Componential analysis. The domains were organised into sets, such as comparison and contrast sets, and schematic diagrams were made.
4. Theme analysis. To search for cultural themes the domains from each transcript were mapped out together, particularly comparing and contrasting domains from

different sources (e.g. patients versus staff) and from different health centres. Spradleys strategies for discovering cultural themes were followed throughout the analysis.[212]

I attempted to analyse the data in depth by:

- Immersing myself in the data
- Constantly contrasting and comparing data, for example, between interviews, between health centres and between personnel.
- Reflecting on any data that were surprising or seemed inconsistent. For example, any deviant views expressed within and between focus groups were highlighted and particular importance was given to them during the thematic analysis.
- Reviewing whether the data were as expected.
- Seeking to include or exclude cultural themes and models from all new data I reviewed.
- Attempting to understand what was not being said and not happening as well as what was said and occurred.
- Using pictures and diagrams of the data, domains, key words and phrases.

*Collaborative analyses*

Data from the first health centre, with the exception of the field notes, were analysed by myself and a second researcher (BA) for reasons outlined in Section 3.8. Domain and taxonomic analyses were undertaken separately and then an agreed full list of domains and inclusion terms was agreed. The proportion of agreed domains was calculated to give an idea of the inter-rater variability. Theme analysis was undertaken initially by myself and then discussed with the second researcher.

### 3.5.2 Content analysis

*Definition and rationale*

Content analysis is "an approach to the analysis of documents and texts that seeks to quantify content in terms of predetermined categories and in a systematic and replicable manner".[211] It takes an etic perspective as the researcher approaches the analysis with an outsider's perspective and framework. It is one of the classical procedures for analysing textual material, whatever the source, and seems an appropriate and efficient method to analyse the large amount of data collected in this study. One of the essential features is the use of categories that are usually brought to the empirical material from previous research.[227] In the case of the current study, previous work[107,108,109] has suggested factors that may influence the care of patients with diabetes, grouped into patient, health professional and organisational factors (Table 2.1 – 2.3). It therefore seemed appropriate to search, classify and explore the data within these predetermined categories.

### *Data included*

The computer software program NVivo[228], an updated version of NUDIST, was selected as the most appropriate computer package for the large quantities of qualitative data to be analysed. The following documents were incorporated into an NVivo software program for the content analysis:

1. From the three qualitative health centres:
- Fieldnotes from participant observation
- Transcripts of semi-structured interviews of the lead clinicians (3)
- Transcripts of staff focus groups (3)
- Transcripts of patient focus groups (12)
- Structured patient interviews (40)

2. From visits to 60 other health centres while inputting the quantitative data of the study:
- Fieldnotes from 'informal participant observation'

3. Other sources
- Fieldnotes from 'informal participant observation' at the DSSB
- Transcripts of semi-structured interviews of key informants (7)
- Observation at relevant, educational meetings (19)
- Other relevant documents

### *Method of analysis*

All documents were systematically searched and coded into nodes according to any potential barrier or facilitator to care identified. The 'tree' facility within NVivo was used with the three main branches being the broad themes of patient, health professional or organisational factors. Each node was included as a 'child node' of these main branches, and 'child nodes' themselves could also have further 'child nodes', etc. During analysis the nodes were regularly reviewed and re-grouped or re-classified according to new data.

During the initial coding process, no differentiation was made between barriers and facilitators to care; all factors, whether potentially positive or negative, were coded into the same nodes. Later, while investigating the most commonly coded nodes, the factors were explored as to whether it was a potential barrier or facilitator to good care, or both.

### 3.6 Transcription and language Issues

> "In every nation, the formation of language takes place according to their own terminology. The linguistic habit that the Arabs obtained in that way is the best there is."
>
> Ibn Khaldoun, 14th century, Tunis[1]

Considerable consideration was given prior to the study to the issue of language. Tunisian Arabic is the first language learnt by all Tunisians and is the 'heart' language of the people. However, it is an oral dialect only and different to written Arabic. French is used in the medical field and widely spoken by many, but not all, Tunisians. After discussion with Tunisian colleagues, it was decided that Tunisian Arabic would be the preferred language for the interviews and focus groups, albeit the transcripts would need to be typed out in an alternative language, in this case English. Although the ideal for transcribed data is to analyse them in their spoken form, simultaneous translation and transcription is a necessity for all oral dialects and has been used in similar research contexts.[152,229] Twinn[230] has explored in-depth the influence of translation on the validity and reliability of qualitative data and stresses the importance of having only one transcriber/translator work with the qualitative data in order to maximise reliability of the data sets. She and others have also made the observation that the use of an ethnographic approach lends itself most easily to managing the complexities of translation of qualitative data.[231]

I spent six months prior to commencing the project in intensive Tunisian Arabic study and throughout the project I continued formal and informal language lessons. Most transactions and interactions I observed and participated in were conducted in Tunisian Arabic. Whenever possible I asked for clarification for anything that I did not understand, either directly from the relevant participant or later from one of my language helpers. Professional medical meetings and some interactions between medical practitioners were conducted in French for which my level of French (AS level) was sufficient. All relevant written documents were also in French, apart from the most recent Ministry of Health reports, which are in written Arabic. I received help from my colleagues in understanding the relevant sections required of the latter documents.

All focus groups and semi-structured interviews were recorded using a microphone and Minidisk player. I later simultaneously translated and transcribed the interviews, initially with help from a Tunisian language tutor. A Tunisian English teacher later checked and corrected all transcripts by listening to the original recording whilst reading the draft transcription. The purpose throughout was to translate the essential meaning of the language, through the translator's understanding of the Tunisian culture, rather than a word-for-word translation. The philosopher of science, Karl Popper stated:[232]

> "Everybody who has done some translating, and who has thought about it, knows there is no such thing as a grammatically correct and almost literal translation of any interesting text. Every good translation is an interpretation of the original text"

Phrases with various meanings or no similar English expression were left in Tunisian Arabic using a phonetic form. Later respondent validation (section 3.8) was a further attempt to ensure that no significant translation errors were made.

## 3.7 Ethical considerations

Although ethical approval was granted for the study by the Tunisian Ministry of Public Health, qualitative research methods in particular, like all research involving human beings, raise many, profound ethical issues.[196]

*Informed consent*

Informed consent of all participants is difficult in ethnography because it takes place in natural settings where control over the research process is often limited; it is near impossible to ensure that all participants are fully informed and freely consent to be involved. However, attempts were made to ensure informed consent where at all possible. For the recorded semi-structured interviews, signed consent was requested using a written consent form and information sheet (Appendix 3.4). Anonymity was discussed prior to each interview. The issue of consent for the focus groups was discussed at length with my supervisors and Tunisian colleagues. It was decided that written consent, though the ideal, would not be feasible as many patients are illiterate, Tunisia has an oral culture rather than a written one and within a group interview implied consent would be sufficient. Participants of the focus groups were invited and prior to each discussion I explained that participation was optional, that they were free to leave at any time and that their comments would remain anonymous (Appendix 3.2). I particularly stressed that any negative comments about the health centre or staff would not be repeated to the staff. Similarly, patients were invited to participate in the structured patient questionnaire interviews and informed verbally that their participation was optional and responses anonymous (Appendix 3.3). On reflection, implied consent seemed to be effective as on two occasions a participant left the group early without contributing (one staff member and one patient) suggesting that participants felt free to not participate if they did not wish to. The issue of consent during observation work is more complex. Staff at each health centre were informed that I was researching the care of patients with diabetes in Tunisia, and where possible, patients at the health centres were informed that I was a researcher from the United Kingdom. On occasions it was apparent that mis-information had been communicated, such as the perception of staff or patients that my aim was to 'evaluate' the health centre; I would aim to quickly correct this misconception. The practical difficulties of informed consent are such that in most observational research, anonymity of observed actions and comments of participants are deemed sufficient.[68,74]

A related ethical issue common to ethnography is the issue of covert participation observation, where the researcher carries out the research without most or all of the participants being aware that the research is taking place. I would agree with most ethnographers that overt observation is preferable to covert where possible.[74] However, it was apparent in my participant observation, such as when observing patients in places such as the waiting room, that my observation was somewhat covert. This was particularly the case when I was sat with my computer appearing to input data rather than in reality, noting actions and behaviours around me. At times, I felt some discomfort with my apparent deception. However, health centre waiting rooms are areas open to the general public, who likewise are observing all that is occurring around them. After discussion with colleagues, I considered that my attempts to communicate my research objectives when possible and my emphasis on confidentiality and anonymity (see below) to protect privacy ensured that my actions were ethically acceptable.

### *Confidentiality and anonymity*

Confidentiality and anonymity issues are particularly pertinent in qualitative research as, particularly during the informal discussion times, people may disclose more information than they intended, and it can potentially be more difficult to keep names anonymous. When writing my fieldnotes initials rather than full names were always recorded. Health centres were always recorded as a number or letter rather than a name and only one file contained a list of all the health centre names and their associated number/letter. My two colleagues in the DSSB and myself were the only people who knew all the health centres I included in the study, although out of necessity staff in each regional office were aware of the centres in their region that I visited. In my reports, publications and thesis, all sources of quotations are given as role of the source (patient, doctor, nurse, etc.) and the health centre number only.

### *Personal bias*

In addition to reflecting on the implication of subjective bias on the research results, it is also a relevant ethical issue. In my case, there were several factors that could potentially influence the integrity of my research and its presentation. I was welcomed by the Tunisian Ministry of Public Health and have written them a report of my findings to assist them in improving diabetes care in Tunisia. Potentially myself or my colleagues in the DSSB, who assisted me, may have sought to present the results in a favourable light. My own positive experience of Tunisia and Tunisians, particularly my colleagues, could influence my writing of articles and indeed, this thesis. These factors are particularly relevant to my research area as it could be seen as a study of 'how good' diabetes care is in this country and whether the care is 'better' than it was in the past. In addition to being aware of this potential bias, I have sought in all cases to present both barriers and facilitators to care, that is, both the potential positive and negative findings. Close field relations can also be a potential bias.[74] My colleagues at the DSSB and several health professionals at health centres became personal friends whom I often saw outside of the study context. I used my reflexive approach to make these potential biases explicit and to reflect on their potential influence.

*Other ethical issues*

A further ethical issue that was brought to my intention by my training in qualitative methods and by my supervisor, was the question of what to do if I witnessed incompetent behaviour during my observation. After discussing the issue, I decided that if I witnessed dangerous, rather than simply poor, care, I would feel obliged to mention my concern to an appropriate person. In actual fact, only on one occasion did I observe potentially dangerous practice and it was easily rectified.

Finally, the question of making the results of the research available to the participants is often highlighted as an ethical issue in qualitative research.[68,212] On completion of the study I wrote a report of my results for the Tunisian Ministry of Health, primarily to assist the co-ordinators of the national program in incorporating some of the findings into practice. A summary of the results was presented to regional directors and co-ordinators. In addition, participants often asked me 'informally' about what I had discovered. I used these opportunities to discuss with them the barriers and facilitators to care that I had encountered and this would often lead to further informative exchanges.

*Summary of ethical considerations*

Throughout the study, I have aspired to follow the ethical principles set out by Spradley[212] based on those adopted by the American Anthropological Association: to consider informants first; to safeguard informants rights, interests and sensitivities; to communicate research objectives; to protect the privacy of informants; to not exploit informants; and to make reports available to informants.

## 3.8 Validity issues

The rigour, or validity, of qualitative research is an important issue and the following techniques were incorporated into the study to ensure validity, as recommended by experts in the field:[221,233,234]

*1. Triangulation*

Triangulation compares the results of two or more data sources. The researcher looks for patterns of convergence to develop or corroborate an overall interpretation. It involves the comparison of data relating to the same phenomenon but deriving from different phases of the study, different points in the temporal cycles occurring in the setting, or the accounts of different participants (including the researcher) differently located in the setting. This study not only involves both quantitative and qualitative methods, but a multiple of qualitative sources (participant observation, interviews, focus groups, key informants, other documents). I aimed to focus on any inconsistency in the data from different sources not just to judge which data are true and false, but to seek to discover why these differences are present (reflexive triangulation[74]).

*2. Respondent validation*

Respondent validation includes techniques in which the investigator's account is compared with those of the research subjects to establish the level of correspondence between the two sets. Study participants' reactions and any additional comments are then incorporated into the study findings. All recorded interviews and focus groups of health centre staff were summarised in English. This summary was then translated orally back into Tunisian Arabic to the participant and their reactions and comments were noted. This was found to be particularly useful for the staff focus groups as occasionally a participant would admit to not concurring with the overall opinions of the group and reasons for this were noted. Respondent validation of the patient focus groups was not possible as I was unable to easily trace the participants.

*3. Clear audit trail*

Since the methods used in research unavoidably influence the objects of enquiry, a clear account of the process of data collection and analysis is important. All decisions made regarding the methods of data collection and analysis, and the reasons for them, were clearly noted in my research dairy and are readily available to myself for further reflection and to any interested outsider. I have included extracts of text and detailed ethnographic analysis in Appendix 6.1 to allow the reader to scrutinise a portion of my analytic process.

*4. Reflexivity*

Reflexivity means "sensitivity to the ways in which the researcher and the research process have shaped the collected data, including the role of prior assumptions and experience, which can influence even the most avowedly inductive enquiries".[234] In addition to reflexivity being an essential component of the research methodology, it assists in ensuring the validity of the results. Throughout the data collection and analysis, a reflexive approach was taken and clearly described in the fieldnotes. This process commenced even before data collection. Malterud in *Qualitative Research: standards, challenges, and guidelines* states that reflexivity starts by "identifying preconceptions brought into the project by the researcher, representing previous personal and professional experiences, pre-study beliefs about how things are and what is to be investigated, motivation and qualifications for exploration of the field, and perspectives and theoretical foundations related to education and interests".[194] For that reason, I wrote out an initial declaration of my beliefs prior to the study and reflected on its influence during the analytical process.

5. *Attention to negative cases*

Attention to negative cases, or 'deviant case analysis', involves searching for and discussing elements in the data that contradict, or seem to contradict, the emerging explanation of the phenomena under study. This is one of the essential methods of analysis used in the ethnographic analysis of the data, but was also recalled during the other techniques.

6. *Prolonged engagement in the field*

Prolonged engagement in the field is one of the essential tactics of observational methods. Although the length of time I observed each centre was shortened to six months, I spent four years in total, longer than initially intended, visiting health centres in various stages of the study. In addition, I chose to live amongst Tunisians and follow Tunisian customs during the time of the study to enhance my engagement of Tunisian culture.

7. *Inter-rater reliability*

The role of more than one analyst to improve the consistency and reliability of qualitative analyses is a debatable area.[235] The essential role of the researcher as a research instrument would suggest that inter-rater reliability is not as crucial as it might seem. However, I felt there was merit in involving a second researcher for the more potentially subjective, ethnographic analysis, particularly as this was an approach that I was learning to use. BA is an anthropologist with an archaeological background, who agreed to undertake simultaneous, separate analysis of data from the first health centre. Differences and similarities between our findings were not only used to improve my analytical skills but were also incorporated into the process of data analysis. An approximate inter-rater score was calculated based on the proportion of domains that both analysts described.

## 3.9 Summary

This study uses multiple methodologies within an ethnographic framework, encompassing participant observation, semi-structured interviews, focus groups, structured interviews, personal reflection and trace documents. The rationale for and practical use of all these methodologies has been discussed along with ethical, access, linguistic and validity issues. The use and explanation of the two contrasting methods of qualitative analyses, ethnographic and content, has been described. The multiple methodologies encompass both qualitative and quantitative approaches, and the latter are covered in the following chapter.

# Chapter 4: Quantitative Methodology

## 4.1 Introduction

This second methodology chapter will present the quantitative approach employed in the study. The aim of the quantitative methodology is to describe the care of patients with diabetes in primary care at a national and health centre level, to assess the standards of care and any improvements over time, and to test potential factors that are associated with quality of care. Details of population definition, data selection, data collection and methods of analysis are presented.

## 4.2 Population definition

### *Patients*

The study is limited to patients with diabetes who are managed in public sector, primary care health centres. Patients who attend private care, who are generally wealthier, are excluded, and those who attend secondary care, presumed to have more complications, are excluded. Patients who receive their care at secondary care facilities, but attend the primary care health centre for their medication only, are also excluded. Patients selected in this study are therefore likely to be less wealthy and have fewer complications than the 'average' Tunisian with diabetes.

### *Health centres*

At the start of the study in 2002, Tunisia had 2028 primary care health centres within the Ministry of Public health. The majority of these centres are small and staffed by nurses with medical consultations by clinicians taking place once or twice a week only. It was decided to focus the study on centres with medical consultations at least four times a week (546 centres in 2002), because most patients with diabetes managed in primary care are cared for in these centres. In addition, it is these centres that the national program is focussing on, for example, in recommending weekly chronic disease clinics.

### *Categorising type of diabetes*

Patients with both type 1 and type 2 diabetes are managed at primary health care centres. Although the national program is predominantly set up for managing people with type 2 diabetes, those with type 1 may attend if the treating physician agrees. During data collection, the diagnosis of diabetes was defined according to the clinician's entry in the medical records. However, it was soon apparent that in many cases differentiating between type 1 and type 2 diabetes was not systematically performed. This is not surprising since many of the medical records were commenced before the latest classification[3] suggesting the use of type 1 and type 2 diabetes as diagnostic criteria. It was therefore decided to use the following criteria:

1. Type 1 diabetes: people aged 35 years or less at diagnosis and on insulin at the start of the study period
2. Type 2 diabetes: people aged over 35 years of age at diagnosis or not on insulin treatment at the start of the study period.

Although it would have been more accurate to classify patients by more detailed clinical criteria, C peptide levels or antibody status, this is clearly impossible in such a study as this. The age criteria used reflect methodology from previous epidemiological studies.[236,237] Type 2 diabetes in the young is on the increase worldwide[238] so the group classified as type 1 may include a few patients with type 2 who have been presumed to be type 1 and commenced immediately on insulin. It is also possible that some patients with type 1 are diagnosed late and included in the type 2 group. However, those with true type 2 diabetes are likely to heavily outnumber those with type 1 and thus not influence the results.

## 4.3 National level data: Regional reports

The specific objective of collecting data from the annual regional reports was to describe the management of patients with diabetes across the 24 regions of Tunisia and to assess any national longitudinal changes over the time period 2000 to 2006.

### *Data available*

Since 1999, each of the 24 government regions of Tunisia has been required to complete an annual report as a component of the national program of diabetes and hypertension management (Appendix 4.1). Regions are requested to send the reports to the national centre of primary care (DSSB) by March of the following year. The data collected are used in the annual report of the Ministry of Public Health.

### *Data collection*

These reports were used to collect annual regional data concerning:

a) Number of patients with diabetes and hypertension.

b) Number of new cases of diabetes and hypertension.

c) Number of new cases of diabetes and hypertension with complications (renal, ocular, cardiac and neurological).

d) Number of centres that set aside an individual day for patients with diabetes and hypertension (chronic disease clinic).

e) Number of doctors working at the health centres.

f) Number of doctors who have received a week of specific training in diabetes or hypertension as part of the national program.

During the time period of the study, additional information was requested in the regional reports regarding new components of the national program and these data were also collected where available:

g) Number of supervision visits made.

h) Number of glucometers and glucometer strips provided.

i) Number of patients with diabetes and hypertension managed at secondary care facilities that attend primary care facilities for supplies of medication only.

Many of the regions also send more detailed information and this information was also collected.

Data were collated into Excel spreadsheets. To ensure data entry reliability, 10% of randomly selected reports were re-read and entered a second time.

### *Problems encountered*

A number of data problems were encountered with the annual regional reports.

- Missing data

Reports were sometimes missing information and others stated that certain figures were not available. In particular, data regarding complication rates were rarely included and when present, very few cases were noted. It was clear that these data were not reliable indicators of regional differences.

- Incomprehension of information requested.

It was apparent that there was confusion over certain data such as whether the number of patients or consultations was required. This may in part be due to the similarity of terms used in French for patients ('consultants') and consultations ('consultations').

- Unreliability of data

By comparing the figures for each year, it was clear that some data were obviously aberrant. Any clearly variant data were noted and excluded from the final analysis.

- Change of report form

In 2003 the report form was changed by the DSSB in an attempt to improve the data reliability. Unfortunately the result was that some centres used the old report and others the new report, and so different data were collected from different regions.

Due to these problems it was evident from the first year of collection that it was not going to be possible to rely strongly on this source of data. In an attempt to improve the validity of the data:

1. I assisted the DSSB in suggesting ways to improve the regional reports.
2. I undertook data reliability checks, when possible, at regional director's offices.
3. I used the annual reports of the Ministry of Public Health to double check information regarding the number of health centres and number of doctors in each region. Where the data were diverse, I used the latter report due to the problems with the regional reports.

Despite the problems noted, it was anticipated that broad national trends over the six years of the study would be identifiable.

## 4.4 Health centre-level data: Medical record review

The objectives of collecting data from the medical records of a random sample of patients with diabetes were to describe the care of patients, to assess the standards of care and any improvements over time, and to test potential factors that are associated with quality of care.

### 4.4.1 Pilot study

A pilot study of the medical record review was undertaken in order to:

- test the feasibility of the medical record review phase of the study.
- verify accessibility to the medical records and health care facilities.
- design and modify a user-friendly and efficient database.

- estimate the time required to collect data to assist in calculating a reasonable sample size for the study.
- observe the management of care at four health centres in Greater Tunis and assess any variations in care.

*Data selection*

One health centre from each of the four regions of Greater Tunis was selected. The capital was chosen for convenience; they were not selected randomly as this was thought to be unnecessary for the pilot study. Each region has a medical co-ordinator for the national program and the co-ordinators were asked to select one centre within their region. In three of the four cases, the centre at which the regional co-ordinator worked was visited. This was expected to bias the results as one of the hypotheses was that more interested clinicians would provide better quality of care. A random sample comprising of at least 25% of the patients with diabetes managed at each centre was collected using random number tables, and the medical records studied. Each centre was visited four or five times and visits included discussions with the clinicians and other health professionals and observation of consultations (results included in the qualitative data).

*Data entry*

Initially a flat spreadsheet was designed in Microsoft Access to collect patient data available in the new disease-specific records covering patient characteristics, process and outcome of care criteria, treatment and attendance. It was soon apparent that a relational database was required, with additional levels to include multiple patient consultations and multiple medications prescribed at each consultation. Assistance was sought from a computer technician who specialises in database programming and his input continued throughout the study. The database was continually modified and improved during the pilot study (Appendix 4.2).

*Summary*

Corresponding to the listed aims above, the pilot study revealed that:

- The medical record review was feasible.
- The facilities and information were accessible.
- A database was designed with the help of a computer software specialist.

- A realistic sample size was agreed with a statistician (see following section).
- Observations and discussions were held at four health centres and data collected on 235 patients.

### 4.4.2 Sampling

*Health centre selection*

Following the pilot study and discussions with a statistician from the Newcastle Statistics Department, a two stage randomised sampling strategy was designed.

*1. Regional.*

The aim of the study was to give a nationally representative sample of patients with diabetes and thus health centres were selected from each of the 24 government regions. These regions correspond to the regions that provide individual reports to the DSSB each year. The pilot study had also suggested that there were wide variations in care between centres from different regions.

*2. Urban/rural.*

Milieu was selected as a stratification variable because:

1. The background literature suggested it was a possible factor influencing care (Section 2.5.3).
2. During the pilot study it became clear that the distance from the health centre to a regional hospital was a potentially significant factor, as all patients need to travel to the hospital for an eye examination, and often for blood tests and an electrocardiogram (ECG).
3. Epidemiological studies have shown a significant difference in the prevalence of diabetes between rural and urban areas in Tunisia.[62,63]

The Ministry of Public Health provided lists of health centres in each region, giving details of their milieu and the number of days per week that medical consultations were held. The numbers of urban and rural centres holding surgeries at least four times a week were counted independently and each centre was given a number from one upwards. A computerised random number program was used to select one urban and one rural health centre from every region. The selection was performed for each region shortly prior to data collection to ensure that the most recent data were used.

### *Power calculations*

The pilot study suggested that in the time available, one urban and one rural centre could feasibly be visited from each of the 24 regions. The power calculations use an Intraclass Correlation Coefficient (ICC), as in cluster randomised designs, to allow for the fact that subjects within a centre will be more like one another than subjects between centres. It was felt that the ICC would be quite high and a conservative estimate of 0.1 is used in the calculations. Working on this basis, it was calculated that a 15% difference between rural and urban health centres could be detected with 5% significance and 80% power if 40 patients were sampled from each centre.
It was therefore decided to sample 40-50 patients from two centres (one urban and one rural) from each of the 24 regions. In order to make the most effective use of time, once 40 patients were sampled from a health centre, medical records continued to be reviewed until the end of that visit to the health centre. A maximum sample of 50 was set to reduce the problem of weighting caused by variant numbers of patients from health centres. A minimum sample of 20 patients (50% of the intended number) per centre was set; if the health centre sampled was found to have less than 20 patients with diabetes managed at the centre, an alternative health centre was randomly selected.

### *Patient selection*

A list of patients with diabetes was sought at each centre. If the health centre used the chronic disease register, as provided by the national program, the list of patients recorded in these registers was used. If patients were recorded in three separate registers for hypertension, diabetes and hypertension associated with diabetes, the latter two registers were used. If a chronic disease register was unavailable, the medical records of patients with diabetes were counted manually. If a register was partially completed, both the patients on the register and those not, were included. Once the total number of patients with diabetes was known, each record was nominated a digit from one upwards and a computerised random number program was used to determine which records to select. If a selected record was not available it was noted and looked for during the subsequent visit. If it remained unavailable, the next randomly selected record was reviewed. If more than one medical record was available for the patient (for example, an old general medical record and a new disease-specific record), both records were reviewed. If only new medical records were available, the old records were requested. Medical records were excluded if:

- No consultations at the health centre were found since 1st January 2000 (these patients were presumed to have died, moved away, or sought care elsewhere).
- The patient was incorrectly classified in the disease register as having diabetes (based on all available fasting glucose results and treatment prescribed).

### 4.4.3 Data collection and sources

Data for the medical record review phase included:

- Patient data from the medical records
- Health centre data from:
    - Discussions with staff
    - Statistical data at the health centre
    - Statistical data at the Ministry of Health
    - A structured questionnaire

*Patient data entry*

The data collected from the manual medical records into the database are listed in Appendix 4.3.

*Health centre data: Discussions with staff*

Details of the following were requested from clinicians and other health professionals at the health centre:

- Number and gender of clinicians and the proportion of them that had attended the national program training in diabetes management.
- Number and type of other health professionals.
- Population served by the health centre.
- Distance that patients are required to travel from the centre to have their blood tests, ECG and eye examination.
- Presence of a chronic disease clinic.
- Use of a disease register and patient-held records.
- Presence of a functioning glucometer.
- Availability of medication for diabetes, hypertension and hypercholesterolaemia.

- Distance from the centre to towns/villages inhabited by patients included in the medical record review.
- Staff were also asked their view of the management of diabetes and any problems encountered (data included in the qualitative analysis).

*Health centre data: Statistical data from the health centre*

Statistical data at the health centre were requested and data collected regarding:

- Total number of patients attending per month during the previous calendar year, including gender and health insurance coverage details.
- Number of patients with diabetes and hypertension managed at the health centre and managed in local secondary care facilities.

*Health centre data: Statistical data from the Ministry of Public Health*

Data from the Ministry of Public Health were requested and data collected regarding:

- Urban/rural location. The definition is based on whether there is a town hall in the community in which the health centre is situated.
- Type of health centre. Classified into Type I to IV[i].
- Population served. These data were only used if it was unavailable at the health centre.
- Number of days per week that medical consultations were held.

*Health centre data: Structured questionnaire*

It was suggested shortly after the commencement of data collection by one of my colleagues at the DSSB that we use a questionnaire to collect information from each health centre. She had previously designed a nine-page questionnaire to assess the quality of care at health centres relating to the national program but had received very little response, probably due to the length of the questionnaire. Following the principles of triangulation (Section 3.8.1), I liked the idea of a questionnaire to collect information alongside the informal discussions at the health centres. We shortened and modified her questionnaire and initially tested it in one region (Ariana). The questionnaire (Appendix 4.4) has two parts:

1. 19 structured questions.

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[i] Definition of type of centre is based on a variety of indicators such as number of medical consultations held per week, the health centre building and equipment available.

2. Two final open questions asking for ideas about the barriers to care and ways to improve care (data included in the qualitative analysis).

### 4.4.4 Data analysis

The analyses included a descriptive analysis of the variables collected, a longitudinal analysis to assess any improvements in standards of care over time and a multivariate analysis of the factors that influence quality of care.

#### 4.4.4.1 Descriptive analysis

A descriptive analysis was undertaken of all variables collected, to fulfil the objective of describing the management of patients with diabetes in Tunisia. Patient and health centre characteristics of the 48 randomly selected centres were compared to the three health centres used in the qualitative phase of the study. Standards of care, based on processes, outcomes and medications, were also assessed.

#### 4.4.4.2 Longitudinal study on standards of care

The specific aim of the longitudinal analysis was to test the hypothesis that the quality of care across Tunisia had improved since the introduction of the national program of diabetes and hypertension management. The quality indicators were based on ten processes of care measures (listed in Section 4.4.5), intermediate outcomes of care measures (based on mean levels of fasting glucose, systolic and diastolic blood pressure, cholesterol, creatinine and body mass index) and changes in medication prescribing.

*Patient selection*

Data were available from 2000 to 2002 for all 48 health centres and these were used as the national cohort. Although data collection started shortly prior to the end of 2002 in four centres, it was thought that omitting two months of data from these centres would not influence the results. The last 14 health centres (the seven regions in the south) were visited in 2005 and so data was available from 2000 through to 2004. These data were used as the southern cohort. Type 2 patients were also analysed separately.

*Process of care analysis*

In the process of care analysis, patients who had at least two visits in a calendar year (2000, 2001 and 2002) were included. Patients who were seen less than twice a year were likely to have attended alternative health institutions (private care, secondary care, etc.) and the aim of this component of the study was to assess trends in quality of care at the primary health care centres only. To check the validity of the data, in particular to exclude the possibility of bias caused by differences in patient characteristics from year to year, the analysis was repeated using only those patients who attended their health centre every year (at least once), i.e. three consecutive years in the national cohort and five consecutive years in the southern cohort.

*Intermediate outcome of care analysis*

In the outcome of care analysis, a paired comparison of patients with at least one measurement in the initial year (2000) and the final year (2002 in the national cohort and 2004 in the southern cohort) was made. In addition, patients with at least one measurement taken in every consecutive calendar year (i.e. 2000 to 2002 in the national cohort and 2000 to 2004 in the southern cohort) were included in a repeated measures analysis. If a patient had more than one measurement in a given year, a mean of the results was used.

*Medication analysis*

Changes in medication prescribing were assessed from 2000 to 2002 in the national cohort and from 2000 to 2004 in the southern cohort. Changes in prescribing of ACE inhibitors and lipid-lowering medication were particularly noted.

#### 4.4.4.3 Additional analyses

A number of additional analyses were undertaken:

- *Seasonal variation of attendance*

The number of visits made by patients per month was explored to test the hypothesis that patients attend less often in seasons of bad weather (summer or winter).

- *Influence of fasting in Ramadan on attendance and outcomes*

Muslims who fast during the month of Ramadan must abstain from eating, drinking, use of oral medications and smoking from predawn until sunset. The Koran specifically exempts the sick from the duty of fasting, but large epidemiological studies have shown that 43% of patients with type 1 diabetes and 79% of patients with type 2 diabetes fast during Ramadan.[239] The numbers of visits and average glucose, cholesterol, blood pressure, creatinine and HbA1c during the month of Ramadan were explored to test the hypothesis that Ramadan detrimentally affects the care of patients with diabetes.

- *Terminal digital preference*

It was noted in the pilot study that the majority of blood pressure readings were recorded to the nearest 10mmHg. Previous studies have suggested that this can affect the quality of care and so terminal digit preference was explored as a factor influencing care.[240]

- *Distance to laboratory and secondary care facilities*

The distance from health centres to laboratory and secondary care facilities was compared specifically with the proportion of patients who had an examination undertaken that required a laboratory (creatinine, cholesterol) or secondary care facilities (ophthalmoscopy). Distances were measured in kilometres by driving from the health centre to the laboratory/secondary care facility or based on information given from health centre staff.

- *Fasting glucose correlation with HbA1c.*

All consultations in which a fasting glucose and HbA1c were recorded were noted and the correlation between the two measurements was calculated. This was used to correlate the target levels of fasting glucose employed in the outcome of care scores (Section 4.4.5) with approximate HbA1c levels.

### Multivariate analysis of factors that influence quality of care

The multivariate analysis was undertaken to test the factors that influence the quality of care of diabetes in Tunisia.

*Unit of randomisation*

It is generally recommended that in primary care studies, patients be clustered into practices[241] and so the practice, or health centre, was used as the most appropriate unit of randomisation and analysis. Although using the health centre as the unit of analysis may lead to a loss of power in revealing patient-level factors, it is essential as patients within a centre will be more alike than those from different centres.[242] Other researchers assessing quality of diabetes care in primary care internationally have taken a similar approach[15,75]. In addition, this method of analysis corresponds fittingly with the qualitative work in which the health centre was used as the foundation of the ethnographical fieldwork. Hence, the multivariate analysis was undertaken at the level of the health centre.

*Data selection*

- Explanatory variables

The explanatory variables were developed from the literature review (Table 2.1 – 2.3). The complete lists of explanatory variables and the definitions of each variable are listed in Tables 4.1 - 4.3, grouped into patient, health professional and organisational variables.

- Additional potential confounding variables

The majority of potential confounding factors, such as age, gender and type of diabetes, were included as explanatory factors. In addition, two other potential confounding variables were included in the analysis. Firstly, time of data collection was included as a potential confounding variable to exclude any bias caused by improving (or worsening) quality of care over time. Secondly, all analyses were weighted for the number of patients included in the study per centre.

- Outcome variables

The outcome variables were based on the quality indicators described in the following section.

*Patient selection*

The patient group used for each analysis were:

- Process of care analysis. A 12-month time period was used. This was calculated up to the day prior to my first visit to the health centre, in order to exclude the Hawthorne effect[218] whereby visiting the centre might have influenced the doctors' behaviour during the period of my visits. Patients who had no clinic visit during the 12-month period were excluded from this analysis. They were presumed to have moved, died, be followed up elsewhere or have been lost to follow-up.
- Outcome of care analysis. All patients who had at least one fasting glucose or blood pressure measurement recorded.
- Medication analysis. All patients.

*Table 4.1 Explanatory variables entered into the multivariate analysis: Patient factors*

| **Explanatory variable** | **Data (per health centre)** |
|---|---|
| Age | Mean patient age at the time of data collection |
| Gender | Percentage of female patients |
| Type of diabetes | Percentage of patients with type 1 diabetes[1] |
| Family history of diabetes | Percentage of patients with a first degree relative with diabetes |
| Obesity | Average body mass index |
| Schooling level (1) | Average schooling score[2] |
| Schooling level (2) | Percentage of patients with a schooling level of zero[2] |
| Poverty (1) | Percentage of patients with health insurance coverage of type 1 indigent[2] |
| Poverty (2) | Percentage of patients with health insurance coverage of type 1 or type 2 indigent[2] |
| Employment | Percentage of patients who were in employment[3] |
| Residence | Distance from patients' homes to the health centre |
| Marital status | Percentage of patients who are married |
| Duration of diabetes | Mean duration of diabetes |
| Insulin treatment | Percentage of patients prescribed insulin |
| Non-attendance | Percentage of patients who did not attend the centre for diabetes care in the preceding year |
| Frequency of attendance | Mean number of visits per patient in the preceding year |
| Frequency of appointments | Mean number of days until next appointment offered by the primary care doctor |
| Punctuality of attendance | Proportion of visits during the preceding year in which patients were less than two weeks late[4] |
| Adherence to treatment | Proportion of visits in which the doctor indicated that patients were not adherent to medication[5] |
| Smoking habit | Percentage of patients who were recorded as smokers[6] |
| Alcohol use | Percentage of patients who were recorded as consumers of alcohol[6] |
| Associated illness (1) | Percentage of patients who were recorded as having a history of cardiovascular disease |
| Associated illness (2) | Percentage of patients who were recorded as having a history of renal disease |
| Associated illness (3) | Percentage of patients who were recorded as having a history of dyslipidaemia |

*Table 4.2* *Explanatory variables entered into the multivariate analysis: Health professional factors*

| **Explanatory variable** | **Data (per health centre)** |
|---|---|
| Clinician interest in diabetes | Presence of a regional or local national program co-ordinator |
| Clinician training | Proportion of doctors who had received post-graduate training in diabetes[1] |
| Clinician gender | Proportion of female doctors[1] |
| Number of clinicians | Number of primary care doctors |
| Motivation of clinicians | The motivation of the doctors[2] was assessed based on discussions with the doctors and staff and observations at the health centre, sometimes including observation of the doctor consulting; each centre was assigned a score of one to three |
| Workload of clinicians | The average number of patients per doctor per clinic |
| Time commitment of clinicians | An estimate of the number of hours the doctors worked on the days the centre was observed |
| Nutritionist present | Availability of a nutritionist for patients with diabetes |
| Number of nurses | The number of full-time equivalent nurses[3] |

*Table 4.3* ***Explanatory variables entered into the multivariate analysis: Organisational factors***

| **Explanatory variable** | **Data (per health centre)** |
|---|---|
| Urban/rural | Definition described in Section 4.4.3 |
| Development | Development (type) of the health centre (as defined in Section 4.4.3) |
| Frequency of clinics | Number of medical consultations per week (4, 5 or 6) |
| Distance to Tunis | Number of kilometres from the health centre to the capital, Tunis[1] |
| Regional affluence | Score based on United Nations data (Appendix 4.5) |
| Motivation of the regional director | The motivation of each director was assessed through discussions with the director, his staff and health professionals at the centres and observation at the director's office, and assigned a score of one to three |
| Distance to secondary care | Distance from the health centre to the nearest secondary care hospital staffed by an ophthalmologist[2] |
| Size of centre (1) | Total number of people served by the health centre |
| Size of centre (2) | Number of patients with diabetes managed at the health centre |
| Proportion of patients with DM | Number of patients with diabetes divided by the total number of people served |
| Materials (1) | New disease-specific medical records presence[3] |
| Materials (2) | New disease-specific medical records completion[4] |
| Materials (3) | Chronic disease register use |
| Materials (4) | Patient-held records use, based on observations at the health centres |
| Availability of medication | The availability of medication based on discussions with the staff and observation at the health centre[5] |
| Affluence of all patients (1) | Percentage of all patients attending the centre with health insurance coverage of type 1 indigent[6] |
| Affluence of all patients (2) | Percentage of all patients attending the centre with health insurance coverage of type 1 or type 2 indigent[6] |
| Chronic disease clinic presence | Presence of a chronic disease clinic |
| Chronic disease clinic adherence | Percentage of patient visits on the day of the chronic disease clinic in the preceding year |
| Equipment (1) | Presence of an electrocardiogram |
| Equipment (2) | Presence of a functioning glucometer |
| Equipment (3) | Presence of a means of measuring height |
| Equipment (4) | Presence of a means of measuring weight |
| Patient education sessions | Presence of regular, group education sessions |

## Legend to Table 4.1

[1] Criteria for classifying type of diabetes is described in Section 4.2.
[2] Definitions given in Appendix 4.3.
[3] Insufficient data were available to calculate the socio-economic class of patients based on employment.
[4] Two weeks is the definition of late attendance within the national program.
[5] This was calculated with and without missing information, as it was clear that the information was usually only completed if the patients were non-adherent and therefore gave a falsely high result.
[6] Recorded as yes/no only in the medical records.

## Legend to Table 4.2

[1] Converted into categorical variables because the data were not normally distributed even after logarithmic transformation: All/some/none.
[2] Doctor motivation was assessed collectively per health centre rather than on an individual clinician basis. This was required, as with all the explanatory factors, in order to analyse the data using the health centre as the unit of analysis.
[3] For health centres that also included other departments, such as maternity and emergency care, only those nurses who were involved in primary care outpatient care were included.

## Legend to Table 4.3

[1] Converted into categorical variables because the data were not normally distributed even after logarithmic transformation: Near (<100km), middle distance (100-300km) and far (>300km).
[2] This definition was used as the ophthalmologist is essential in order to fulfil the requirements of the national program. In most cases, distances were measured in kilometres by driving from the health centre to the secondary care facility. Occasionally the distance relied on information from the health centre staff.
[3] Converted into categorical variables because the data were not normally distributed even after logarithmic transformation: High (at least 80% of consultations recorded in the new medical records) and low (<80%).
[4] Percentage of recorded data fields in the introductory five pages of the medical records completed.
[5] Availability of medications for diabetes, hypertension and hypercholesterolaemia were classified as: 0 – Never available, 1 – Available some of the time/often unavailable, 2 - Available most of the time/sometimes unavailable, 3 - Available almost all of the time/occasionally unavailable, 4 - Available all of the time/never unavailable.
[6] Definitions given in Appendix 4.3.
DM: Diabetes mellitus

### 4.4.5 Quality indicators

A large number of proxy indicators of quality of care have been used and suggested in diabetes research as described in Section 1.2. For the current study, indicators based on processes of care, intermediate outcomes of care and medication prescribed were used in order to assess quality of care in its broadest sense. The indicators selected were based on the data available in primary care in Tunisia and have all been used in previous studies on quality of diabetes care. Although some of the clinical components of the overall quality scores do not have a strong evidence base (such as annual electrocardiogram and cardiovascular examination), they were included because they are recommended in the Tunisian national program.

*Process of care indicators*

The processes of care used are those recommended in the Tunisian national program of diabetes and hypertension (Section 1.3.7), namely fasting glucose, blood pressure, weight, total cholesterol, creatinine, foot examination, cardiovascular examination, electrocardiogram (ECG), eye examination and HbA1c measurement. The assessment was based on whether the patient had a measurement performed at least once during the 12-month period. Following a model proposed and undertaken by Gulliford *et al* in Trinidad and Tobago[75], the process of care results were combined to create a 'quality score'. Other authors have also used quality of care scores to assess diabetes care.[53]

1. Non-weighted process of care score (NWPOC). A score was calculated using the 10 measurements for each patient with each measurement given an equal weighting. Thus a patient could have a potential maximum score of 10. Each health centre was then given an average score based on the patients selected at that health centre.

1a. Clinical process of care score (ClinPOC). A sub-analysis of the above score was calculated based only on clinical examinations undertaken at the health centre (blood pressure, weight, foot examination and CVS examination). This would give an indicator of the standards of clinical care at the health centre.

1b. Referral process of care score (RefPOC). The remaining six measurements that all potentially require referral (although some centres perform ECGs, glucose, cholesterol, and creatinine measurements) were also analysed separately.

2. Weighted process of care score (WPOC). It could be argued that some processes of care are more important than others. Control of blood glucose and blood pressure

are particularly important in the care of diabetes; these measurements are required 3-monthly within the national program in Tunisia rather than annually as is the case for the other recommendations. Therefore, a score was also calculated in which glucose and blood pressure were given a weighted score of four rather than one, based on the tests being required four times as often. Gulliford *et al*[75] also used a similar weighted score although they gave blood glucose and blood pressure a weighted score of five each, seemingly for pragmatic reasons. The other measurements remained with a score of one. Thus a maximum score per patient was 16.

Each of the above scores was assessed for normality, and the value of Cronbach's alpha was calculated to measure the internal consistency of each scale.

*Outcome of care indicators*

The intermediate outcomes of care employed were levels of fasting glucose, blood pressure, total cholesterol and body mass index. Ideally, HbA1c would be used as the indicator of glycaemic control, but this is not widely available in primary care in Tunisia. It has been suggested that where resources are lacking, glucose testing is a reliable indicator of poor control that can be used to modify treatment safely.[243] Although specific targets of each of the above are not listed in the national program guidelines, a number of worldwide guidelines are available, each with slightly different target levels.[244,245,246] The latest Diabetes UK guidelines[244] were used because they include fasting glucose and total cholesterol levels, and give values for indicators of quality of care as well as targets for metabolic control. Based on these indicators, the following levels were set: blood pressure ≤140/80, fasting glucose ≤7.8mmol/l, total cholesterol ≤5mmol/l, BMI ≤25kg/m$^2$.

The assessment was based on an average of all the results collected in the database per patient. No timeframe was specified to maximise the use of the data collected. The following outcome variables were used:

- Average mean fasting glucose per centre.
- Average mean systolic blood pressure per centre.
- Average mean diastolic blood pressure per centre.
- Average mean cholesterol per centre.
- Four-variable outcome of care score (4vOOC). An outcome of care score was calculated based on how many patients achieved the four targets described above. A score was given for each patient from zero (no targets achieved) to four (all targets

achieved) and an average score was calculated for each health centre. Missing data were excluded. Patients were excluded from the analysis if they had none of the four measures recorded.

- Two-variable outcome of care score (2vOOC). A second outcome of care score was calculated using fasting glucose and blood pressure levels only. The scoring system used a range from good control (using definitions above), borderline control and poor control (defined as blood pressure ≥160/95mmHg and fasting glucose ≥11.1mmol/l). Each patient was given a score of two for good control, one for borderline and zero for poor control for both fasting glucose and blood pressure. Patients were excluded from the analysis if they had neither a fasting glucose nor a blood pressure recorded.

Both scores was assessed for normality, and the value of Cronbach's alpha was calculated to measure the internal consistency of each scale.

*Medication indicators*

Prescribed medications were used as secondary quality of care indicators based upon:

- Proportion of visits in which the patient had a blood pressure of ≥160/95mmHg and anti-hypertensive therapy was commenced or increased.
- Proportion of visits in which the patient had a fasting glucose of ≥11.1mmol/l and oral diabetes therapy was commenced or increased.
- Proportion of patients on anti-hypertensive medication who were prescribed ACE inhibitors.
- Proportion of patients with an average blood pressure of >140/80mmHg who were prescribed anti-hypertensive medication.
- Proportion of patients with an average total cholesterol of >5mmol/l who were on lipid lowering medication.

## 4.5 Statistical analysis

All analyses were performed using the SPSS software package (version 12.0.1) with the exception of the chi-squared test for trend, which was performed using MedStat (version 8.1.1.0).

### *General analysis*

Means and standard deviations (SD) are calculated for continuous variables and frequencies for categorical variables. Comparison of data are assessed using 2 by 2 tables for comparison of proportions and analysis of variance (or Kruskal-Wallis if data were not normally distributed) for comparison of means. Plotting histograms of continuous data assessed normal distribution.

### *Longitudinal analysis*

Changes over time data are assessed using the chi-squared test for trend for categorical data and the paired t-test for continuous variables with a normal distribution; otherwise with the Wilcoxon signed rank test. Changes over time of continuous data with more than two time points are assessed using the ANOVA test for repeated measures (logarithmic transformations were made if variables were not normally distributed).

### *Multivariate model*

The multivariate analysis was undertaken at the level of the health centre as described in Section 4.4.4.4. Each individual explanatory variable was initially tested against each of the outcome variables using ANOVA for categorical variables and linear regression for continuous variables. Logarithmic transformations were made for variables not normally distributed in order to make the maximum use of the data; if the variable remained not normally distributed, the variable was converted into a categorical variable. Log transformations (rather than other types such as square root and reciprocal) are usually recommended as they are the only transformation that gives useful confidence intervals[247] Analyses were weighted for number of patients per centre using the WLS facility in SPSS. Variables with a p value of less than 0.15 were entered into three intermediate multilinear regression models grouping variables into patient, health professional and organisational, with each of the outcome variables as the dependent variable. Explanatory variables that continued to have a p value of less than 0.15 in the three intermediate models were entered into a final model against each outcome variable. A p value of 0.15 was chosen on the advice of statisticians in order to include all potentially important variables in the final multivariate models.

The various outcome variables were tested against one another using Pearson's correlation coefficient to assess correlation and consistency.

### 4.6 Summary

This chapter has described the quantitative methodology employed in this study, covering details of patient selection, data collection and analytical methods.
The following six chapters will now report the findings of the study, starting with the three qualitative results chapters and then moving on to the three quantitative results chapters.

# Chapter 5: A Tale of Three Centres

## A description of the management of diabetes in primary care in Tunisia, particularly focussing on three purposively sampled health centres.

### 5.1 Introduction

This first results chapter provides a picture of diabetes care at health centres in Tunisia, particularly for readers from outside of the country, and fulfils the first objective of the study: to describe, on a health centre level, the management of patients with diabetes in primary care in Tunisia. An appreciation of the context of care is an essential requisite in interpreting and understanding the factors discovered to be influencing the care of patients with diabetes. This chapter creates a platform on which the rest of the results in this thesis will be supported.

An overview of the care of patients with diabetes in Tunisia is presented, followed by a detailed description of the three health centres used in the qualitative phase of the study. Included also are reflections on the qualitative methodology and its implementation.

### 5.2 Description of the management of diabetes in primary care in Tunisia

The following descriptions are based on four years experience of visiting over sixty health centres throughout Tunisia.

### 5.2.1 Health centres

Primary care health centres are distributed extensively throughout the 24 regions of Tunisia. Although the majority of the population are within walking distance of their local 'dispensaire'[ii], the closest health centre may not have a doctor consulting daily and may not offer components of the national program, such as a weekly chronic disease clinic. More developed health centres with daily clinics are found in the towns and larger villages. Many patients attend their nearest health centre for acute minor illnesses, usually treated by a nurse, and attend a larger centre for chronic disease care or to receive a blood test, ECG or X-ray. This study focussed on the 500

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[ii] 'Dispensaire' is the French term usually used by Tunisians for the primary care health centre

centres that offer a medical consultation most days of the week and the following description is limited to these centres.

A typical health centre is a white, square, concrete building with, like all government buildings, a Tunisian flag flying outside (see photograph in Appendix 5.1). It usually has a large central waiting room and several adjacent rooms including doctors' consultation rooms, a treatment room, a pharmacy and one or two reception areas where medical records are stored.

The majority of centres have one doctor and several nurses and health assistants, although in cities, health centres tend to have three or four physicians. Primary care doctors are employed to work from 7am to 1pm daily, six days a week; in practice the majority arrive at the health centre around 9am and leave between 12 and 1pm. Medical consultations are held in mornings only, on a first come first served basis. In the afternoon health centres are officially open, at the bare minimum from 3pm to 5pm, for simple nursing procedures such as injections. The nurses predominantly do clerical rather than clinical work such as organising patients to see the doctor by registering them, extracting and filing the medical records, and recording patient data. A nurse, sometimes with extra training in pharmacy, gives medications to the patients and a handful of health centres have a nutritionist available to see patients.

A few health centres in larger rural towns are classified as 'mini-hospitals' staffed by primary care doctors. These centres are open 24 hours a day for accidents and emergencies and are able to care for in-patients when necessary. The primary care doctors are required to be on-call and available to work in the emergency department. The doctors also hold consultations in the smaller health centres in the vicinity of the mini-hospital. Laboratory, X-ray, midwifery and dental services are invariably present and, less commonly, specialists such as paediatricians.

### 5.2.2 Tunisians with diabetes

Tunisians have a choice between private and public sector health care, and between primary and secondary care as no referral is required to see a secondary care specialist. Thus, a person with diabetes may choose to attend a general practitioner at a primary care health centre, a diabetologist at a secondary care hospital, or a private general practitioner or diabetologist. The choice is more limited in rural areas where fewer private doctors are found and it may be a long distance to secondary care services. Consequently, those that choose to attend the primary care, public sector health centres are usually the poorest minority in urban areas, but the majority of people in rural areas.

A Tunisian with diabetes will have a general awareness of her[iii] illness and can usually list a number of relatives who also have 'sugar', as it is known in the local dialect. There is some awareness of the link between sugar in the diet and diabetes, but most Tunisians link their illness to emotional factors such as anger and stress. The majority of patients seem aware of basic dietary advice but few are strict compliers.

Patients usually attend their health centre two-three monthly for diabetes care where the clinical examinations (blood pressure, foot examination, etc.) are the responsibility of the primary care doctor. Self-monitoring is non-existent in patients attending public sector, primary care facilities. Blood tests may be performed at the local health centre (especially fasting glucose) but more often they require a visit to the secondary care hospital, a variable distance away. Similarly, an electrocardiogram may be available at larger health centres, but usually requires a referral to the hospital. An eye examination always necessitates a referral to the nearest ophthalmology department.

### 5.2.3 Visits to the health centre

Patients usually walk to their local health centre as only a small minority of Tunisians own private vehicles; attendance at the local hospital usually requires public transport. Arriving at the health centre near to its opening time between 7am and 8am, the patient registers and pays (usually 1.5TD; Section 1.3.3) and is given her medical records by the receptionist or nurse. She may then have to wait in a large, noisy waiting room for up to three hours before seeing the doctor. In contrast, male patients usually arrive late and stand outside, or register early and return later. The nurse accompanies the patient into the doctor's consulting room and the patient then has a couple of minutes to report her condition to the doctor, who may at any time be interrupted by the telephone or other staff. Generally, the doctor measures her blood pressure and less often performs other clinical examinations. The patient exits the room with one or more pieces of paper placed into her palm; a prescription, a written request for at least a fasting glucose and possibly other blood tests and

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[iii] The majority of patients with diabetes attending primary care health centres in Tunisia are women (Table 9.1).

referrals, and sometimes a subsequent appointment date. The next step is to go and queue outside the pharmacy to be given 15 days of treatment. She then returns to the centre every 15 days for her treatment until her next appointment with the doctor in two-three months time; she may have a specific date to return or she may simply be told to return in a certain number of months. In the meantime she may still have in her hand pieces of paper requesting her to have blood tests, an electrocardiogram and/or an eye examination. Many older Tunisians are illiterate and require assistance from their younger relatives to read appointment slips and requests for blood tests and referrals.

### 5.3.1 Sampling the three health centres

The three health centres were purposively sampled as described in section 3.2. Centre A was intentionally selected to represent health centres with a motivated doctor and an organised health centre. One of the co-ordinators of the national program previously worked there and for this reason, she suggested this centre for the pilot study of the quantitative work. The centre had the best process and outcome data at the time of commencing the formal qualitative data collection and in addition, a friendly and hospitable lead clinician.

Centre B was a contrast to centre A. I initially chose the centre as an accessible rural centre (approximately two hours drive away), which was not organised but there seemed to be a motivated doctor who was trying to input the national program recommendations and had appreciated my presence during my visit to collect quantitative data. However, when I returned to commence participant observation, two of the doctors were absent due to sickness/maternity and the lead clinician had, on his own admission, lost his motivation to implement the national program. The centre therefore became my 'unorganised' centre with 'unmotivated' staff.

Centre C was found opportunistically. The association between motivated doctors and organised health centres appears close and finding one without the other proved difficult (Section 3.2). However, a highly motivated clinician moved from a health centre that I used in the pilot study and started to work in another centre, which he described as needing organising. Unlike centres A and B, I did not know the centre in advance, and I chose the centre on the basis of the description given by the clinician. I was particularly interested to observe how a motivated clinician might stimulate a health centre to become organised and potentially improve care.

### 5.3.2 Quantitative data of the three health centres

In order to place the three health centres in their comparative context, quantitative data were collected in line with the data collected from the 48 randomly selected health centres. Full data and analysis of the latter centres is presented in Chapter 9. Table 5.1 presents the basic patient characteristics and Table 5.2 the treatment prescribed, intermediate outcomes and quality of scores from the three health centres compared to the average results of the 48 randomly selected centres. Unlike the formal quantitative analysis, no account has been taken of the time of data collection which proved to be important as the quality of diabetes care improved over time (Section 9.5); centre A was visited in 2004, centre B in 2004/5 and centre C in 2005/6.

***Table 5.1 Comparison of patient characteristics in centres A, B and C***

| Factor | Centre A *(n=75)* | Centre B *(n=62)* | Centre C *(n=57)* | Full Study *(n=2160)* |
|---|---|---|---|---|
| Age (years) | 63.0 | 62.5 | 60.3 | 59.9 |
| Female (%) | 73 | 69 | 75 | 61 |
| Type 1 diabetes (%) | 6 | 2 | 4 | 6 |
| Positive family history (%) | 46 | 19 | 80 | 54 |
| Education score[1] (max. 3) | 0.36 | 0.24 | 0.39 | 0.50 |
| Education score[1] is zero (%) | 70 | 84 | 65 | 63 |
| Poverty (% type I[1]) | x | 19 | 18 | 12 |
| Poverty (% type I and II[1]) | x | 48 | 24 | 30 |
| Unemployed/retired (%) | 93 | 89 | 73 | 67 |
| Married (%) | 64 | 58 | 83 | 76 |
| Duration of diabetes (years) | 11.2 | 9.8 | 10.3 | 8.6 |
| Non-attendance[2] (%) | 8 | 27 | 7 | 12 |
| Number of visits per year[2] | 3.9 | 4.6 | 3.3 | 3.7 |
| Time until next RDV (days) | 72 | 48 | 88 | 81 |
| Consultations late (%) | x | 47 | 27 | 23 |
| Smoking habit (%) | 7 | 3 | 21 | 19 |
| Alcohol consumption (%) | 2 | 7 | 11 | 6 |
| Associated illness: CVD (%) | 5 | 13 | 4 | 8 |
| Associated illness: RD (%) | 2 | 6 | 12 | 6 |
| Associated illness: DYS (%) | 7 | 10 | 12 | 9 |
| DSMR used (%) | 81 | 87 | 98 | 87 |
| DSMR completed[2] (max. 12) | 9.9 | 9.1 | 10.8 | 9.5 |
| Visits on CDC day[2] (%) | 78 | 14 | 94 | 67 |

[1] Definitions given in appendix 4.3.
[2] Data from visits from preceding 12 months only.
x – Data not collected.
RDV: Rendez-vous (appointment), CVD: Cardiovascular disease, RD: Renal disease, DYS: Dyslipidaemia, DSMR: Disease-specific medical records, CDC: Chronic disease clinic.

*Table 5.2* ***Comparison of outcomes, treatment and quality of care scores in centres A, B and C***

| Factor | Centre A *(n=75)* | Centre B *(n=62)* | Centre C *(n=57)* | Full Study *(n=2160)* |
|---|---|---|---|---|
| *Intermediate outcomes* | | | | |
| Fasting glucose (mmol/l) | 11.2 | 9.3 | 11.4 | 10.2 |
| Mean SBP (mmHg) | 136.9 | 143.9 | 138.9 | 139.1 |
| Mean DBP (mmHg) | 80.8 | 81.6 | 83.1 | 80.5 |
| Mean total cholesterol (mmol/l) | 5.1 | 5.3 | 5.0 | 4.9 |
| Mean creatinine (μmol/l) | 77.7 | x | 74.9 | 85.0 |
| Mean BMI (kg/m$^2$) | 26.5 | 26.9 | 28.1 | 27.9 |
| Mean HbA1c (%) | x | x | 8.8 | 8.9 |
| *Treatment prescribed* | | | | |
| Insulin | 14.6% | 14.5% | 24.5% | 19.0% |
| Oral hypo-glycaemic agents | 86.7% | 95.2% | 86.0% | 86.0% |
| Diet only | 6.7% | 11.3% | 8.8% | 4.4% |
| Anti-hypertensive agents | 58.7% | 56.5% | 56.1% | 50.3% |
| ACE inhibitors | 9.3% | 4.8% | 22.8% | 16.2% |
| Lipid-lowering medications | 21.3% | 16.1% | 17.5% | 15.6% |
| *Quality of care scores*[1] | | | | |
| NWPOC score (max. 10) | 5.6 | 3.1 | 6.7 | 4.5 |
| WPOC score (max.16) | 11.5 | 8.2 | 12.6 | 9.9 |
| 4vOOC score (max. 4) | 1.4 | 1.4 | 1.7 | 1.5 |
| 2vOOC score (max. 4) | 1.9 | 2.2 | 2.0 | 2.9 |

[1] For detailed explanation of quality of care scores see Section 4.4.5.

x – No data available.

SBP: Systolic blood pressure, DBP: Diastolic blood pressure, BMI: Body mass index.

NWPOC: Non-weighted process of care score is the proportion of 10 measures patients have had undertaken in the preceding 12 months.

WPOC: The weighted process of care score assigns a weight of four to blood pressure and fasting glucose measurements and one to the other eight measures.

4vOOC: 4 variables outcome of care score is based on achieving a target for fasting glucose, blood pressure, total cholesterol and body mass index.

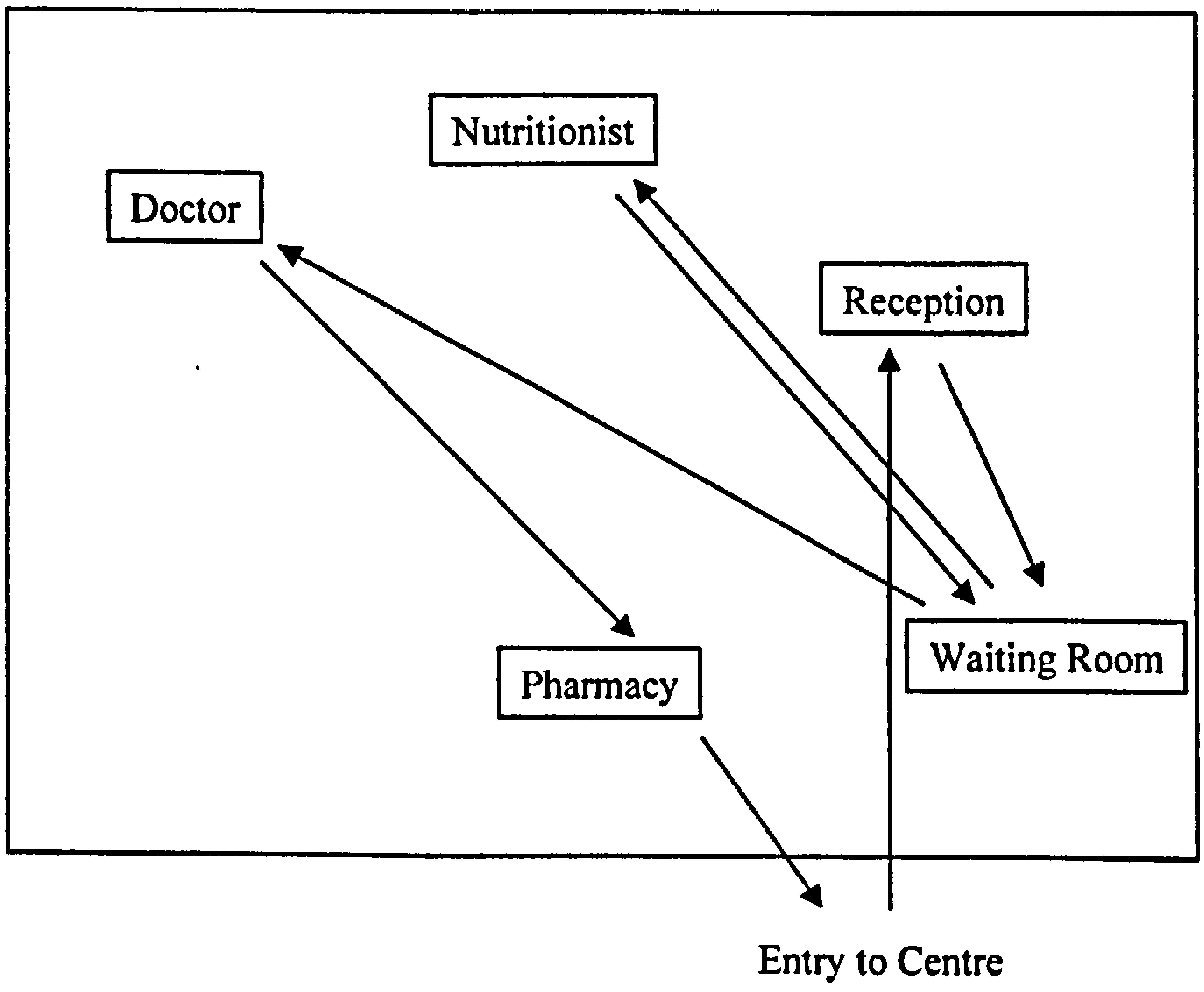
2vOOC: 2 variable outcome of care is based on achieving low and high targets for blood pressure and fasting glucose only.

### 5.3.3 Centre A

Centre A is situated in a busy urban area on the outskirts of the capital (photograph in Appendix 5.1). The centre is in a quiet cul-de-sac just off a busy main street. The staff at the centre describe the area as poor, although it appears very similar to the majority of suburban Tunis. Both the doctors and the nurses are friendly and the team morale seems high (see poster on motivation in Appendix 5.2). The large waiting room is lively during surgery hours although the lead nurse attempts to keep the noise and chatter down. As usual, the waiting room is full of mostly older women, with the men standing outside.

The centre has three primary care doctors; the lead doctor is the regional medical co-odinator for the national program. The centre employs six nurses and health assistants and a nutritionist. A pictorial representation of a patients visit for an appointment at centre A is shown in Figure 5.1.

***Figure 5.1 Pictorial representation of a patient's visit for an appointment at centre A***



There are differences between the patients with diabetes attending centre A compared to national averages as demonstrated in Table 5.1. Patients are older and they are more likely to be women, less educated and unemployed or retired. They have had diabetes for longer than average and have less recorded associated illnesses. Compared to the national average, fewer disease-specific medical records are being used but more patients are attending on the day of the chronic disease clinic. Mean intermediate outcomes are not strikingly different to national averages (Table 5.2). The quality of care scores show that the recording of care at centre A is high but the number reaching targets is low.

I visited centre A on 24 occasions from January to June 2004. Atypically, the centre holds twice weekly chronic disease clinics. I experimented with both days and chose to visit on the busier of the two days. I undertook participant observation in the reception area, the treatment room and pharmacy and watched doctor-patient consultations with the nutritionist and the lead physician, whom I also formally interviewed. The staff focus group consisted of three nurses, the pharmacist and the dietician (three women, two men) and the four patient focus groups consisted of 23 participants (16 women, seven men). Structured patient interviews did not take place in Centre A (Section 3.4).

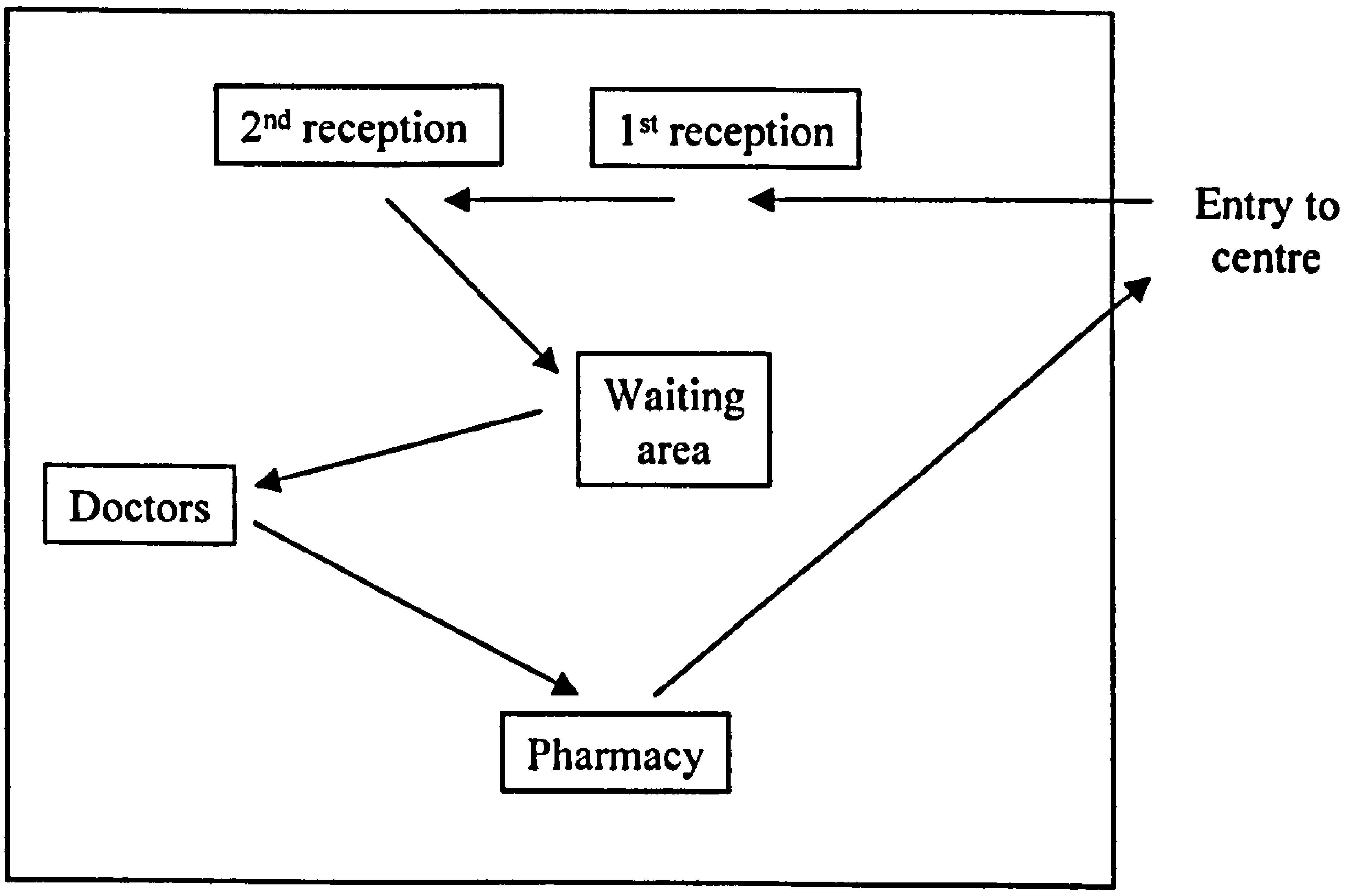
### 5.3.4 Centre B

Centre B is situated on the main road of an archetypal rural, agricultural town, 120km from the capital (photograph in Appendix 5.1). The centre of the town is a constant whirl of activity, which is accentuated on market day when the inhabitants of all the local villages descend on the town. The majority of the surrounding population rely on farming and selling their goods at the market. The main street consists of a variety of shops including numerous coffee shops with men sitting in front, lining the pavement. There is more rain in this area than other parts of the country and the crops are usually sufficient to feed the local population, although there were some dry years prior to the time of the study. The surrounding countryside is green and hilly with some Roman ruins about 20km away commonly visited by tourists, who rarely choose to stop in the town. The closest regional city is a one hour journey away on public transport but most people opt to visit the capital for important business (three hours away and 5TD on local transport).

The health centre itself is located on one of the main thorough ways of the town and is clearly one of the chief landmarks. It is an example of a 'mini-hospital' as described above in Section 5.2.1. The health centre is described as a '*mustashfa*' (hospital) by both staff and patients; it has an emergency department and in-patient beds, although these are rarely occupied. The electricity supply occasionally fails. The health centre is the hub for a dozen smaller centres in surrounding villages, which the doctors visit on a rotating basis.

Officially five doctors are employed to work at the centre, although during the period that I visited one doctor was on maternity leave and another doctor was frequently absent due to sickness. The three remaining doctors were responsible for daily consultations at the centre, visiting the smaller rural centres and covering the emergency department. As a 'mini-hospital', the centre employs numerous staff; 19 nurses, nine health assistants, five ambulance drivers, five midwives, two laboratory technicians, two X-ray technicians and a dentist. The doctors and nurses are friendly but they are clearly de-motivated; the impression they give is that they have got used to not working hard or long hours. They complain about the number of patients but usually finish routine patient consultations by 11am. Up until that time the waiting room is always noisy, with patients crowding the open doors of the doctor's consulting rooms. A pictorial representation of a patients visit for an appointment at centre B is shown in Figure 5.2.

*Figure 5.2* ***Pictorial representation of a patient's visit for an appointment at centre B***



Noteworthy but expected differences between patients from centre B and national averages are demonstrated in Table 5.1. The patients are older, less educated and poorer. There is a high proportion of non-attendance and late attendees, although those that do attend come more frequently than the average. Also as expected, the rate of adherence to the use of the new medical records and the chronic disease clinics is considerably lower than the average. Table 5.2 shows that the mean fasting glucose is low, though conversely the quality of care scores are all below average. The only noticeable difference in treatment prescribing is the low number of ACE inhibitors prescribed.

I visited centre B on 20 occasions between October 2004 and June 2005, with a two-month interval without visits (March and April) due to transportation problems. I usually visited on the day that, nominally, had been chosen for the chronic disease clinic although I quickly discovered that this was no longer adhered to. I generally travelled to and from the centre with one of the doctors who lived in the capital. I undertook participant observation in the two reception areas, the treatment room and the pharmacy and watched doctor-patient consultations with all four doctors. I also visited an outlying centre with one of the doctors. I interviewed the lead physician. The staff focus group consisted of four nurses and the pharmacist (three women, two men) and the four patient focus groups consisted of 10 participants (six women, four men). As the centre no longer holds a weekly chronic disease clinic it was difficult to gather a number of patients with diabetes simultaneously and consequently the numbers of patients in the focus groups is lower than intended. One of the doctors assisted by formally inviting patients to attend on the day that I visited, but numbers remained low. I undertook 20 structured patient interviews (Appendix 3.3) over several weeks and a summary of the responses to the questions are shown in Table 5.3.

***Table 5.3 Summary of responses of patient interviews at centre B (n=20)***

1. The majority have had diabetes, without hypertension, for 5-10 years.
2. The majority attend this centre only, although a few attend hospitals in Tunis. Equal numbers report taking their medications regularly and irregularly.
3. Three patients admitted to taking herbal medicines.
4. The majority had no complaints, those that did complained about the lack of availability of medicines.
5. The majority did not attend a secondary care hospital; those that did had various complaints.
6. The majority did not consider 2TD[iv] a financial barrier to attending the health centre.
7. Half of the patients said they followed the dietary advice; the other half admitted to not adhering to the advice given.
8. The most common explanations for why more women than men attended the centre were that women have more illnesses and also attend for insignificant reasons.
9. The majority had no suggestions of how to improve care; those that did mentioned better and more available treatment and blood tests.
10. Nearly all blamed the cause of their diabetes on a shock or stress.

### 5.3.5 Centre C

Centre C is located in a coastal town. The town is several miles from the capital, but due to increased urbanisation, it has been swallowed up by sprawling suburbs. The immediate area is poor, although it is adjacent to some of the most prosperous districts of the whole country. The centre is situated on the town's main street alongside a number of other government buildings (photograph in Appendix 5.1). The regional hospital is less than 2km away and several other hospitals are situated within a short bus journey.

The centre has four doctors, a nutritionist, six nurses, five health assistants, one medical secretary and two midwives with two secretaries working for them. There is a good team spirit in the centre and a sense of the staff working together well. It appears to be a popular place for doctors to work, near to the wealthy suburbs of

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[iv] As a 'mini-hospital', the cost of a consultation is 2TD (≈£1.00) rather than the standard 1.5TD (≈£0.75).

Tunis. Atypically, the centre has a formal 'office' in which there is a computer, one of only three computers that I observed in primary care health centres. The computer is used predominantly by the new doctor for statistical data and writing reports. The lead nurse prides himself on the 'circuit' that patients follow on the chronic disease clinic day as represented pictorially in Figure 5.3. A manifest consequence of this 'circuit' is that the centre is quieter than most, with fewer patients waiting in one area simultaneously.

***Figure 5.3*** ***Pictorial representation of a patient's visit for an appointment at Centre C***

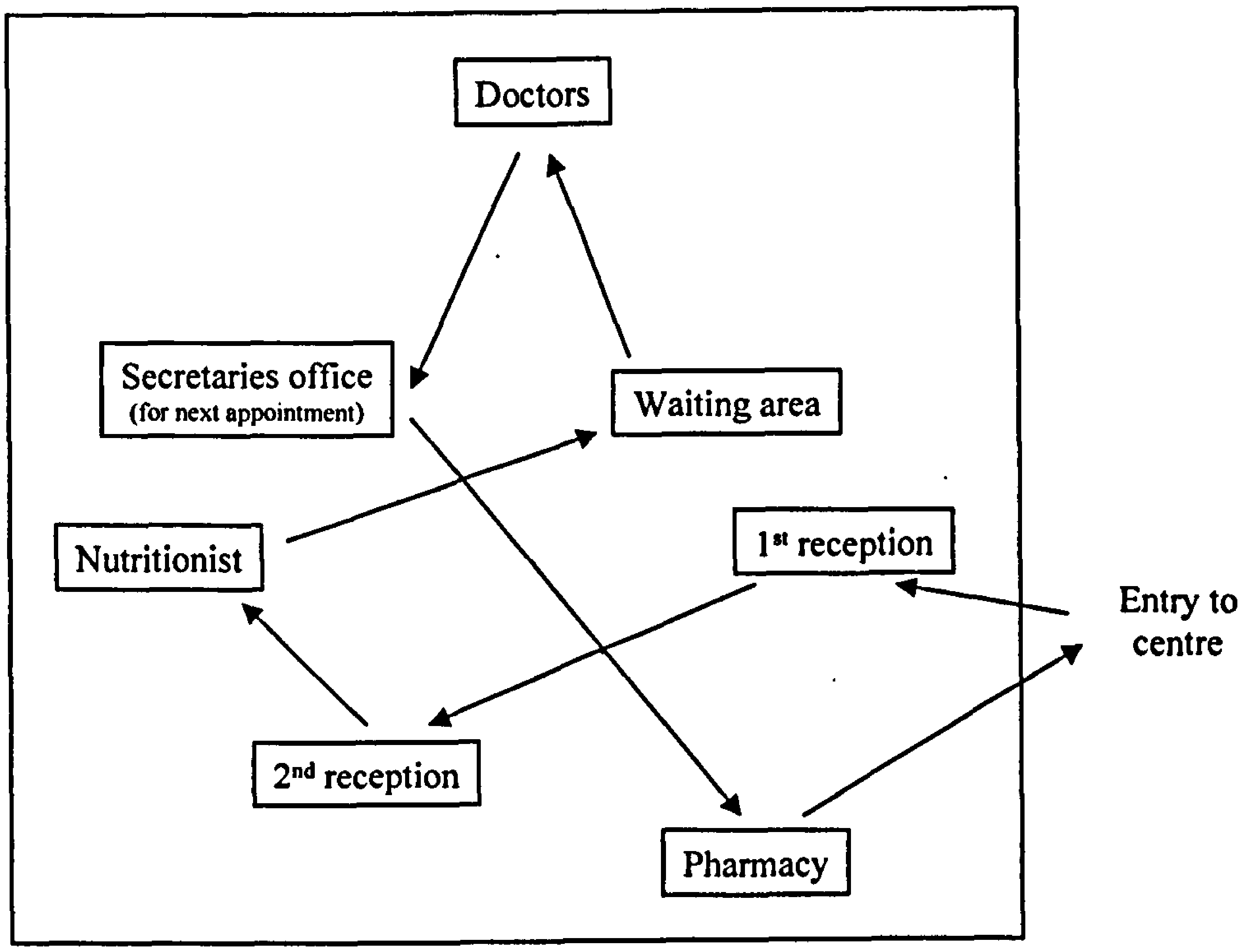


Table 5.1 demonstrates that patients with diabetes from centre C are more similar to the national averages than those from centres A and B. The only notable exceptions are the higher proportion of women and the much higher number recorded as having a family history of diabetes. The non-attendance rate is low and the adherence rates of using the new medical records and the chronic disease clinic exceptionally high. Most of the intermediate outcomes are higher than the average (Table 5.2), especially fasting glucose. The quality of care scores show that the recording of care at centre C is very good but the outcome scores are poorer than average.

I visited centre C on 20 occasions from December 2005 to May 2006 on the day of the weekly chronic disease clinic and undertook participant observation in the two reception areas, the treatment room, the office and the pharmacy, and watched doctor-patient consultations with one doctor. I formally interviewed the new, motivated doctor, rather than the lead physician at the centre as originally intended, because I was particularly interested in the issue of doctor motivation and its influence on the health centre. The staff focus group consisted of two nurses, the medical secretary, the pharmacist and the dietician (four women, one man) and the four patient focus groups consisted of 24 participants (13 women, 11 men). I undertook 20 structured patient interviews (Appendix 3.3) and a summary of the responses to the questions are shown in Table 5.4.

***Table 5.4 Summary of responses of patient interviews at centre C (n=20)***

1. The majority have had both diabetes and hypertension for more than five years.
2. The majority attend this centre only and take their medications regularly but if they are not available at the centre, equal numbers would buy medications and do without.
3. Four participants said that they regularly take herbal medicines, one in the place of her prescribed medications. Others said that only older people nowadays use herbal medicines.
4. They had no complaints about the staff, health centre or waiting times; the only complaint was the lack of medication.
5. The majority did not go to the hospital but those that did had no complaints.
6. They did not consider 1.5TD (≈£0.75) to be a problem to attend the health centre but most said that the medications were too expensive to buy.
7. The majority admitted that they did not follow the diet as recommended.
8. The most common explanations for why there were more men than women were that men work and attend private care, and women have more illnesses.
9. Very few suggestions were made as to how care could be improved.
10. Almost all blamed their diabetes on a surprise or a shock.

## 5.4 Reflections on the qualitative methodology

In line with the reflective approach to my qualitative research, this section describes a few reflections on my experience of the qualitative methodology and a discussion of some of the changes made during the study.

### *Participant observation*

For the majority of the time I succeeded in maintaining my role as an observer, but there were many occasions when I was asked to participate actively. For example, patients, nurses and doctors often asked my advice on medical topics. More sensitively, though not surprisingly, I was sometimes asked my opinion of the care at a particular health centre by the staff working there. In these cases, I learnt from experience to be non-committal if at all possible; if pressed, I would offer both barriers and facilitators to care, and attempt to initiate a discussion with them.

> "At the end he asked me my advice as to how to improve care. I was very cautious because previously doctors who asked (including at the DSSB) were then very defensive about my comments. I gave examples of what other centres had done and this seemed to work..."
>
> (Fieldnotes from discussion with a doctor, centre 45)

At the three purposively sampled health centres I sensed that I did indeed become 'a part of the furniture'. For example, at centre C I was given a white coat to wear as all the staff including the doctors did, and eventually I joined the 'circuit' that patients followed in order to undertake the structured interviews.

### *Hawthorne effect*

As expected, I noted many occasions when my presence appeared to influence the behaviour of clinicians and other paramedical staff. For example:

> "they brought me two new records that had just been started today ... very well completed" (Fieldnotes from participant observation, centre 12)

These instances did not affect my quantitative results because I intentionally only analysed data recorded prior to my first visit to a health centre. They did however, confirm my prediction that my presence would influence behaviour positively and I would not always be able to observe 'real-life' at a health centre.

### *Frankness of participants*

On several occasions I was surprised by the frankness of the participants, particularly the doctors.

> "The doctor was suspicious of me to start with and asked lots of questions (personal reflection: only surprise is that this has been rare) but later came and talked to me openly (without the other doctor present): he was fed up..."
> (Fieldnotes from discussion with a doctor, centre 53)

> "The doctor was surprised I was still around (second gulf war had started since my last visit): we talked about it and she cried."
> (Fieldnotes from visit to centre 12)

Patients also spoke frankly even regarding behaviours that one might have expected them to not disclose to a medical doctor, such as their lack of adherence to diet and/or medications. Only on one occasion in a focus group did the idea surface of needing to give me a good impression:

> "Patient 1: And like I told you, with the wages of the citizens you can't do it (follow the diet), it's impossible.
> Interviewer: So again it's to do with the resources?
> Patient 3: He will go back to his country and give them this idea about Tunisia!"
> (Patient focus group 1, centre C)

### *The influence of my personal opinions*

There were occasions when I was very aware of my own status and opinions and their potential influence on my analysis. For example, my background as a medical doctor:

> "The other nurse said that in theory the doctors should do the blood pressure and weight but often they pass stuff like that on to the nurses here... especially a problem like today when one of the doctors is away. My personal opinion is that there are enough staff to do stuff like that... but then I am a doctor!"
> (Fieldnotes from visit to centre 14)

### *Access*

Gatekeepers, understandably, may attempt to exercise some degree of control and surveillance, by blocking or shepherding the researcher.[74] I had some experience of this in my quantitative work with regional directors sometimes seeking to change the two health centres I had randomly selected to visit from their region. In contrast, I was surprised by the ease of access I received for the qualitative work, given that I could have been seen as evaluating 'how good' the health centre was. Only once was I clearly blocked from access when a clinician at centre A initially agreed to being observed, but later relayed a message via a third party to withdraw her consent.

### *Data saturation*

My fieldnotes included several comments regarding no longer finding any new significant themes or ideas towards the end of my visits to all three health centres.

### *Changes in methodology*

Hammersley and Atkinson state clearly and aptly that "the course of ethnography cannot be pre-determined".[74] It has proved very difficult to describe succinctly the journey from initially designing the methodology to completing the qualitative aspects of this research in a few pages. Although the final methods broadly follow those I started out with, alterations, additions and removals were made throughout the study. Reasons for these changes were wide and varied, such as changes in circumstances, increased awareness of the health care system and new ideas or themes generated from the data. Examples of significant alterations, additions and exclusions are:

- Alterations: I initially planned to visit only two health centres for the participant observation for one year each, in accordance with my understanding of qualitative research with its emphasis on in-depth rather than broad research. I eventually finished by visiting three health centres for six months each as described in Section 3.2. Although I may have lost some quality of depth by doing this, I appeared to achieve saturation of the data in the three health centres.
- Additions: a number of methods of data collection were added during the study. An example is the use of the structured questionnaires used to interview patients in the second and third qualitative health centres. Other examples are the interviews of key informants and the use of a structured questionnaire to collect some of the quantitative data.
- Exclusions: my initial research proposal stated that I would interview all staff at the health centre and that I would tape and transcribe these interviews. For practical

reasons, this was changed to a more realistic aim of interviewing formally the lead physician of each health centre, undertaking a focus group of the staff and ensuring I observed and informally talked to all other members of staff. Similarly, it was decided to focus on including patients only, rather than their families, in the focus groups for reasons of efficiency of time and problems of access.

## 5.5 Summary

A broad appreciation of the context and setting of the selected health centres is essential in order to fully understand the findings of the qualitative components of this study. A detailed description of the centres has been presented, as well as a picture of a typical Tunisian attending a health centre for diabetes care. The next chapter will narrow the focus to the more detailed cultural themes elicited at these three health centres from the ethnographic analysis.

# Chapter 6: Cultural themes

## Results of the ethnographic analysis

### 6.1 Introduction

This second qualitative results chapter presents the results of the ethnographic analysis, outlining the domain analysis of the data and describing the key concepts that emerged from the theme analysis. The cultural themes present at primary care health centres that may be relevant to the management of patients with diabetes in primary care in Tunisia are described. The results fulfill the third objective of the thesis; to explore the culture of caring for patients with diabetes in Tunisia within primary care health centres.

### 6.2 Domain analysis

A full domain analysis, including each domain's taxonomy and components, was undertaken of the qualitative data collected from the three purposively sampled health centres (fieldnotes of participant observation, transcripts of interviews, transcripts of focus groups). The average number of domains from the focus groups at centre A was 25 (range: 23-27), at centre B, 24 (range: 20-29) and at centre C, 31 (range: 26-34). The numbers of domains from the doctor interviews were 23, 27 and 33 respectively and from the fieldnotes of participant observation 65, 60 and 72 respectively. Domains from each analysis were listed, charted pictorially and compared and contrasted with other domains. A componential analysis was undertaken in turn of the full list of domains, as recommended by Spradley[212], and the most frequently occurring domains are shown in Table 6.1. The most common domain names were types of illness, the role of patients, places to get care, patients' emotions and characteristics of doctors.

*Table 6.1 Major domains emerging from the ethnographic analysis*

| Topic | Domain Name | n | Source |
|---|---|---|---|
| **People** | Types of people | 12 | All |
| Patients | Characteristics | 5 | All |
| | Role | 20 | All |
| | Numbers | 8 | Obs |
| | Emotions | 19 | Pts, Obs |
| | Why more women than men | 11 | Pts, Drs, St |
| Doctors | Characteristics | 18 | All |
| | Role | 15 | All |
| | Motivation | 4 | Doctors |
| Paramedical staff | Nurses characteristics | 5 | Pts, Obs |
| | Nurses roles | 6 | All |
| Relatives | Role | 9 | Patients |
| **Places** | Places to get care | 19 | All |
| 'Here' (The centre) | Characteristics | 8 | Pts, Obs |
| | Problems | 12 | All |
| | Things that are good | 8 | All |
| | Improvements in care | 5 | All |
| | Suggestions on how to improve care | 12 | Pts, Drs |
| Hospitals | Characteristics | 6 | All |
| | Problems | 4 | Pts, St |
| **Illnesses** | Types of illness | 20 | All |
| | Causes of diabetes | 11 | All |
| | Levels of sugar[1] | 9 | All |
| | Causes of a high sugar[1] level | 7 | Pts, Obs |
| | Causes of high blood pressure | 5 | Pts, Obs |
| | Levels of blood pressure | 7 | Pts, Obs |
| | Obesity | 3 | Pts, Obs |
| **Treatments** | Ways to treat diabetes | 8 | All |
| | Types of medications | 11 | All |
| | Characteristics of medications | 7 | Patients |
| | Lack of availability of medications | 11 | All |
| | Types of herbal medicines | 11 | All |
| | Uses of herbal medicines | 10 | All |
| | Types of food | 10 | All |
| | 'Brothers'[1] of diabetes | 9 | Pts, St |
| | 'Enemies'[1] of diabetes | 5 | Pts, Obs |
| | Dietary adherence | 9 | Pts, St |
| **Money** | Things that cost money | 12 | Pts, Obs |
| | Results of having no money | 11 | Pts, St |
| **Others** | Past versus present contrasts | 10 | All |
| | Tunisian characteristics | 7 | All |
| | Questions patients ask | 7 | Pts, Obs |
| | The role of God | 3 | Pts, Obs |

**Legend to Table 6.1**

n = number of domains, i.e. how many of the interview/focus group transcripts and fieldnotes included a domain of that name.

[1] Within ethnographic analysis, it is suggested that domain names be 'folk terms', i.e. terms used by the participants themselves, and so the term sugar is used rather than glucose.

Obs: Participant observation from researchers fieldnotes, Pts: Patient focus groups, Drs: Doctor interviews, St: Staff (paramedical) focus groups.

### 6.2.1 Collaborative analysis

Data from the first health centre, with the exception of the field notes, were also analysed by a second researcher for reasons outlined in Section 3.8. Domain and taxonomic analyses were undertaken separately and then a full list of domains and inclusion terms was agreed. The proportion of agreed domains was 66% for the doctor interview, 64% for the staff focus group and 70%, 64%, 65% and 58% for the patient focus groups. As an example, Appendix 6.1 includes an excerpt of a transcript of a patient focus group with the preliminary and final list of domains from the two researchers and the full taxonomy of the final domains. I undertook the theme analysis initially and then discussed the results with the second researcher.

## 6.3 Theme analysis

Numerous cultural themes were developed from the data, using an iterative approach, as outlined in Section 3.5.1. They are presented in order of perceived importance to the participants.

### 6.3.1 "The only thing that matters": The primacy of access to medication.

The central importance of access to medication at the health centres emerged early in the period of data collection, and continued to play a prominent role in the analysis. Early contact with patients revealed the notion that many attend their appointment for diabetes care for the sole purpose of receiving a prescription. The consultation with the doctor, including any examinations and referrals, are perceived to be hurdles requiring negotiation prior to receiving a prescription. Observation of consultations confirmed this idea. If a doctor gave a patient a referral letter or blood test request, the patient often ensured that a prescription was also present.

The theme emerged at both the explicit and tacit level. Many of the patient focus groups include a domain explicitly related to lack of availability of medication. It is described by patients as "the only thing that matters", "the first thing", "the most important thing", "the foundational point" and "there is nothing else". Domains from all three health centres equally stressed the importance of this theme and a study of other domains confirms this central theme, particularly for the patients, at the tacit level. For example, domains related to the role and function of the doctor and paramedical staff always include mention of provision of medication from the patient sources, with other roles being "telling us" things, "sending us" places and less often, "checking us". In contrast, domains of doctor roles from the health professionals never include the provision of medication but instead, feature ideas of consulting, referring and discussing.

A study of the common domain of 'the role of the patients' is illuminating. This domain was often a sequence domain involving a number of steps. The figures in the previous chapters charting a patient's visit at each health centre are based on these domains from the participant observation fieldnotes. However, the same domain from the patient focus groups reveals a much-simplified version, involving far fewer steps:

***Figure 6.1 Sequence in visiting the health centre according to patients***

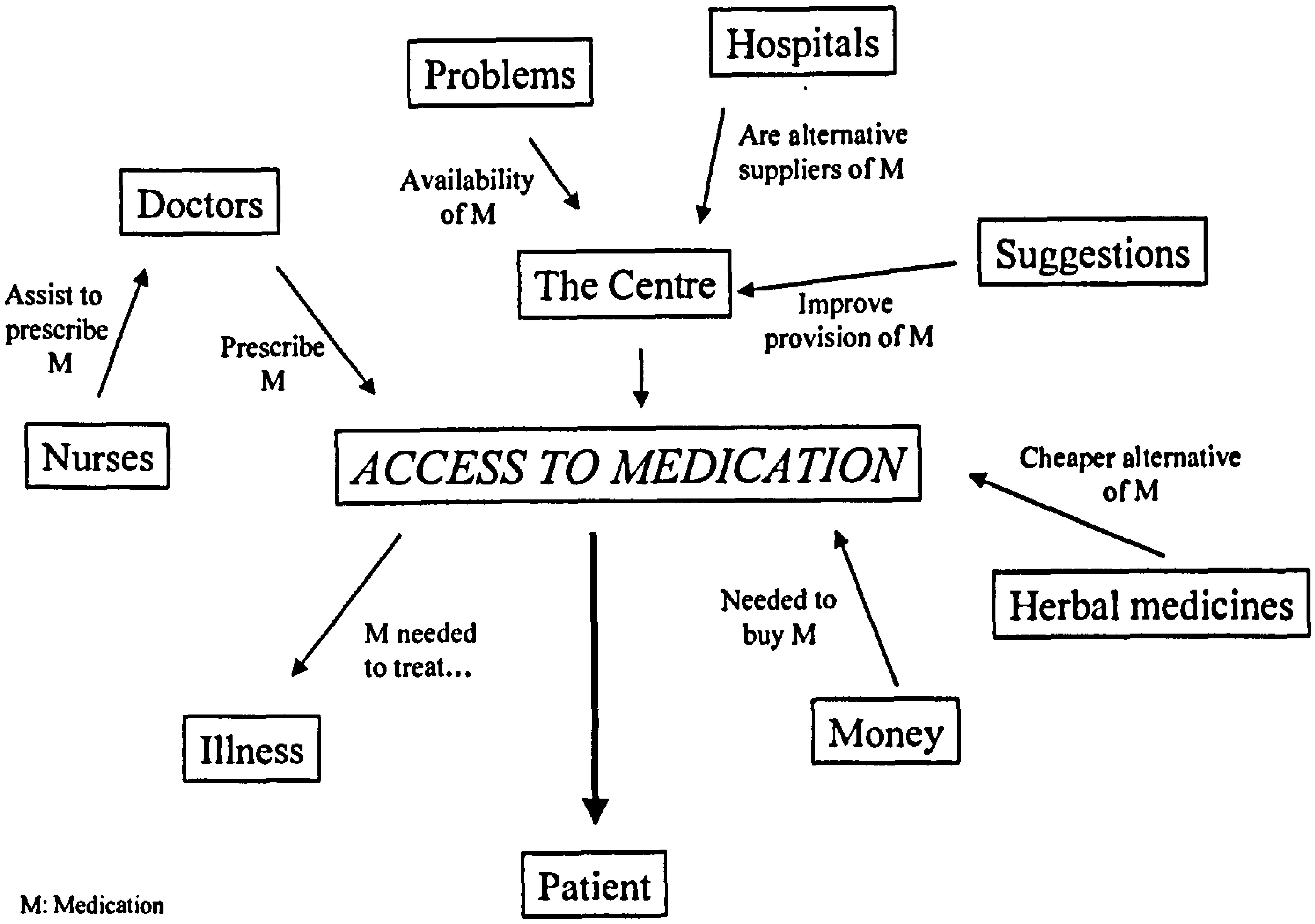
Step 1 → Step 2 → Step 3 → Step 4
Come to the centre → Consult the doctor → Get medicines → Go home
(or go and buy them)

This was true for all three health centres. Occasionally an additional stage entailing a blood test was added between steps 3 and 4. Being weighed or referred or having to register and pay was mentioned in only one or two of the 12 focus groups, and no groups mentioned being examined by the doctor. This is in marked contrast to the observations, and the quantitative data in Chapter 9, which show that there are many other steps in the patient's journey at the health centre, such as discussions with the nutritionist and examinations by the doctor. Clearly, for the patient, access to medication is "the only thing that matters".

There are few domains in which the availability of medication does not play a significant role. The health centre itself is often classified as good or bad depending on the availability of medication and contrasted with provision of drugs at hospitals.

Figure 6.2 demonstrates the association between medication and the other major domains.

***Figure 6.2*** ***Pictorial demonstration of the 'primacy of access to medication' theme in relationship to other domains.***



Although the issue of the primacy of access to medication predominantly emerged from the patient focus groups, both the doctors and paramedical staff also acknowledged its prime role:

> "The medication must be readily available, you can't just say good-bye, this is essential..." (Doctor, semi-structured interview, centre A)

In contrast, few domains emerged related to adherence to medication and other medication issues such as their efficacy, strength and side-effects. The underlying assumption seems to be that if you have diabetes, you must take medication and therefore it must be made accessible at the health centre.

### 6.3.2 "Its from shock": Causation of diabetes and hypertension

> *"It should be known that the origin of all illnesses is food...The incidence of illnesses is most frequent among the inhabitants of sedentary areas and cities, because they live a life of plenty. They eat a great deal and rarely restrict themselves to one particular kind of food. They lack caution in taking food... Furthermore, the inhabitants of cities lack exercise. As a rule, they rest and remain quiet. Thus, the incidence of illness is great in towns and cities ..."*
>
> Ibn Khaldoun, 14th century, Tunis[1]

Figure 6.3 presents the ethnomedical model of diabetes that emerged from the analysis of the patient focus groups. The Tunisian Arabic name for diabetes is '*sokkor*', the word for sugar, and the name of hypertension is '*damm*', which means blood. According to the patients, *sokkor* is primarily caused by anger and/or stress (the same word is used for both these concepts in Tunisian Arabic), a shock or is inherited. Patients' perceptions of the causes of a high sugar in people with diabetes are similar but also include eating sweet food or too much carbohydrate. A strikingly similar model emerged for the causation of *damm* presented in Figure 6.4.

***Figure 6.3 Ethnomedical model of 'sokkor' (diabetes) in the study patients***

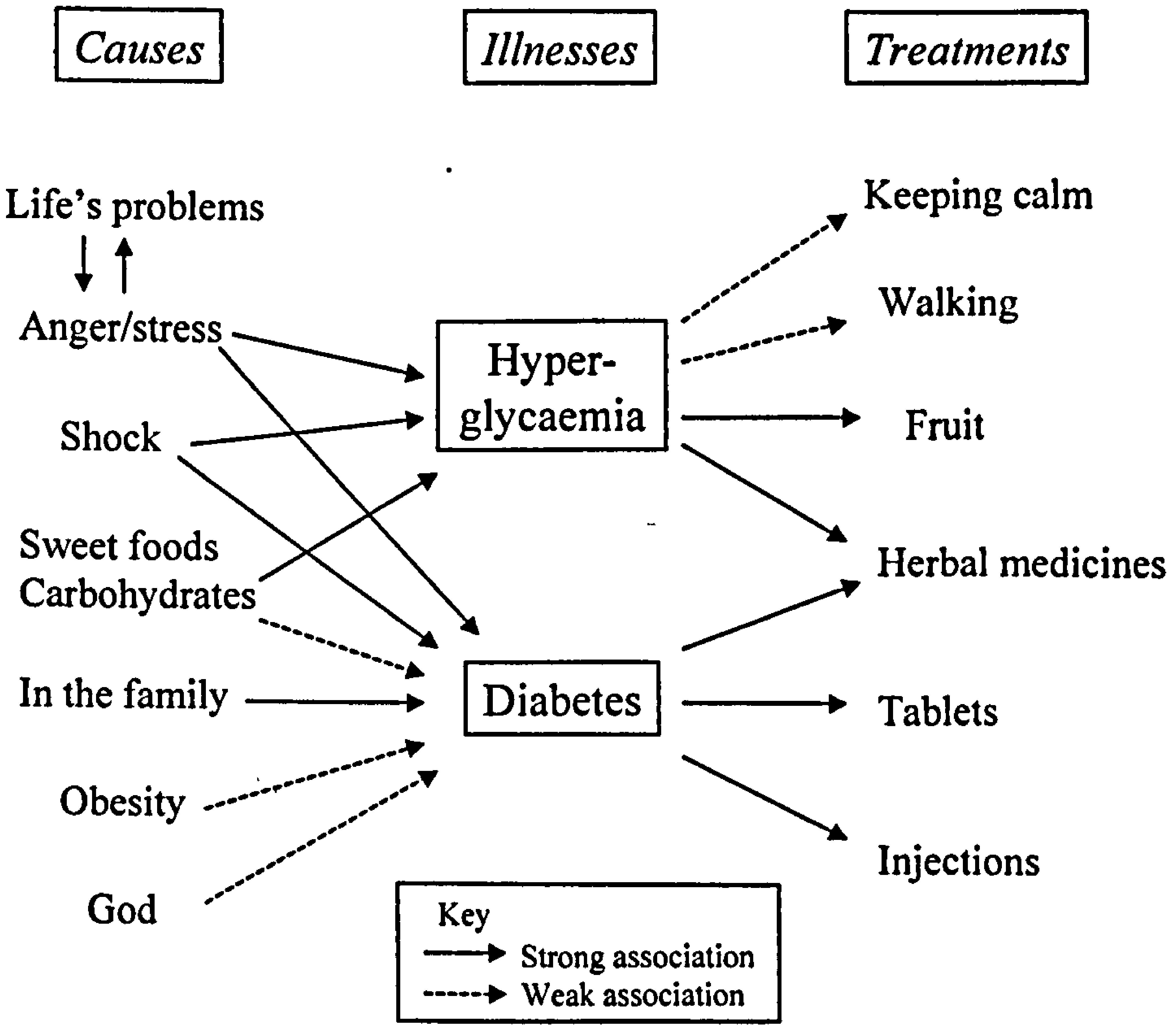
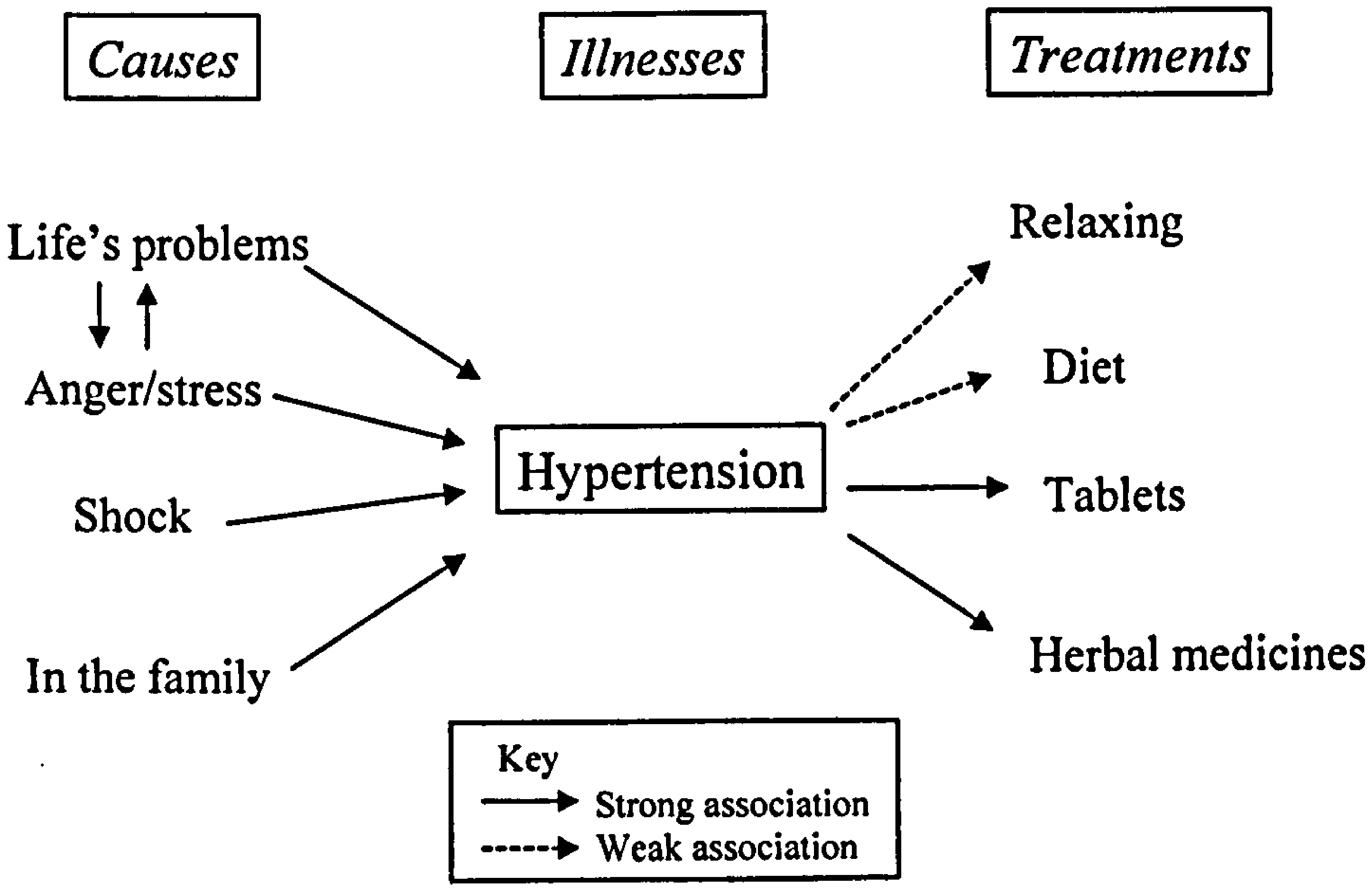


*Figure 6.4 Ethnomedical model of 'damm' (hypertension) in the study patients*



Health professionals also had varying views as to the cause of diabetes:

> "In the afternoon a nurse told me that two of her siblings had diabetes (she was in her 30s). Very interesting; she told me a long story of how shock had caused her brother to be diabetic but also told me she was being careful herself by avoiding eating sugar..."
>
> (Fieldnotes from observation, centre 51)

Patients were also asked specifically in the structured interviews as to the cause of their diabetes (question 10 in Tables 5.3 and 5.4). When asked directly, almost all patients blamed their illness on a shock or a surprise of some kind and some patients were able to describe in detail the context:

> "Interviewer: Do you know why you have diabetes or blood pressure, why do you think it is?
> Patient 7: I am one of those people who got it when my son failed his 6th year exams, he prepared everything but he still failed. He had studied hard and everyone came round to the house. I was in shock, I was washing the clothes and everyone came round, my hands were in the water like this... and it's from that time. I couldn't get up and didn't even talk for three days, it's from that time. Now I have had it for four years..."
>
> (Patient focus group 3, centre A)

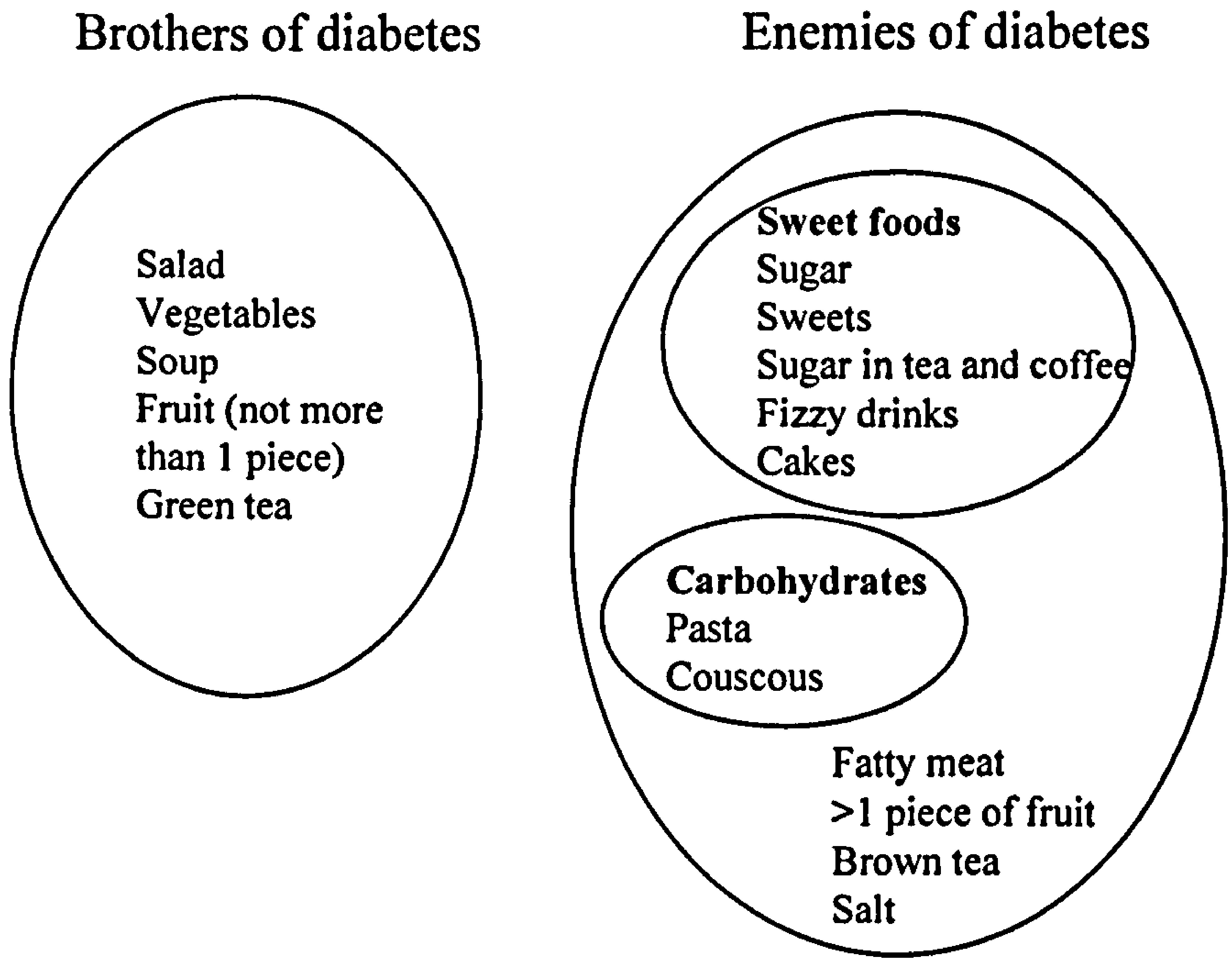
Emotional factors appear to play an important role in the patients' perception of their illness and particularly its cause.

### 6.3.3 "Brothers and enemies of diabetes": The diet

> *"It may tentatively be suggested that a great amount of food and the moisture it contains generate pernicious superfluous matters in the body, which, in turn, produce a disproportionate widening of the body...The result is a pale complexion and an ugly figure, because the person has too much flesh"*
>
> Ibn Khaldoun, 14th century, Tunis[1]

Many domains emerged related to food and the diet that patients with diabetes should follow. However, in contrast to tablets (above) and herbal medicines (Section 7.1.4), the diet did not feature as a specific treatment for diabetes as shown in Figure 6.3. Instead it was perceived to be something that could potentially help or hinder the illness; as one patient described it, foods are either 'brothers' or 'enemies' of diabetes (Figure 6.5).

*Figure 6.5 Cultural domain of food and its relationship to diabetes*



In contrast to medication, a number of domains relate to non-adherence to the diet and in particular, reasons for patients finding the diet difficult to follow. No domains emerged related to food or the diet from the doctor interviews. It appears to be an important issue for patients and nurses but not clinicians. No staff or patients mentioned the use of alcohol, perhaps because of the low number of Tunisian patients who consume it (Table 9.1) as well as the negative stigma attached in a Muslim society to its consumption.

In contrast to the emphasis placed on the relationship between food and diabetes, exercise did not emerge as a theme. On the rare occasions that exercise or sport were alluded to by any of the participants, it was in relation to reasons why patients cannot do sport:

> "For an old woman for example, how can she (exercise)?"
> (Patient 5, focus group 4, centre C)

### 6.3.4 "It's something from God": The role of religion.

"Praise be God! He is powerful and mighty. In His hand, he holds royal authority and kingship. His are the most beautiful names and attributes. His knowledge is such that nothing, be it revealed in secret whispering or left unsaid, remains strange to Him. His power is such that nothing in heaven or on earth is too much for Him or escapes Him...The final outcome of things is up to God."
Ibn Khaldoun, 14th century, Tunis[1]

A key cultural theme that emerged from the patient focus groups was the important role that God plays in the lives of the participants. God plays many roles: He is the provider, the healer, the One able to improve situations, a helper and blesser. The focus groups included numerous uses of the terms *hamdullah* (God be praised) and *inshallah* (if it's Gods will). God is believed to be all powerful and nothing happens outside of his will. He is the cause of both bad and good, illnesses and their healing.

> "Previously someone was ill and unless God healed them, they would die"
> (Patient 1, focus group 1, centre B)
>
> "It's (diabetes) something from God. We don't know why it comes"
> (Patient 1, focus group 2, centre C)
>
> "If it's God's will your (blood) pressure will be controlled"
> (Patient 1, focus group 4, centre B)

The influence of fatalism on diabetes care emerged early in the study from comments by physicians:

> "He also mentioned how the fact that Tunisians are Muslims may affect their health care - they tend to have a rather fatalistic worldview because of their belief in *Inshallah* - If God Wills."
> (Fieldnotes of a discussion with a doctor, centre.3)

> "You can't totally generalise within Tunisia but it is still the predominant worldview, which is *maktub* (translation: it is written, destiny or fate), that is you know it's in God's hands and therefore human initiative in trying to change the course of the future has less impact than it would have in other cultures. The classic example of this would be seatbelt wearing, you know, where the vast majority of people still cannot be bothered to wear a seatbelt even though they know that wearing a seatbelt reduces mortality. It's the same as smoking as well. Eighty per cent of Tunisian males smoke and they know that tobacco damages health but, you know, whether it damages my health or not is up to God..."
>
> (Key informant interview: English doctor)

During the focus groups there was evidence of this influence on patient adherence and God was seen as being able to make up for dietary mistakes:

> "Sometimes, God is powerful, one makes a mistake and eats something"
>
> (Patient 3, focus group 2, centre B)

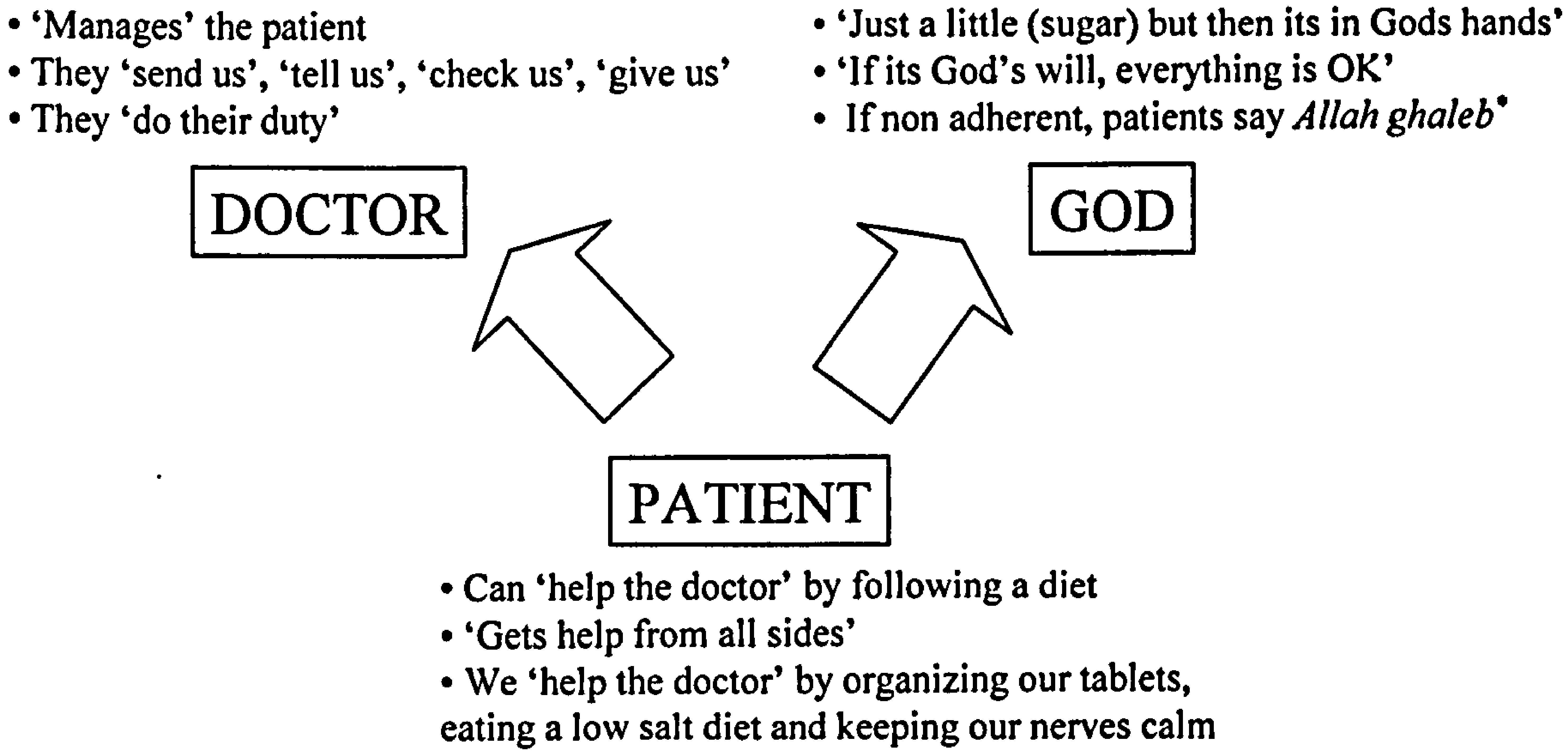
> "Be careful in the *aiid* (festival) the patient was told by the nutritionist. The reply was 'God is with me' (which probably means I will eat what I want and trust God to look after me!)"
>
> (Fieldnotes of participant observation at centre C)

The only specific religious practice that emerged in relation to care of patients with diabetes was the practice of fasting during the month of Ramadan (Section 3.4). Several ideas emerged related to the month of Ramadan. More people attend prior to and after Ramadan and fewer during the month, patients reduce the number of tablets they take and consultation times may vary. The influence of Ramadan on the quality of care has been analysed in the quantitative component of the study (Section 7.8.3).

### 6.3.5 "We help the doctors... then it's in Gods hands": External locus of control.

A further development on the preceding theme of the role of God and fatalism in the care of patients with diabetes is the idea of locus of control: who is responsible for their diabetes and its control? Results from the final analyses revealed the concept displayed in Figure 6.6. The illness, in this case diabetes, almost appears as a separate entity to the patient and it is predominantly in the control of and the responsibility of the clinician. The patient's role is merely to help the doctor in managing this entity, where possible. If this is not feasible, due to the patient eating sugar for example, then the result is in God's hands. In all cases the locus of control is external to the patient. This concept has important implications for the idea of self-management of chronic illnesses.

*Figure 6.6 Pictorial demonstration of locus of control domain*



- 'Manages' the patient
- They 'send us', 'tell us', 'check us', 'give us'
- They 'do their duty'

- 'Just a little (sugar) but then its in Gods hands'
- 'If its God's will, everything is OK'
- If non adherent, patients say *Allah ghaleb**

- Can 'help the doctor' by following a diet
- 'Gets help from all sides'
- We 'help the doctor' by organizing our tablets, eating a low salt diet and keeping our nerves calm

*This term literally translated means 'God is victor' and is used anytime something unfortunate occurs, expressing the feeling that God is omnipotent.

### 6.3.6 "We get very happy and very sad": Emotions.

Several themes emerged concerning people's emotions, their causes and consequences, the most common one being anger. As described above, anger, along with stress and shock, was seen as the major cause of diabetes and hypertension, and a significant problem regarding attempting to achieve good glycaemic and blood pressure control.

> "Patient 6: Listen, listen, when you have no worries you can eat anything and you don't get diabetes, but when you have worries, even if you eat a little, your sugar goes up...
> Patient 3: Stress puts your sugar up and your blood pressure and causes problems, but food, no. If someone has diabetes he mustn't get angry, he mustn't hit... he can't or it will put his sugar up and his blood pressure... and the medicine here, is not really effective..."
> (Patient focus group 1, centre A)

Anger appeared to be a major cultural theme, often present in the health centres and commonly mentioned by the paramedical staff. Staff cited many circumstances in which patients might get angry, such as if there were no medications available or if they had attended the centre with an acute illness and could not be seen as it was the day of the weekly chronic disease clinic.

> "She says some (patients) go without and some buy them (medicines), but they often get angry and insult her."
>
> (Fieldnotes of discussion with a nurse, centre 38)

Patients often discussed anger and its causes:

> "Anger with children, with your husband, with lots of things, life in general, from work. Life is hard."
>
> (Patient 3, focus group 1, centre C)

There seemed to be a strong perception that emotions and chronic illness are closely linked, and that this is particularly true for Tunisians:

> "We get very happy, us, the Arabs, we get very happy and we get very sad... And this gives us diabetes. We get very happy. You understand what I am saying...We get very happy and we get upset quickly, it's our character, our character is like this. We get very happy and we get angry a lot. And this causes shock and shock can cause high blood pressure; it's like having an accident. It can cause high blood pressure and it can cause diabetes."
>
> (Patient 3, focus group 4, centre A)

### 6.3.7 "Each one is different": Characteristics of doctors.

Domains describing the attributions of the clinicians were often contrast/comparison domains. Clinicians were not perceived to be one collective group, but were noted to be variable. A common Tunisian expression, '*koll wehed keefesh*', describes this well. Literally translated this means 'each one how', with the idea that 'each individual is unique', each person is different. Contrasts were made of private and public, primary care and secondary care and good and bad doctors. The latter designation depended mostly on whether the doctor talked to the patient or not.

> "Why are we around these one or two doctors? Because we all want to see him. He cares for you and he measures your blood pressure and allows you to rest so you can see if you have high blood pressure or not. He talks to you even about problems at home; he will ask why you have high blood pressure and talk to you about it. The others will say no, I have lots of patients and I am in a hurry and I can't. Its like he was selling something."
>
> (Patient 1, focus group 4, centre B)

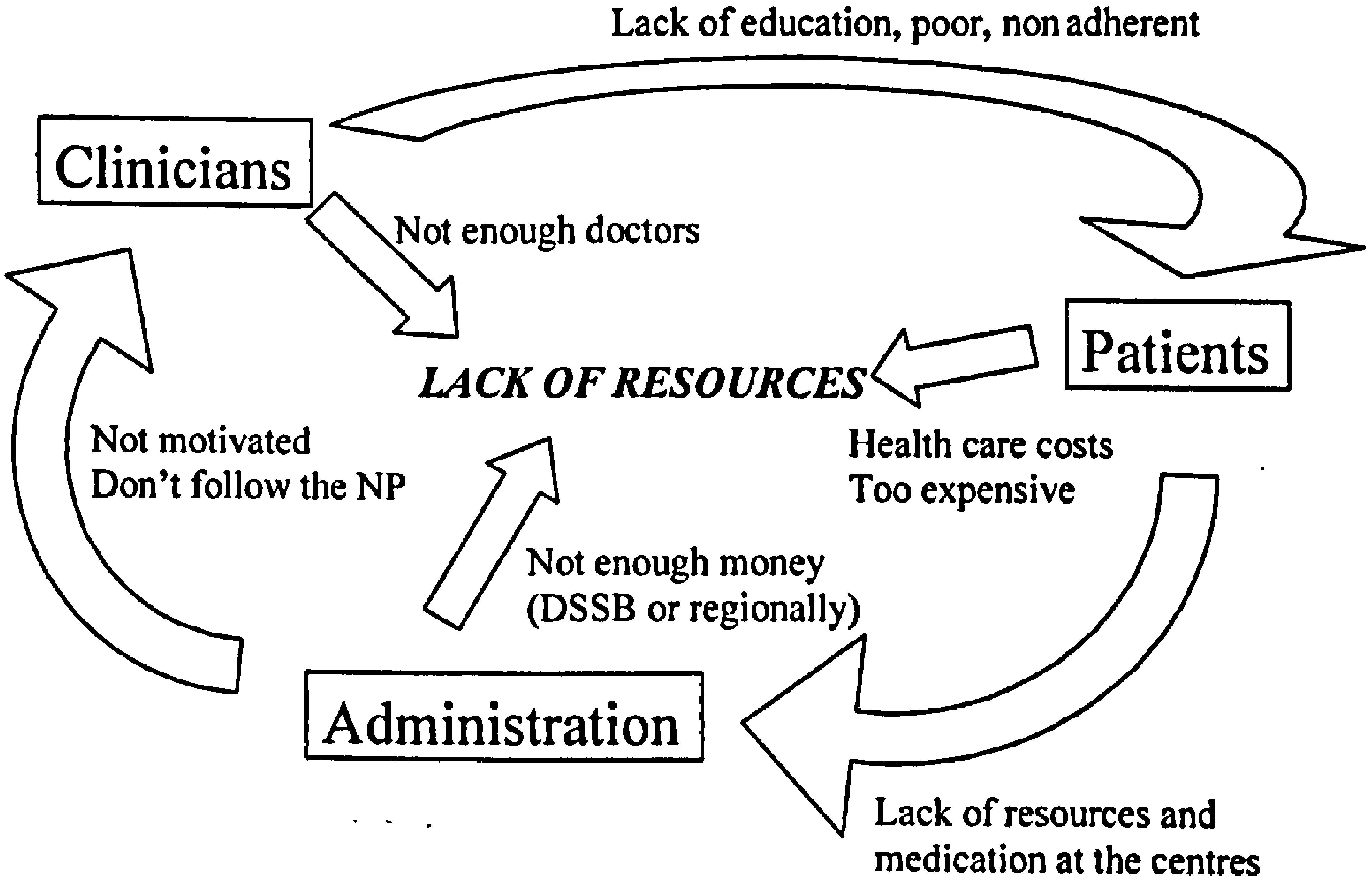
Seldom was any explicit mention made of the length of time spent by the doctor with the patient and indeed, the concept of time in general was conspicuous by its absence. Likewise, few domains related to the issue of appointments; the ideas of 'an appointment time' and 'consultation time' appear to be foreign concepts. Patients are given an appointment day, rather than time, as is the case in other spheres of Tunisian life. A need for an appointment time did not emerge from the data. Other issues related to doctor characteristics, such as beliefs, attitudes and motivation, were rarely eluded to and only by the doctors or researcher.

While doctors were viewed individually, the nurses were generally perceived by the patients to be uniformally 'good'. Their characteristics and role appeared to be less important than the clinicians and they were often seen as being there to 'help' the doctor. Domains related to other paramedical staff such as the nutritionist, health assistants, pharmacists and secretaries only emerged from the researchers fieldnotes: to the patient it appears that other paramedical staff do not play significant roles in their care.

### 6.3.8 The circle of blame

During the participation observation and interviews at the first health centre, the idea of 'who was to blame' for poor care emerged as a recurring theme. Each group of participants had differing views on the cause of poor care, but they all seemed to blame one other group of participants along with financial restraints (Figure 6.7):

*Figure 6.7 The circle of blame*



Nothing was found to disprove this theory in the second and third health centres, but it was not such a predominant theme. The first centre was chosen as an example of good care and it is possible that this concept is widely present in centres where quality of care is a concern and hence reasons for lack of high quality are reflected on and discussed by both patients and professionals alike.

### 6.3.9 "If you have no money you die": The importance of money

The importance of money was a key theme for patients. Domains emerged related to 'things that cost money' and 'the results of having no money' from almost all the patient focus groups. Medicines were always listed as something that cost money; other expenses were consultations, blood tests, a healthy diet, the family and seeing specialists. In order of frequency of occurrence, the consequences of having no money were not being able to buy medicines, having problems, an inability to get well, an inability to follow the diet and having to 'wait on God'. In contrast, health professionals rarely mentioned money or financial concerns.

A number of domains emerged compromising of rhetorical questions. Patients' questions were invariably related to money:

> "You must buy some (medicines) but I do not work and I have no money, so how will I buy any?"
>
> (Patient 4, focus group 4, centre A)

### 6.3.10 "There are lots of things that are needed": Suggestions to improve care

Numerous suggestions were offered as to how the care of patients could be improved, particularly by the clinicians, and they are listed in full in Appendix 6.2. As one patient put it succinctly; "there are lots of things that are needed". The suggestions have been grouped under the headings of personnel, training, health centre, infrastructure, the national program and patient issues. In line with the overall impression that access to medications is the predominant theme at the health centre, the most common suggestion made was to improve the provision of medications. Other common suggestions were to provide laboratory facilities at the health centre, to increase the number of doctors and dieticians and to train doctors and paramedical staff within the framework of the national program.

Often the patients, even when specifically asked, had no suggestions to offer (question 9 in Tables 5.3 and 5.4):

> Interviewer: And tell me, do you have ideas about how we can improve the care here? How we can improve the health centre and the care generally here for patients with diabetes? Do you have any ideas?
> Patient 2: For patients with diabetes?
> Interviewer: Yes.
> Patient 2: I really don't know.
> Patient 1: I don't know how. (Patient focus group 1, centre B)

Examples of good practice were often observed during participant observation or cited by health professionals; these are listed in Appendix 6.3 under the headings of the primary health care centre, chronic disease clinics, use of the new medical records, the consultation and motivated clinicians.

### 6.3.11 "It's improved, little by little": Comparison of the past and present

The comparison of the past and present emerged as a common theme across all participants and at all three health centres. The present was usually perceived to be superior to the past, whether the subject matter was patient care, improved socio-economic conditions, supply of medicines or quality of personnel. Like many of the major themes, there was often a link between this theme and the patient's perception of the primary importance of medication.

> "They (the doctors) came for two hours in those days. They didn't stay; they came and finished quickly. Not like today when they come. They don't go home quickly and they give them time and are patient with them. And the patients also have other requests not like before. In the past they came for their medication and were not looking for anything else. Now they understand and they say - give me my request for an Xray, give me my request for a blood test, give me an ECG. You feel that Tunisians have become more aware, aware of their health, even the old men..."
> (Staff focus group, centre A)

Exceptions to the generalisation that the present was better than the past was that some patients perceiving life to be harder nowadays and more expensive; an example quoted was that consultations had been free in the past.

### 6.3.12 Other themes

As expected, cultural themes emerged that were centre-specific, such as domains related to use of the emergency department in centre B, the 'mini-hospital'. However, a number of other themes were apparent across the centres and participants though less definitively than the major themes described above: the characteristics of Tunisians, types of illness, the role of relatives and the issue of change. Other potentially important themes, such as the use of herbal medicines and gender issues, are presented in the following chapter.

*Characteristics of Tunisians*

There were a few explicit references to the characteristics of Tunisians. The majority related to dietary habit, such as their fondness of sweet food and drinks, or emotional traits (see above). Otherwise, the concept of a uniform Tunisian with his/her own culture was not evident and this absence was noted by one of the clinicians:

> "I don't think that Tunisians are very specific. I don't think so.... This is not unique to Tunisians." (Doctor, semi-structured interview, centre B)

*Types of illness*

The most frequent domain that emerged from the overall analysis, as shown in Table 6.1, was type of illness. This in itself was to be expected given that the health centre is seen as the place where people with illnesses come to be seen and treated. Equally anticipated, is the finding that diabetes and hypertension[v] were listed in every 'type of illness' domain. However, the additional illnesses listed were extremely inconsistent, and in particular, heart disease, stroke and high cholesterol were rarely noted. This finding may suggest that these associations and complications of diabetes are either uncommon or relatively unknown to the participants.

---

[v] Many of the patients have associated hypertension with their diabetes, and the national program and its components, such as the chronic disease clinics, cover the management of both diseases.

### *The role of relatives*

> *"(Respect for) blood ties is something natural among men, with the rarest exceptions. It leads to affection for one's relations and blood relatives, (the feeling that) no harm ought to befall them nor any destruction come upon them. One feels shame when one's relatives are treated unjustly or attacked, and one wishes to intervene between them and whatever peril or destruction threatens them. This is a natural urge in man, for as long as there have been human beings."*
>
> Ibn Khaldoun, 14th century, Tunis[1]

A common domain from the patient focus groups featured the role of relatives in the lives of patients. In contrast, very rarely were relatives of patients mentioned by clinicians or paramedical staff. Arab cultures do tend to stress the importance of the wider family[223], and the taxonomies of the domains were not limited to close relatives but covered aunts, uncles and distant cousins. The potential influence of family members in the care of patients in these cultures should not be neglected.

### *Changing behaviour*

The lead physicians at the two health centres B and C both stated that they wanted to improve the quality of care at their health centre by implementing the national program. The latter appeared to be succeeding whereas the former stated explicitly that he had failed. A comparison of the domain analyses at the two health centres revealed that probable causes of this difference were contextual barriers. Centre B was characterised by numerous domains concerning lack of both personnel and equipment, and problems with the doctors and staff as well as the medications. The domains from centre C centred on the issue of medication and its availability only, suggesting that the other barriers to care were less significant. It appears that even a motivated doctor may not be able to implement improvements to care if there are too many existing contextual barriers.

## 6.4 Summary

From the ethnographic analysis it appears that the one overriding theme, certainly for the patients, is the primacy of access to medications at the health centre. Patients see the purpose of their visit to the health centre is to acquire their medicines and all other issues are either related to this or are of secondary importance; for example, financial issues emerge in relation to availability of medications.

Emotional factors are also highlighted, particularly the role of shock, anger and stress in the causation of diabetes, hypertension and high levels of sugar. Local concepts of food are dichotomised into 'brothers' or 'enemies' of diabetes rather than as a means of treating diabetes. Physical activity does not appear as a part of the local ethnomedical model. Patients have an external locus of control and perceive the management of their diabetes to be in the hands of the doctor and God. Finally, there is the perception from all participants that the care at health centres has improved, but many problems remain and a variety of suggestions are offered to improve care. Many of these themes seem highly relevant to diabetes care at health centres, and the following chapter specifically addresses the issue of factors influencing care emerging from the qualitative data.

# Chapter 7: Content analysis of the factors that influence the care of patients with diabetes

## 7.1 Introduction

This final qualitative results chapter presents the findings of the content analysis, describing the most frequently cited and observed factors that emerged as potentially influencing the care of patients with diabetes. It thereby fulfils the fifth objective of the thesis; to identify and explore the factors, both barriers and facilitators that influence the care of patients with diabetes in primary care in Tunisia.

## 7.2 Coding tree

The full coding tree included 438 nodes of which 26 were categorising nodes only that did not include data. Thus, there were 412 active nodes each identifying one factor that could potentially influence patient care, distributed as 92 patient factors, 135 health professional factors and 185 organisational factors. Appendix 7.1 lists the full coding tree. 3083 passages were coded within these nodes. Although some factors could be classified into more than one node, each factor was coded only once for ease of counting and classification.

## 7.3 Prioritising the factors

The frequency that each node (factor) was coded was counted and classified according to its source; researcher, primary health care doctor, paramedical staff, patient, or other informant. Many of the nodes had 'child nodes' which were included in the total. For example, the node 'Patient/Compliance/Dietary' also had four child nodes (cost, Tunisian, festivals, being hosted) and these were all added together to give a total for 'patient compliance with diet'. The results are grouped into patient, health professional or organisational factors. The aim was to give a general idea of the most frequently observed and cited factors. Only the top twenty factors of each group are shown and each count of factors is also differentiated into the source.

Some attempt has been made to reduce the bias of the structured interviews with patients in which the interviewer specifically asked about some potential areas, by excluding the counting of these data. The semi-structured interviews and focus groups occasionally contained specific questions but these were not excluded as they were less frequent and almost always covered areas of discussion that the participants themselves had initiated previously. However, other potential biases remain and these results are to be viewed within the context of all the quantitative and qualitative results.

Quotations from the interviews, focus groups and the researcher's fieldnotes have been selected to represent the themes most commonly cited. In line with the reflexive approach to this project, I have reflected on and given particular care to the quotes from the fieldnotes and have commented, where appropriate, on how my personal perspective may have influenced their presentation.

## 7.4 Patient factors

The most important patient factors to emerge were patient financial constraints, compliance and attendance issues, patient education, gender issues, use of herbal medicines and patient health beliefs (Table 7.1).

*Financial constraint*

The patient-related factor most often mentioned by patients and by clinicians was financial constraint. Lack of money was always mentioned as a barrier to good care:

> "If a person doesn't have the money to register or to go some other place, it's a problem. He has to wait on God. He has nothing to do. It's a question of the financial situation. One day a person might have five dinars, the next day they have nothing. He has children, he has this and that..."
>
> (Patient 3, focus group 2, centre B)

> "He (the doctor) said the biggest factors were that patients are poor and therefore don't go for blood tests and referrals when requested, for example it costs 10TD to go to Town X to make an appointment and 10TD to go back again for the appointment..."
>
> (Fieldnotes from discussion with a doctor, centre 34)

Both patients and health professionals described financial barriers influencing various aspects of the patients' care, from the patients attending the health centre initially, attending the local hospital for blood tests and referrals and being able to purchase medications if they were not available at the health centre.

***Table 7.1 The top twenty patient factors: The number of passages coded for the twenty most frequently mentioned patient factors and their sources***

| Patient Factor | Total | Observer | Doctors | Staff | Patients* | Others |
|---|---|---|---|---|---|---|
| Financial constraints | **69** | 7 | 26 | 5 | 24 | 7 |
| Compliance with medication | **68** | 20 | 23 | 10 | 12 | 3 |
| Compliance with diet | **63** | 9 | 19 | 13 | 17 | 5 |
| Patient education | **57** | 8 | 24 | 4 | 7 | 14 |
| Gender issues | **52** | 10 | 13 | 9 | 14 | 6 |
| Use of herbal medicine | **43** | 3 | 17 | 5 | 15 | 3 |
| Attendance at clinics | **35** | 13 | 11 | 8 | 0 | 3 |
| Compliance with referrals | **27** | 9 | 14 | 3 | 0 | 1 |
| Knowledge of diabetes | **27** | 13 | 2 | 1 | 9 | 2 |
| Also attend other places | **23** | 13 | 4 | 4 | 0 | 2 |
| Compliance with blood tests | **20** | 4 | 11 | 4 | 0 | 1 |
| Patient behaviour | **18** | 9 | 3 | 5 | 1 | 0 |
| Patient age | **17** | 2 | 12 | 3 | 0 | 0 |
| PB: Importance of a prescription | **18** | 5 | 3 | 2 | 7 | 1 |
| Illiteracy | **16** | 6 | 6 | 0 | 2 | 2 |
| Frequency of attendance | **15** | 6 | 4 | 1 | 3 | 1 |
| Other compliance issues | **15** | 2 | 5 | 1 | 1 | 6 |
| Lack of privacy in consultations | **13** | 13 | 0 | 0 | 0 | 0 |
| PB: Stress increases sugar levels | **13** | 6 | 0 | 1 | 6 | 0 |
| Weather influence an attendance | **13** | 10 | 2 | 1 | 0 | 0 |

* Structured interviews with patients excluded
Staff: Health professionals, excluding doctors, who work at the primary health care centres
Others: Health managers, co-ordinators of the national program and key informants
PB: Patient belief

During the structured interview of patients I specifically asked patients if it was difficult to find 1.5 dinar (≈£0.75) to be able to consult the doctor at the health centre. The majority of patients replied that this was not a barrier for them, though a significant minority reported that even this amount was often difficult to find (question 6 in Tables 5.3 - 5.4).

*Compliance*

*"The stomach is the home of disease. Dieting is the main medicine"*
Ibn Khaldoun, 14th century, North Africa[1]

Poor patient compliance, now known more appropriately as patient concordance or adherence, was a very commonly mentioned barrier to care, encompassing adherence to diet, medications, blood tests and referrals for examinations such as fundoscopy. Patients and paramedical staff considered dietary adherence to be the most relevant problem whereas doctors were more likely to mention adherence to medications:

> "Nurse 3: In my view, the patients, the diabetics and the hypertensives, none of them eat the diet that they should; it's impossible...
> Nurse 1: Tunisians adore their tea, for example, and they can't drink their tea without sugar, and then a little coffee in the afternoon, and then there are the guests; you go and visit someone and they offer you tea...
> Pharmacist: They take the medicines but don't eat the (right) food!"
> (Staff focus group, centre A)

> "I don't follow it at all...I just eat normally..."
> (Patient 3, focus group 3, centre C)

> "There are patients who stop their medicines when they feel like it, there are patients who don't like their medicines, it upsets their stomach a little or I don't know, or for another reason they come back after a week or two to change their medicines to another, there are patients who stop them and don't come back, and there, and there are the majority who adhere to their medications..."
> (Doctor, semi-structured interview, centre B)

> "Patients often don't attend for their eye examination because they are assymptomatic, even though it is not far and there is not a long waiting list..."
> (Fieldnotes from discussion with a doctor, centre 18)

Patients and health professionals often quoted financial constraints as the reason for poor patient compliance.

The structured interviews of patients covered the issues of compliance with diet and medication (questions 2 and 7 in Tables 5.3 – 5.4). All patients reported having been given dietary advice, usually by their doctor but most acknowledged that it was difficult to adhere to it. Only a few patients confessed to forgetting their medication although some openly stated that when the medications were not available at the health centre, they could not afford to buy them from private pharmacies.

### *Patient education*

Clinicians commonly quoted patient education as a problem and often seemed to blame patients for being poorly educated. However, the clinicians and paramedical staff, as well as the patients, acknowledged the steps being made to address this issue and many were positive about the improvements achieved.

> "They are really good with us and they talk to us and they guide us and always there are medicines and they tell us we must continue our medications and never let them run out..."
>
> (Patient 2, focus group 1, centre B)

### *Attendance*

Several issues emerged around the area of patient attendance at the health centres, the most common ones being attendance at different centres, the frequency of attendance and the influence of the weather on attendance. Attendance issues were particularly noted by the observer rather than by patients or health professionals. Most health professionals reported that patients generally did attend their health centres regularly, and those that did not were usually being managed in secondary care or within the private system.

One problem cited was the issue of patients attending more than one centre. This was most commonly a problem in rural areas where patients might live close to a small nurse-led health post but also attend a larger centre further away:

> "The patient is also seen at a smaller centre and has two medical records; says she came here today because of the market in the town here and her centre has no medication..."
>
> (Fieldnotes from observation of consultations, centre 26)

Patients rather than health professionals addressed the issue of frequency of attendance and usually stated that they would rather attend less frequently than is currently the case. Attendance also seemed to be affected by the weather, both the heat in the summer and the cold in the winter emerged as potential barriers to attendance.

### *Gender issues*

There is a disparity of attendance at the health centres between men and women: 62% of patients consulting with diabetes are women despite the similar prevalence rates.[63] Patients and staff were asked in the semi-structured and structured interviews for their views on the cause of this disparity. Generally, respondents reported more reasons for men under-attending centres than reasons for women over-attending. The most frequent reasons given for men under-attending were work commitments, attendance at other health care facilities (such as occupational, private or secondary care) and the opinion that men are less interested in looking after their own health:

> "He said they (men) work and they don't bother coming; they don't bother about their illnesses until they die..."
>
> (Fieldnotes from discussion with a nurse, centre C)

In contrast, respondents felt that women tended to over-attend, for social and insignificant reasons as well as the perception that women are 'iller':

> "Nurse 1 (male): Well look. Women by nature like to come and complain to doctors. They are iller, they come to the hospital (health centre) more for many reasons, I don't know, giving birth, and on top of that women by their nature like to attend. Men are more rational. Perhaps because of work or they are busier... this is for the majority of cases, not for the diabetics only...
> Interviewer: And do you all think the same?
> Nurse 2 (female): Yes, for a woman her time is always staying at home. She always wants to come especially those that don't have the means for leisure activities. She attends the (centre) and gathers and chats with her friends...this is for the majority...."
>
> (Focus group of staff, centre A)

### *Use of herbal medicines*

*"the case of the person who had a stomach-ache and was treated with honey"*

Ibn Khaldoun, 14th century, Tunis[1]

In Tunisian Arabic, herbal medication is literally translated as 'Arabic medicine' in contrast to pharmaceutical medications, 'French medicines'. Clinicians most often mentioned their use. It was known that many older patients took them, but their use was not perceived to be a barrier to care.

> "She said it (herbal medicine) is used but less than before and not for serious illnesses. She says that as long as it's not harmful she lets the patients continue taking it..."
>
> (Fieldnotes from discussion with a doctor, centre 27)

A significant minority of patients reported talking herbal medications (question 3 in Tables 5.3 – 5.4):

> "Patient 1: We use them...
> Interviewer: Do you all use them?
> Patient 1: Sometimes, I use them. If there is something effective, a little *qliil*, a little *zata*...
> Patient 5: Traditional medicine, that's all...
> Patient 1: Things that are well-known and good... *Qliil* is good, *zata* is good...
> Patient 5: Yes, we do use herbs and it's proven to be effective..."
>
> (Patient focus group 4, centre A)

A handful of herbs were often mentioned as being beneficial for diabetes, notably *shiih* (white wormwood), *qliil* (thyme) and *zata* (rosemary). Generally speaking, the use of herbal medication was not seen as a barrier to care and only in one case did a patient admit to taking them in place of her prescribed medications.

*Patient beliefs*

The most common patient belief or attitude that was expressed by patients and also alluded to by health professionals, was the importance given to the prescription of medication as expanded on in the previous chapter.

> "Patient 5: The most important thing, it's the medicines. The first thing is whether the medicines are present or not; in the health centre and in the hospitals. This is the only thing..."
>
> (Patient focus group 4, centre A)

> "Patient 2: There's one thing that we the patients talk about: give us medicines and that's all, then everything is fine. There is nothing else..."
>
> (Patient focus group 1, centre B)

A number of other health beliefs held by patients were also cited, such as the affect of stress on glucose and blood pressure and the belief of *maktub* (fate or God's will). These themes have been discussed in more depth in the previous chapter.

## 7.5 Health professional factors

The most frequently mentioned health professional factors are listed in Table 7.2. Doctor motivation emerged clearly as the most important health professional factor. Other issues were the role of the nurses and doctors, shortages of health professionals and the doctors' placement, work time and length of consultation.

*Table 7.2* ***The top twenty health professional factors: The number of passages coded for the twenty most frequently mentioned health professional actors and their sources***

| Health Professional Factor | Total | Observer | Doctors | Staff | Patients* | Others |
|---|---|---|---|---|---|---|
| Motivation of doctors | **102** | 32 | 41 | 1 | 0 | 28 |
| Doctors' time with patients | **43** | 13 | 8 | 2 | 18 | 2 |
| Role of nurses | **42** | 31 | 3 | 2 | 1 | 5 |
| Shortage of paramedical staff | **36** | 4 | 19 | 9 | 0 | 4 |
| Doctors' work time | **36** | 18 | 7 | 1 | 1 | 9 |
| Teamwork | **29** | 16 | 4 | 8 | 0 | 1 |
| Shortage of specialists | **29** | 2 | 21 | 1 | 0 | 5 |
| Lack of feedback from specialists | **28** | 14 | 12 | 1 | 0 | 1 |
| Placement of doctors | **28** | 8 | 15 | 0 | 0 | 5 |
| Lack of doctors training | **27** | 5 | 14 | 0 | 0 | 8 |
| Staff-patient communication | **26** | 16 | 5 | 4 | 1 | 0 |
| Eye examination by doctors | **26** | 9 | 7 | 0 | 0 | 10 |
| Shortage of PHC doctors | **24** | 6 | 13 | 2 | 0 | 3 |
| Doctor-patient relationship | **21** | 16 | 2 | 0 | 3 | 0 |
| BP examination by doctors | **21** | 21 | 0 | 0 | 0 | 0 |
| Patient preference for a doctor | **20** | 6 | 4 | 0 | 10 | 0 |
| Role of doctors | **20** | 9 | 8 | 1 | 0 | 2 |
| Motivation of nurses | **18** | 0 | 7 | 9 | 1 | 1 |
| Lack of communication PHC / SHC | **18** | 3 | 9 | 1 | 0 | 5 |
| Lack of nutritionist | **17** | 2 | 12 | 0 | 0 | 3 |

* Structured interviews with patients excluded
Staff: Health professionals, excluding doctors, who work at the primary health care centres
Others: Health managers, co-ordinators of the national program and key informants
PHC: Primary health care, SHC: Secondary health care, BP: Blood pressure

### *Doctor motivation*

Doctor motivation was the issue most often alluded to by the doctors themselves. Motivation was seen as a collective term covering multiple issues such as the doctor's interest, intentions and professional conscience. Many doctors and managers saw doctor motivation as the most important influence on the quality of care given.

> "For the management to be good regarding the doctors it's necessary that they are motivated. They must know the things regarding diabetes and want to know more about it... The doctor should put himself in the patient's place and know that the patient faces many serious problems. Its necessary that the doctor is motivated, he must put himself in the place of the patient, which is a little difficult, but it's necessary to be a good doctor..."
>
> (Doctor, semi-structured interview, centre A)

Some doctors described de-motivating factors that had led them to lose their incentive to provide high quality of care.

> "He says he was keen to do excellent care when he got here two years ago, for example, fundoscopy and all the blood tests, but then patients can't afford to go for their eye examination and he was laughed at when he asked about HbA1c – the others said: Do you think you are in New York? But he says how can we do good care with one glucose result every three months, which means nothing..."
>
> (Fieldnotes from discussion with a young doctor from centre 24)

> "If a health centre has other problems... the doctors slowly become more and more de-motivated and they don't try and improve the care because always there are barriers. This is the largest problem - they no longer look for solutions..."
>
> (Doctor, semi-structured interview, key informant 7)

### *Role of health professionals*

The role of health professionals, particularly the nurses, was a factor often noted by myself, the observer, probably due to my perspective of having worked in a different context in the United Kingdom. Areas highlighted were their use of time, such as the amount of time spent doing administrative tasks rather than clinical tasks, the polyvalent nature of the nurses and the boundary between the tasks assigned to nurses and doctors. One area often alluded to was the measurement of blood pressure: whose responsibility was it?

> "He said there are not enough doctors for the number of patients; for example, nurses have to do medical acts, doctors jobs, such as taking blood pressures, since there are so many patients. Therefore the management of patients is not 100% done by doctors; he was talking as if this was a negative thing... There does seem to be an overall view that blood pressure measurement is a doctor's job..."
>
> (Fieldnotes from discussion with a doctor, centre 20)

A number of other potential factors were mentioned related to the responsibilities of doctors in primary care particularly in more rural areas, such as covering emergency care, working at several health centres and working night shifts at the local hospital.

*Shortage of health professionals*

Lack of nurses, dieticians, primary health care and secondary health care doctors were all referred to as possible barriers to care, predominantly by the professionals themselves.

> "He says the main problem is the infrastructure, the buildings, supplies, etc, and the lack of staff. For example, a centre may only have one doctor and one nurse so how can they do all the national programs?"
>
> (Fieldnotes from discussion with staff at the regional headquarters, region Q)

> "Problems according to him: shortage of doctors. Until two months ago they only had three doctors for the area to cover the routine consultations, emergency department, school visits and outlying centres. So no time to complete medical records as well. Now they have two or three more doctors so they are wanting to improve things"
>
> (Fieldnotes from discussion with a doctor, centre 28)

> "One of the big problems is the problem of specialists, there are not enough ophthalmologists, there are not enough nephrologists, there are not enough cardiologists to look after the complications of patients with chronic diseases..."
>
> (Doctor, semi-structured interview, centre C)

Lack of personnel was also a commonly cited problem from the staff questionnaires (Section 3.4.4) with recruitment of a dietician being the most common suggestion offered to improve care. In contrast, patients did not refer to shortage of staff as a significant problem.

*Placement of doctors*

Doctors' placement refers to the policy of the Ministry of Public Health to place primary health care doctors in centres in rural areas at the start of their career in order to provide cover to the whole of the country. Later, doctors can apply to work in other areas. Many doctors travel up to two hours a day to work and this appeared to be a significant barrier to providing good care:

> "His main problem, and he says the main problem for the quality of care, is the placement of the doctors; he lives in (the capital) and commutes four hours a day. He has spent his whole career trying to move closer to (the capital) or (his hometown). He says he doesn't really care what time he arrives (at work) because he has to travel so far; says if he worked in (the capital) he'd happily arrive at 7.30 every morning..."
>
> (Fieldnotes from discussion with doctors, centre B)

My own personal experience of travelling to one of the centres over a six-month period reflected a little of what some doctors may feel:

> "I am fed up of the travelling, getting up early and travelling 2-3 hours to get here and the same distance to return. This is what three of the doctors do continually and they have to work overnight 1-2 nights per week as well; I can understand some of their feelings of tiredness, frustration and being fed up; I am relieved that this is my last visit..."
>
> (Fieldnotes from personal reflections of visiting centre B)

In contrast, benefits were reported by doctors who lived near to where they worked, and particularly by those who came from the area in which they worked:

> "He has lots of ideas, seems motivated and well informed. He is from this area and he says that is an advantage because he understands the patients better..."
>
> (Fieldnotes from discussion with a doctor, centre 30)

*Doctors work time*

Although primary health care doctors are employed to work 36 hours a week, the hours worked in reality seems to be hugely variable. This issue was most often noted by the observer and by other informants, such as health managers, as a potential barrier to care:

> "He says many of the doctors are not motivated and only work for an hour or two and then go and look after their farm, or their buildings or even work medically 'on the side'. For example, one doctor tried to encourage other doctors to get trained to do fundoscopy but they were not interested..."
>
> (Fieldnotes from discussion with a health manager, centre 33)

It also emerged that in some health centres, there was pressure on the doctors to finish early from the nursing staff, arguably for good reasons:

> "The nurse says he aims to be finished (i.e. for the doctors to have finished consulting) with the patients by noon because they are efficient and he doesn't want the patients waiting any longer than that. For the nurse, it seems better for the patients to be out earlier than to have a longer time with the doctor..."
>
> (Fieldnotes from discussion and observation of a nurse, centre C)

*Doctors' time with patients*

Themes around the topic of the doctor/patient relationship were observed, and notably, the time spent by the doctor with the patients. Very different perspectives emerged from the various sources. The observer most commonly noted the short time given to each patient by the clinicians. The clinicians acknowledged that the large number of patients consulting prevented them from giving sufficient time to the patients:

> "He said that lack of patient education was an important factor; patients don't even know what the complications of diabetes are, and doctors don't have time to explain everything to them..."
>
> (Fieldnotes from discussion with a doctor, centre 17)

In contrast, the patients never spontaneously mentioned lack of time with the doctors as a problem, and when asked directly they usually stated that they had enough time:

> "Interviewer: And can you ask the doctors a few questions?
> Patient 7: Yes, we ask them
> Interviewer: And you have the time...
> 2 or 3 patients: Yes, yes, everything.
> Interviewer: Would you like more time with the doctors...
> 2 patients: No, it's enough. *Hamdullah* (Praise God)"
>
> (Patient focus group 3, centre A)

## 7.6 Organisational factors

The availability of medication was the most commonly cited factor overall; the presence of chronic disease clinics and the large number of patients also emerged as key issues. Other important organisational factors were the availability of HbA1c testing, issues related to secondary care, waiting times, and various components of the national program such as the new medical records (Table 7.3).

*Table 7.3* ***The top twenty organisational factors: The number of passages coded for the twenty most frequently mentioned organisational factors and their sources***

| Organisational Factor | Total | Observer | Doctors | Staff | Patients* | Others |
|---|---|---|---|---|---|---|
| Availability of medication | **157** | 44 | 47 | 15 | 35 | 16 |
| Use of chronic disease clinics | **96** | 27 | 49 | 7 | 2 | 11 |
| Large number of patients | **77** | 22 | 37 | 6 | 3 | 9 |
| Availability of HbA1c testing | **42** | 11 | 23 | 0 | 0 | 8 |
| Distance to specialists | **40** | 6 | 17 | 5 | 7 | 5 |
| Waiting time at health centre | **39** | 21 | 5 | 0 | 10 | 3 |
| Waiting time to see specialist | **37** | 5 | 16 | 1 | 10 | 5 |
| Organisation of centre | **36** | 20 | 2 | 4 | 8 | 2 |
| Problems with the managers | **35** | 7 | 14 | 7 | 2 | 5 |
| Lack of resources | **32** | 3 | 14 | 5 | 0 | 10 |
| Use of DSMR | **31** | 17 | 9 | 2 | 0 | 3 |
| Private health system | **31** | 7 | 14 | 1 | 4 | 5 |
| Lack of equipment | **30** | 12 | 9 | 7 | 1 | 1 |
| Use of glucometers | **24** | 8 | 10 | 1 | 1 | 4 |
| Time to complete DSMR | **24** | 12 | 8 | 2 | 0 | 2 |
| Other problems with DSMR | **21** | 9 | 8 | 1 | 0 | 3 |
| Laboratory issues | **21** | 7 | 8 | 0 | 4 | 2 |
| Supply of DSMR | **20** | 13 | 2 | 0 | 0 | 5 |
| Patient-held records | **18** | 13 | 2 | 2 | 0 | 1 |
| Supervision visits | **15** | 4 | 3 | 0 | 0 | 8 |

* Structured interviews with patients excluded
Staff: Health professionals, excluding doctors, who work at the primary health care centres
Others: Health managers, co-ordinators of the national program and key informants
DSMR: Disease-specific medical records

*Availability of medication*

It would seem that based on the content analysis of the data, the lack of availability of medication at the health centres is the most important barrier to care in the management of patients with diabetes. It was the most frequent factor cited by the observer, the paramedical staff and the patients themselves. The problem varied between regions and between health centres:

> "I also spoke to the pharmacist at the centre; he (like the doctor) said that the diabetes and hypertension medication is always available as it's their number one priority. Hypertension medication is 30% and diabetes medication 18-20% of their budget..."
>
> (Field notes from visit to centre 16)

Where it was a problem, it was seen as the most significant factor:

> "Participant 1: The doctors are good, but the medicines, one time they have them another time they don't...
> Participant 2: Sometimes I come and I'm ill and they say there are no medicines. They are expensive and I don't work and they say to buy them so I have to remain ill...
> Participant 4: But the medicines, they are lacking here. I mean, the medicines are missing a lot; our only problem is that there are no medicines..."
>
> (Patient focus group 3, centre C)

Even within the same centre, different views were expressed by staff and patients, and even between patients, as to whether the medication was available or not:

> "Yes and there is always medication available and patients don't leave without it..."
>
> (Staff focus group, centre A)

> "Rarely, they are rarely absent, rarely. The medicines are present..."
>
> (Patient focus group 3, centre A)

> "Now, regarding the medications, they are not always present..."
>
> (Patient focus group 4, centre A)

*Chronic disease clinics*

As described in Section 1.3.7, the national program has encouraged the introduction of chronic disease clinics in which the health centres specify one day a week to see patients with diabetes or hypertension only. Many doctors attribute improvements in quality of care to the chronic disease clinics:

> "She says the care has improved compared to the past, partly due to the chronic disease clinics which allow the doctors to focus on the chronic patients, do group education, occasionally, and increases patient satisfaction."
> (Fieldnotes from discussion with a doctor, centre 37)

Other clinicians described problems with implementing the clinics, particularly the problem of turning away patients with acute illnesses:

> "Someone from down south said it was impractical to have chronic disease clinics because people (with other illnesses) wanted to come everyday..."
> (Fieldnotes from a national program meeting, 2003)

However, the majority of centres seem to have overcome the hurdles:

> "At the beginning it's very difficult but after they understand and they found out themselves when they come to the health centre on the day for chronic illnesses they see many others with diabetes and hypertension and they hear other patients talking, hopefully hearing good things, if that's not obvious, and they realise they are not the only person in the world..."
> (Doctor, semi-structured interview, centre A)

*Large number of patients*

Busy clinics due to the large number of patients consulting at the health centres were a barrier to care cited particularly by the doctors.

> "He said it's busy: 60-100 patients a day and sometimes the doctor has to see them all himself. For example, this week three doctors are off so there was only one doctor each day who finished around 12.30pm both days...."
> (Fieldnotes from discussion with a nurse, centre 27)

> "In fact, if one doctor is left to consult and he calls the patient, and he asks the patient questions, and examines him, and writes the findings in the records, he writes the prescription and he also writes the next appointment and he must also explain things to the patients and also write in the blood results and also give a little health advice; this is not possible. Especially in these conditions, for the doctor who has 60 or 70 patients waiting for him alone this is not possible. And this, unfortunately, prevented us from successfully following the program..."
> (Doctor, semi-structured interview, centre B)

This was a commonly quoted problem reported in the health centre questionnaires (Section 3.4) and often used as the explanation for why the chronic disease clinics had not been introduced.

*Availability of HbA1c*

Widespread lack of availability of HbA1c testing was perceived as an important barrier to quality of care by the observer and by the doctors. In most regions HbA1c testing is not available in primary care, although this potentially important barrier tended to only be mentioned by younger doctors:

> "He realises that lack of HbA1c is a big problem... he says the public laboratories don't do them so people have to go to private laboratories, so only professionals get it done..."
> (Fieldnotes from discussion with a doctor, centre 8)

There was some confusion as to why testing was only available in some regions:

> "Discussed HbA1c testing with (co-ordinators of the national program); neither seemed aware that most regions could not do it and did not know why Region G and Region H could. They said it was the responsibility of the doctors in the region to contact the hospital and ask them to do it..."
> (Fieldnotes from discussion at the DSSB)

*Secondary care*

A number of issues relating to secondary care were seen to impinge on the care of patients with diabetes at the health centres: This is not surprising given that some requirements of routine diabetes care, such as eye examinations, are completely reliant on secondary care. The most common barriers to care raised, particularly by clinicians, were the distance patients have to travel to reach secondary care and the waiting times at the local hospitals.

> "The doctor asked the patient, 'if I send you to (Town X) for an eye check will you go?' Patient said 'no, it was too far'."
> (Fieldnotes from observing consultations, centre 26)

> "His view of the care of patients with diabetes is that it's good at the centre, but the problem is for the external components, such as the eye examination. From his town, patients have to travel 60km to the eye specialists with a 6-month wait..."
> (Fieldnotes from discussion with a doctor, centre 38)

*Waiting times at the health centre*

Although patients were usually required to wait for up to three hours until they could see their doctor, this potential barrier to care was mostly frequently mentioned by the observer rather than by health professionals or patients themselves. Indeed, with some exceptions, most patients did not see this as a problem:

> "Interviewer: And I have seen in the hospital here that you have to wait a while to see the doctor, maybe an hour or two, to see the doctor....
> Patient 3: No, it's necessary...
> Interviewer: ... is this a problem or not...
> Patient 3: No, waiting is inevitable.
> Patient 2: It's necessary to wait
> Patient 3: ... it's necessary to wait and its good for people, for their patience, to wait their turn, first person first, second person second, to be organised, people in their exact place. To see the doctor, people must be patient for him to finish with other people..."
>
> (Patient focus group 2, centre B)

*The new medical records and the national program*

Many of the components of the national program of diabetes and hypertension management, as well as the use of the chronic disease clinics as described above, were perceived to be potential facilitators of good clinical care. For example, the introduction of the new disease-specific medical records:

> "He is aware that the records are not well completed; their plan of action for 2004 includes completing the medical records and motivating the staff to see its importance..."
>
> (Fieldnotes from discussion with a doctor, centre 58)

However, a number of problems with their use were noted, in particular the time required to complete the records and their availability:

> "He says the new medical record is too long to fill in and keeps being changed - he is not motivated to complete it at all..."
>
> (Fieldnotes from discussion with a doctor, centre 4)

> "They were missing the new records for three months until today... this was their explanation for still using the old records..."
>
> (Fieldnotes from observation at centre 19)

A variety of views of the national program in general were expressed with the majority expressing the opinion that its introduction had facilitated improved quality of care:

> "I know the situation before the national program. Before the national program the situation was not good at all. Since then it has improved little by little so now, in general, it is better than it was prior to the national program. Generally, it is perhaps not good enough yet but it is better than it was..."
>
> (Doctor, semi-structured interview, centre C)

Less often, concerns were expressed about the national program, such as the need for more staff and resources to fulfil its recommendations, and the large number of other national programs that the health centre is expected to follow.

## 7.7 Factors by data source

The overall, ten most frequently mentioned factors are shown in Table 7.4 and the top ten factors from each source (observer, doctors, paramedical staff and patients) shown in Table 7.5. It is clear that although the major factors cited are mentioned by all sources, the relative importance given to factors differs according to the data source.

*Table 7.4 The ten most frequently mentioned factors*

| | |
|---|---|
| 1. Availability of medication | Organisational |
| 2. Motivation of doctors | Health professional |
| 3. Use of chronic disease clinics | Organisational |
| 4. Large number of patients | Organisational |
| 5. Financial constraints | Patient |
| 6. Compliance with medication | Patient |
| 7. Compliance with diet | Patient |
| 8. Patient education | Patient |
| 9. Gender issues | Patient |
| =10. Use of herbal medicine | Patient |
| =10. Length of consultations | Health professional |

***Table 7.5 The ten most frequently mentioned factors according to data source***

| Observer | Doctors | Paramedical staff | Patients | Other informants |
|---|---|---|---|---|
| Availability of medication | Chronic disease clinics | Availability of medication | Availability of medication | Doctors motivation |
| Doctors motivation | Availability of medication | Compliance: dietary | Patients financial constraints | Availability of medication |
| Nurses role | Doctors motivation | Compliance: medication | Doctor time with patients | Patient education |
| Chronic disease clinics | Large number of patients | Gender issues | Compliance: dietary | Chronic disease clinics |
| Large number of patients | Patients financial constraints | Shortage of staff | Use of herbal medicine | Lack of resources |
| Waiting time in centres | Patient education | Nurses motivation | Gender issues | Doctors examination of eyes |
| Doctors examination of BP | Compliance with medication | Attendance | Compliance: medication | Large number of patients |
| Compliance with medication | Availability of HbA1c testing | Teamwork | Waiting time for sec. care | Doctors work time |
| HC Organised (or not) | Specialists shortage | Chronic disease clinics | Waiting time in centres | Availability of HbA1c |
| Doctors work time | Compliance with diet | Lack of equipment at HC | Patient preference for a Dr | Lack of doctors training |

HC: Health centre
Other informants includes health managers, co-ordinators of the national program and key informants
Factor coding: Patient, Health professional, Organisational

## 7.8 Summary

The content analysis of the qualitative data has revealed over 400 potential barriers or facilitators to care of patients with diabetes in primary care in Tunisia. The most commonly cited factor was the availability of medication at the heath centres. Other frequently observed organisational factors were the existence of chronic disease clinics and the large number of patients consulting at the health centres. The most commonly mentioned health professional factors were the motivation of the doctors and the role of the nurses. Finally, frequently cited patient factors were financial constraints, patient education and compliance and attendance issues. The relative importance given to factors differs markedly according to the data source.

These results have revealed many factors that may be influencing diabetes care; the following three quantitative chapters will continue to describe this care and ultimately, to test these proposed hypotheses.

# Chapter 8: Nationwide perspective of diabetes care

## 8.1 Introduction

This first quantitative results chapter presents the results of the national level data collected from the annual regional reports within the national program of diabetes and hypertension management. The results fulfill the first objective of the study; to describe, on a national scale, the management of diabetes in primary care in Tunisia.

## 8.2 Annual regional report results

Data collected from the annual regional reports from 2000 to 2006 are shown in Table 8.1. Data were calculated from each region but only the cumulative, national data are shown. Unlike the quantitative data collected from the medical record review, these data have relied on completion of Ministry of Health reports by clinicians and nurses at the health centres. The problems encountered with the data from the reports needs to be re-iterated (Section 4.3); some of the data, particularly from the earlier years, was missing, unclear or unreliable. Consequently, the data presented has not been statistically analysed and no firm conclusions can be drawn. However, it is apparent that large numbers of patients with diabetes and hypertension are managed in primary care and it appears that the numbers of new cases are increasing (Figure 8.1).

The total number of patients with diabetes managed in primary care according to the data in table 8.1 (170,000 in 2006) appears to give a much lower prevalence rate (1.7%) than shown in epidemiological studies (see Section 1.3.6). For example, the National Nutrition Survey[63] from 1997 suggested a prevalence rate of 9.9%, which would be predicted to have risen to between 12-15% over the last 10 years. However, there are a number of factors that must be taken into account. Firstly, the National Nutrition Survey gave prevalence rates for the adult population only. One third of the Tunisian population[59] is 18 years or under and thus the prevalence rate from the data in this study will be around 2.5% of the adult population. Secondly, the data from the reports is of known cases only. The National Nutrition Survey estimated that three quarters of cases of diabetes were unknown[63] and thus the approximate prevalence rate from the presented data should be adjusted from

### *Table 8.1* *Data collected in the annual regional reports*

| | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|---|---|---|---|---|---|---|---|
| Patients with D only | 91,009 | 95,037 | 84,423 | 92,691 | 92,552 | 91,391 | 103,369 |
| Patients with H only | 168,568 | 184,214 | 168,868 | 181,017 | 188,631 | 177,318 | 200,370 |
| Patients with D and H | 43,285 | 54,265 | 48,439 | 57,909 | 61,497 | 56,624 | 67,818 |
| New cases of D only | 7,913 | 7,300 | 8,522 | 8,223 | 9,216 | 11,550 | 10,877 |
| New cases of H only | 13,297 | 11,892 | 15,038 | 14,452 | 18,109 | 22,588 | 24,377 |
| New cases of D and H | 3,508 | 3,056 | 4,081 | 3,788 | 4,434 | 5,795 | 8,496 |
| New cases with renal complications | 654 | 370 | 682 | 542 | 732 | 659 | 710 |
| New cases with ocular complications | 1,184 | 566 | 917 | 756 | 822 | 984 | 878 |
| New cases with CV complications | 1,411 | 753 | 1,441 | 1,341 | 1,913 | 1,968 | 1736 |
| New cases with neuro. complications | 386 | 330 | 807 | 571 | 867 | 1,105 | 753 |
| Number of HCs[1] | 1,981 | 2,003 | 2,028 | 2,052 | 2,067 | 2,070 | 2,074 |
| HCs with a CDC[2] | 468 | 479 | 422 | 455 | 440 | 430 | 427 |
| Number of doctors | 1,395 | 1,474 | 1,346 | 1,354 | 1,367 | 1,526 | 1,561 |
| Doctors trained in D[2] | 713 | 787 | 782 | 787 | 781 | 875 | 894 |
| Doctors trained in H[2] | 752 | 784 | 783 | 789 | 728 | 840 | 817 |
| Number of supervision visits[3] | | | 551 | 493 | 890 | 1,144 | 1,162 |
| Number of glucometers[3] | | | 781 | 1,165 | 1,141 | 1,312 | 1,385 |
| Number of packets of glucometer strips[3] | | | 1,641.5 | 2,056.5 | 3,169 | 2,239 | 3,000 |
| Ambulatory patients with D only[3] | | | 58,369 | 46,489 | 59,330 | 49,294 | 42,916 |
| Ambulatory patients with H only[3] | | | 42,787 | 31,122 | 35,517 | 37,946 | 60,919 |
| Ambulatory patients with D and H[3] | | | 20,577 | 16,071 | 22,999 | 22,348 | 29,873 |

[1] Data from other Ministry of Health reports.

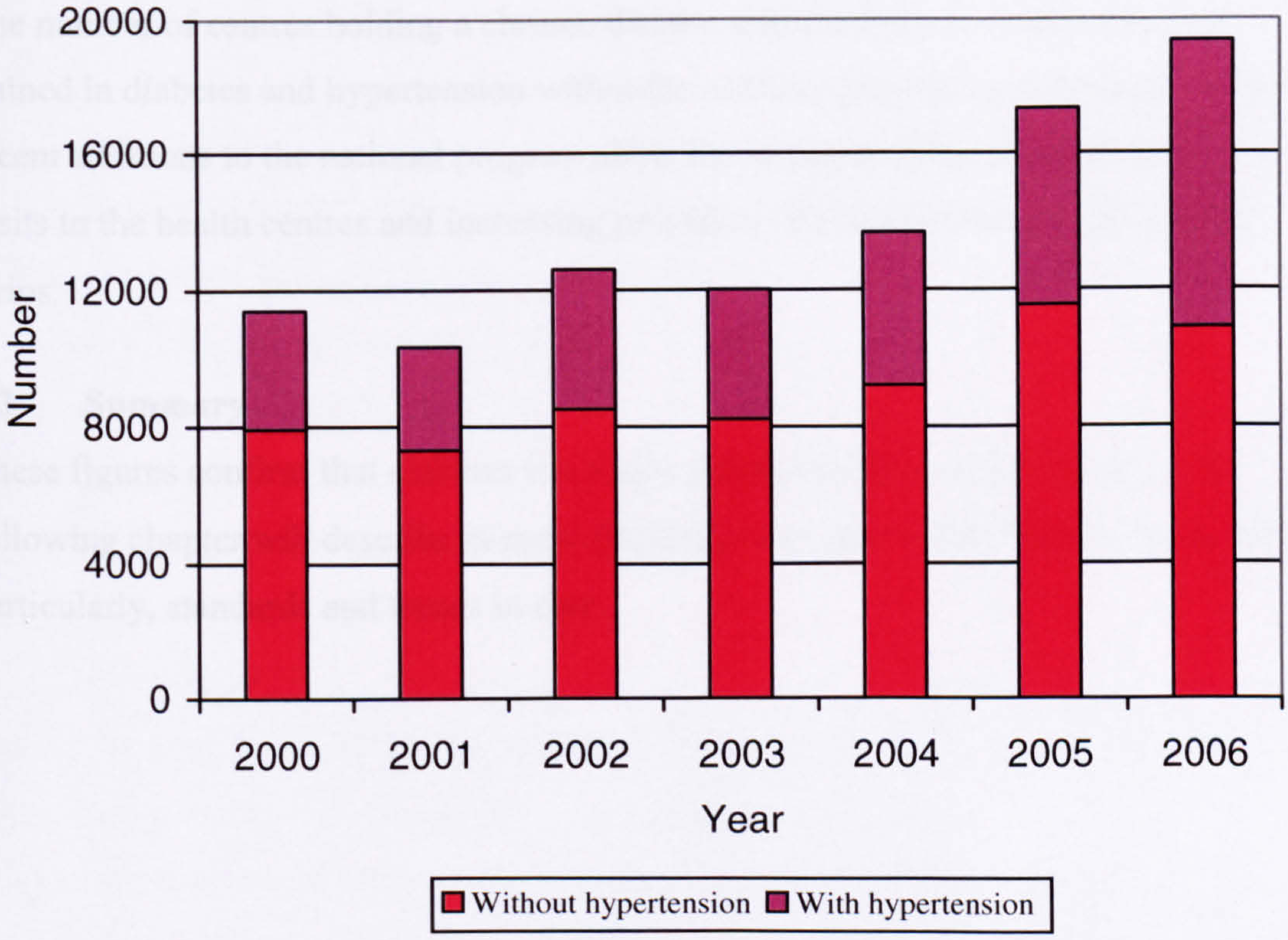
[2] Occasional missing data. If data were missing the figure from the previous year for that region was used to enable fair comparisons to be made.

[3] Data recorded in new reports only (2002 onwards).

D: Diabetes mellitus, H: Hypertension, HC: Health centre, CDC: Chronic disease clinic, CV: cardiovascular, Neuro: Neurological

Ambulatory patients are managed in secondary care but attend the health centre for medication.

***Figure 8.1 New cases of diabetes, with and without hypertension, per year***



2.5% to around 10% to include both known and unknown cases. Thirdly, these data include patients managed in public sector, primary health care centres only and do not include those managed in secondary care, private care and other institutions. Therefore, comparing the adjusted prevalence figure from the reports in this study of 10% to the predicted prevalence rate from the National Nutrition Survey of 12-15%, it appears that the majority of patients with diabetes in Tunisia are managed in public sector, primary care health centres. This would be in accordance with the estimations given by Tunisian doctors working in this sector (Section 1.3.3).

The more recent addition of data concerning the number of ambulatory patients, those patients who are managed in secondary care but attend primary care facilities for their medication, suggest that approximately twice as many patients are managed in primary care compared to secondary care. No details are available nationally as to the proportion of patients managed within the other sectors, and therefore these figures cannot be used as prevalence and incidence data. Instead, they provide a broad overview of workload from chronic illnesses at primary care health centres. In total, around 170,000 patients with diabetes are currently managed within primary care, a considerable number for a country with a total population of 10 million. The number of centres holding a chronic disease clinic and the number of doctors trained in diabetes and hypertension within the national program appear static. More recent additions to the national program show increasing number of supervisory visits to the health centres and increasing provision of glucometers and glucometer strips.

## 8.3 Summary

These figures confirm that diabetes is a major public health issue in Tunisia. The following chapter will describe in more detail diabetes care within health centres and particularly, standards and trends in care.

# Chapter 9: Descriptive and longitudinal analysis of diabetes care

## 9.1 Introduction

This second quantitative results chapter presents the findings of the medical record review of patients with diabetes managed in primary care, including the quantitative descriptive analyses of standards of care, the longitudinal analysis and additional analyses. The results fulfill the fifth objective of the study; to determine the standards of care of patients with diabetes in primary care in Tunisia and to assess any improvements that may occur over time.

## 9.2 Pilot study

Full details of the pilot study were described in a preliminary report of 2002/3[248] and published in *Diabetes & Metabolism*.[249] In summary:

1. The medical record review was feasible.
2. The facilities and information required were accessible.
3. A relational database was designed with the help of a computer software specialist.
4. A sample size for the full study was calculated with statistical help.
5. Results from the medical records of four health centres showed that:

- There was a striking variation in process of care measures across the four centres. This was particularly the case for fundoscopy, cardiovascular and foot examinations.
- Intermediate outcome of care measures (e.g. fasting blood glucose levels, cholesterol results) were similar across the centres.
- There were some marked differences in health centre characteristics (e.g. number of doctors, number of patients), poverty indicators and medication prescribed across the centres.

## 9.3 Descriptive analysis of patients in the study

In total, 60 health centres were visited and 2559 medical records were reviewed. The final study consisted of 2160 medical records from 48 health centres; two from each region (Appendix 9.1 illustrates as a flow chart the selection of the medical records).

### 9.3.1 Categorising type of diabetes

The treatment of all patients diagnosed under 35 years of age were examined and 128 were discovered to be still under 35 and on insulin at the start of the study time period and therefore classified as having type 1 diabetes. The other 47 patients diagnosed under 35 were not on insulin treatment and therefore classified as type 2. A large number of patients (672) had no diagnosis date recorded in their medical records. All those on insulin treatment were assessed (119). Four patients were under 35 and therefore classified as type 1. Of the remaining patients on insulin with an unknown diagnosis date, three were under 40 years of age, none were 40-44 years, nine were 45-49 years, 14 were 50-59 years, and 69 were 60 years or over. It was noted that the average duration of diabetes in patients in the study was 8.6 years. It was therefore decided, pragmatically, that the three patients under 40 years were likely to have been diagnosed under the age of 35 and were classified as type 1. The other patients who were 45 years and over were likely to have been diagnosed over the age of 35 and were therefore classified as type 2 diabetes.

Based on this classification, 134 of the total patients were categorised as having type 1 diabetes (6.2%) and 2026 had type 2 diabetes (93.8%).

### 9.3.2 Patient variables

Characteristics of the 1319 female and 841 male patients included in the study are shown in Tables 9.1 and 9.2. A comparison of men and women and the range of results across the 48 health centres are shown.

The data shown correspond to the explanatory factors in the multivariate analyses (Chapter 10) and also give a detailed picture of patients with diabetes managed in primary care across the whole of Tunisia. Several differences between men and women are shown; women in the study are older, less educated, less likely to smoke and consume alcohol and are more likely to be married. Gender differences in health care provision are also apparent. Women are less likely to consult late, yet are given a longer time until their next appointment. They have fewer details recorded and are less likely to have their details recorded in the new disease-specific records. Large variations of most patient characteristics are demonstrated across the health centres studied.

## *Table 9.1 Characteristics of patients included in the study (Continuous variables, n=2160)*

| Factor | Data available | Mean | SD | Gender | | | Health Centre | |
|---|---|---|---|---|---|---|---|---|
| | | | | Men | Women | p-value[1] | Lowest | Highest |
| Age (years) | 2109 | 59.9 | 14.1 | 58.0 | 60.9 | <0.001 | 47.1 | 66.0 |
| Duration of diabetes (years) | 1469 | 8.6 | 6.3 | 8.5 | 8.7 | 0.58 | 3.6 | 13.5 |
| Education score[2] | 1025 | 0.50 | 0.73 | 0.86 | 0.27 | <0.001 | 0.00 | 2.00 |
| Distance reside from HC (km) | 1798 | 0.9 | 2.7 | 1.0 | 0.8 | 0.12 | 0.0 | 9.5 |
| Number of visits in last year[3] | 1899 | 3.7 | 1.8 | 3.7 | 3.8 | 0.25 | 1.4 | 7.3 |
| Days until next appointment | 1813 | 84.3 | 24.9 | 81.6 | 84.6 | 0.014 | 28.8 | 125.9 |
| DSMR completion (max=12)[4] | 2160 | 6.9 | 4.3 | 7.1 | 6.7 | 0.021 | 0.7 | 11.3 |

[1] One-way analysis of variance
[2] Definition given in Appendix 4.3
[3] Patients who attended at least once in last 12 months only included
[4] Details in Appendix 9.2
SD: Standard deviation, HC: Health centre, DSMR: Disease-specific medical records

***Table 9.2 Characteristics of patients included in the study (categorical variables, n=2160)***

| Factor | Data available | Percentage (n) | Gender | | | Health Centre | |
|---|---|---|---|---|---|---|---|
| | | | Men (n) | Women (n) | p-value[1] | Lowest % | Highest % |
| Female | 2160 | 61.1% (1319) | x | x | x | 36.0 | 88.2 |
| Type 1 diabetes | 2160 | 6.2% (134) | 10.8% (91) | 3.3% (43) | <0.001 | 0.0 | 32.0 |
| Positive family history | 1311 | 53.8% (706) | 51.0% (261) | 55.7% (445) | 0.11 | 16.7 | 85.7 |
| Education score[2] is 0 | 1025 | 63.3% (649) | 40.6% (162) | 77.8% (487) | <0.001 | 11.8 | 100.0 |
| Poverty (type I[2]) | 1589 | 12.1% (192) | 10.2% (64) | 13.3% (128) | 0.06 | 0.0 | 30.6 |
| Poverty (type I and II[2]) | 1589 | 30.5% (485) | 28.7% (180) | 31.7% (305) | 0.23 | 10.0 | 68.4 |
| Unemployed/retired | 980 | 66.9% (656) | 43.3% (176) | 83.6% (574) | <0.001 | 4.3 | 100.0 |
| Marital status | 1487 | 75.6% (1128) | 86.3% (524) | 68.6% (604) | <0.001 | 52.5 | 100.0 |
| Late consultations | 10283[3] | 24.9% (2559) | 27.7% (1045) | 23.3% (6508) | 0.002 | 4.8 | 50.1 |
| Adherence to treatment | 3229[3] | 82.6% (2669) | 81.0% (996) | 83.7% (1673) | 0.053 | 1.6 | 100 |
| Smokers | 1223 | 18.6% (227) | 38.5% (202) | 3.6% (25) | <0.001 | 0.0 | 50.0 |
| Alcohol consumption | 1106 | 6.1% (68) | 12.2% (57) | 1.7% (11) | <0.001 | 0.0 | 50.0 |
| Associated illness: CVD | 1273 | 8.2% (105) | 5.4% (27) | 10.1% (78) | 0.004 | 0.0 | 76.2 |
| Associated illness: RD | 1229 | 5.9% (73) | 6.6% (32) | 5.5% (41) | 0.50 | 0.0 | 33.3 |
| Associated illness: DYS | 1195 | 8.5% (101) | 8.0% (38) | 8.8% (63) | 0.71 | 0.0 | 45.5 |
| DSMR used | 2160 | 86.5% (2026) | 89.3% (751) | 85.8% (1118) | 0.003 | 0.0 | 100.0 |
| Visits on CDC day | 17458[3] | 67.3% (11753) | 67.0% (4589) | 67.5% (7164) | 0.50 | 23.3 | 94.1 |

[1] Chi-squared test

[2] Definitions given in Appendix 4.3

[3] Number of consultations not number of medical records

CVD: Cardiovascular disease, RD: Renal disease, DYS: Dyslipidaemia, DSMR: Disease-specific medical records, CDC: Chronic disease clinic

#### 9.3.2.1 Complication rates

The prevalence of abnormalities on examination of the cardiovascular system, feet, eye and electrocardiogram are shown in Table 9.3. The prevalence of abnormal fundoscopy findings is particularly high; these were usually retinopathy and cataracts. The most prevalent abnormalities on foot examination were infection, absence of pulses and hyperkeratosis. Abnormal cardiovascular examination findings were usually irregular rhythms, particularly tachycardias, and murmurs. Electrocardiogram abnormalities were arrhythmias, cardiomegaly, signs of ischaemia and bundle branch blocks.

***Table 9.3*** ***Prevalence of recorded abnormalities: Percentage of patients who had any abnormal finding of those who had at least one recorded examination***

| Complication | Total | (n) | Men | (n) | Women | (n) | p-value[1] |
|---|---|---|---|---|---|---|---|
| Foot examination (n=1369) | 16.1% | 220 | 15.3% | 81 | 16.6% | 139 | 0.56 |
| CVS examination (n=1493) | 5.4% | 80 | 5.0% | 29 | 5.6% | 51 | 0.70 |
| Eye examination (n=498) | 47.0% | 234 | 45.9% | 90 | 47.7% | 144 | 0.77 |
| ECG examination (n=694) | 9.5% | 66 | 6.0% | 16 | 11.7% | 50 | 0.020 |

[1] Prevalence of abnormalities in men and women compared using chi-squared test
CVS: Cardiovascular, ECG: Electrocardiogram.

#### 9.3.2.2 Medication prescribed

The medications for diabetes, hypertension and hypercholesterolaemia prescribed during the patient's last visit recorded are shown in Table 9.4. The majority of patients are being prescribed oral hypoglycaemic agents (metformin and/or a sulfonamide, usually glibenclamide), half of patients are being treated for hypertension and 15% for hypercholesterolaemia (all with a fibrate). There is a low number of patients on diet only treatment for diabetes. The rate of modification of each group of therapy is shown in Table 9.5.

***Table 9.4 Treatment prescribed at the last consultation recorded (n=2160)***

| Medication | Percentage | n |
|---|---|---|
| *For diabetes* | | |
| Insulin | 19.0 | 410 |
| Oral hypoglycaemic agents | 86.0 | 1858 |
| Biguanides | 69.2 | 1494 |
| Sulfonamides | 68.7 | 1485 |
| Acarbose | 0.2 | 5 |
| Diet only | 4.4 | 95 |
| *For hypertension* | | |
| Anti-hypertensive agents | 50.3 | 1087 |
| Calcium antagonists | 27.3 | 590 |
| Central-acting | 21.0 | 453 |
| Diuretics | 20.2 | 436 |
| ACE inhibitors | 16.2 | 350 |
| B-blockers | 10.0 | 217 |
| A-blockers | 0.05 | 1 |
| *For hypercholesterolaemia* | | |
| Fibrates | 15.6 | 336 |

***Table 9.5 Modification of treatment per consultation***

| Medication | Started | (n) | Stopped | (n) | Increased | (n) | Reduced | (n) | Continued | (n) |
|---|---|---|---|---|---|---|---|---|---|---|
| Oral hypoglycaemic agents | 4.9% | 4084 | 3.3% | 2718 | 4.3% | 3578 | 1.8% | 1523 | 85.8% | 71657 |
| Insulin | 5.5% | 797 | 4.6% | 673 | 7.9% | 1156 | 4.6% | 665 | 77.4% | 11282 |
| Anti-hypertensive agents | 6.5% | 6030 | 4.7% | 4350 | 3.2% | 2956 | 1.6% | 1456 | 84.2% | 78634 |
| Lipid-lowering medications | 6.8% | 1186 | 4.8% | 841 | 3.6% | 627 | 1.5% | 266 | 83.3% | 14570 |

### 9.3.3 Health centre variables

The characteristics of the 48 health centres are shown in Tables 9.6 and 9.7, presented separately as continuous and categorical data. The variables presented correspond to the explanatory variables used in the multivariate analysis (Chapter 10) and give a descriptive picture of primary care health centres in Tunisia. Striking variations between centres are again demonstrated.

*Table 9.6 Health centre variables (continuous variables)*

| | Data available (Max. = 48) | Mean | IQ range | Range across health centres | |
|---|---|---|---|---|---|
| Number of patients in the study | 48 | 45 | 8 | 21 | 50 |
| Number of doctors | 48 | 2.1 | 2.0 | 1 | 5 |
| Mean number of patients per clinic per doctor | 48 | 25.9 | 20.8 | 5.3 | 58.0 |
| Work time of doctors (hours) | 44 | 2.6 | 1.0 | 1.5 | 4 |
| Number of nurses | 44 | 5.6 | 5.0 | 2 | 13 |
| Number of all paramedical staff | 44 | 7.2 | 3.9 | 2 | 17 |
| Distance to Tunis (km) | 48 | 218 | 283 | 3 | 560 |
| Regional deprivation score (Appendix 4.5) | 48 | 11.5 | 5.4 | 7.1 | 18.6 |
| Distance to ophthalmologist (km) | 48 | 19.3 | 32.7 | 1 | 80 |
| Population served | 47 | 15,986 | 13,260 | 2,906 | 130,000 |
| Number of patients with diabetes | 48 | 162 | 125 | 21 | 625 |
| Number of patients with diabetes/1,000 popn. | 47 | 14 | 12 | 1.0 | 34.7 |
| Poverty (% type I[1]) | 42 | 16.7 | 7.8 | 4.9 | 39.8 |
| Poverty (%type I and II[1]) | 47 | 35.1 | 22.8 | 9.7 | 69.2 |
| Non-attendance (%) | 48 | 12.4 | 12.9 | 0 | 44 |

SD: Standard deviation, IQ: Interquartile

[1] Definitions given in Appendix 4.3

*Table 9.7 Health centre variables (categorical variables)*

| | Data available (n=48) | Yes | % | No | % |
|---|---|---|---|---|---|
| Doctor interest in diabetes | 48 | 6 | 12.5 | 42 | 87.5 |
| Nutritionist available | 46 | 9 | 19.6 | 37 | 80.4 |
| Milieu (Urban)[1] | 48 | 31 | 66.7 | 17 | 33.3 |
| DSMRs present | 48 | 41 | 85.4 | 7 | 14.6 |
| Chronic disease register present | 47 | 33 | 70.2 | 14 | 29.8 |
| PHRs present | 30 | 19 | 63.3 | 11 | 36.7 |
| CDC existence | 48 | 38 | 79.2 | 10 | 20.8 |
| ECG machine available | 44 | 17 | 38.6 | 27 | 61.4 |
| Glucometer available | 44 | 41 | 93.2 | 3 | 6.8 |
| Height measuring available | 30 | 5 | 83.3 | 25 | 16.7 |
| Weight machine available | 31 | 31 | 100.0 | 0 | 0.0 |
| Patient group education | 30 | 17 | 56.7 | 13 | 43.3 |

DSMR: Disease-specific medical record, PHR: Patient-held record, CDC: Chronic disease clinic, ECG: Electrocardiogram

[1] The aim was to randomly select one rural and one urban centre from each of the 24 regions. However, two regions were found to have no rural centres that hold medical consultations at least four times a week. In five other regions the initially selected rural health centre was unsuitable (in three cases the centre was mistakenly reported to hold clinics at least four times a week and in two cases, patients with diabetes were cared for at a nearby centre). In these cases the nearby centre that managed the patients with diabetes was used and in all cases, this centre was urban. The final proportion of urban:rural centres used in the study accords closer with the national proportions of centres of the type selected.[58]

The health centres in the study were classified according to the Ministry of Health as type 2 in 16 cases, type 3 in 15 cases and type 4 or more in the other 17 cases (Section 4.4.3). Three of the centres hold medical consultations four-days a week, 12 five-days a week and the remaining 33, six-days a week. According to the health centre staff, chronic disease medication was available all of the time at nine centres, almost all of the time at 16 centres, most of the time at 19 centres and some of the time at three centres (data unavailable from one centre). Of the 102 doctors employed at the 48 centres, 41 (40%) were female; 21 health centres had only male doctors whereas 11 had only female doctors. Less than half of the doctors (42%) had been trained at a postgraduate level in diabetes; in 16 centres all the doctors had been trained and in 15 centres none of the doctors had received training. Doctor motivation was classified as low in 13 centres, moderate in 14 centres and high in 19 centres (data unavailable from two centres). Motivation of the regional director was classified as low in three regions, moderate in 10 regions and high in seven regions (data unavailable from four regions).

## 9.4 Standards of care

*Process of care measures*

The proportion of patients who had each individual process of care measure performed within the preceding 12 months is shown in Figure 9.1 and Table 9.8. Figure 9.1 uses the total number of patients as a denominator (n=2160) and also the number of patients who attended at least once during the preceding 12-month period (n=1899). The latter is a more accurate measure of what is actually done for the patients who consult at the health centres, as it excludes those patients who did not attend the health centre at all during the time period studied. Blood pressure and fasting glucose measurements are undertaken in most of the patients whereas fundoscopy, electrocardiogram and HbA1c rates are conspicuously low. In Table 9.8 the proportion of patients who had an electrocardiogram and fundoscopy performed in the last 24 months, as well as the standard 12 month period, is shown because the national program recommends that these measures be undertaken at least once every 1-2 years.

*Figure 9.1*  ***Process measures performed in preceding 12 months***
Using patients seen at least once in preceding 12 months only (n=1899) and all patients (n=2160)

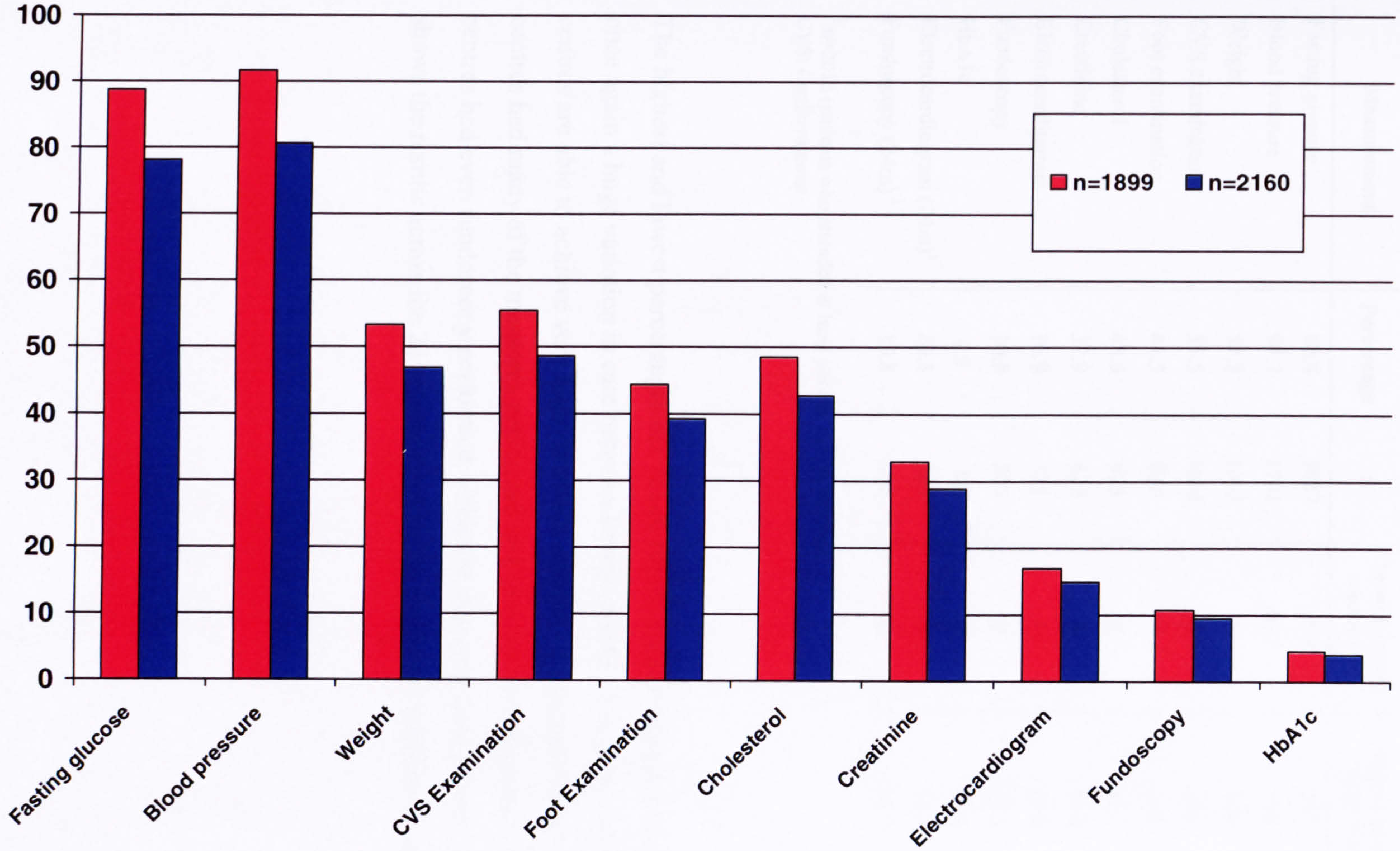


*Table 9.8 Process measures performed in preceding 12 months (n=1899)*

| Measurement | Percentage | n | Lowest health centre (%) | Highest health centre (%) |
|---|---|---|---|---|
| Fasting glucose | 88.8 | 1687 | 15.4 | 100 |
| Blood pressure | 91.7 | 1741 | 46.2 | 100 |
| Weight | 53.3 | 1013 | 0 | 100 |
| CVS examination | 55.5 | 1053 | 0 | 100 |
| Foot examination | 44.5 | 846 | 0 | 100 |
| Cholesterol | 48.6 | 923 | 0 | 95.7 |
| Creatinine | 32.9 | 625 | 0 | 97.8 |
| Electrocardiogram | 16.9 | 321 | 0 | 82.6 |
| Fundoscopy | 10.8 | 205 | 0 | 60.9 |
| HbA1c | 4.5 | 86 | 0 | 71.8 |
| Electrocardiogram (24m)[1] | 24.5 | 565 | 0 | 84.5 |
| Fundoscopy (24m)[1] | 15.8 | 300 | 0 | 66.7 |

[1] n=2018 (patients who attended at least once in last 24 months).
CVS: Cardiovascular

The highest and lowest percentages per health centre are also shown demonstrating once again a huge variation in care between health centres. It is clear that some centres are able to achieve very high standards of care. All patients at several health centres had many of the measures performed and over half of the patients in some centres had even fundoscopy performed within the one-year time period. Table 9.9 shows the results across the 24 regions confirming the wide variations in results.

*Table 9.9* ***Process measures performed in preceding 12 months by region (all percentages)***

| Region | n | Fasting glucose | Blood pressure | Weight | CVS examination | Foot examination | Cholesterol | Creatinine | ECG | Fundoscopy | HbA1c |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A | 86 | 82.6 | 88.4 | 25.6 | 47.7 | 50.0 | 26.7 | 10.5 | 1.2 | 4.7 | 1.2 |
| B | 66 | 92.4 | 97.0 | 42.4 | 59.1 | 47.0 | 50.0 | 48.5 | 27.3 | 9.1 | 9.1 |
| C | 94 | 85.1 | 100.0 | 97.9 | 97.9 | 89.4 | 64.9 | 64.9 | 25.5 | 19.1 | 8.5 |
| D | 72 | 95.8 | 98.6 | 70.8 | 55.6 | 36.1 | 54.2 | 13.9 | 27.8 | 9.7 | 0.0 |
| E | 90 | 88.9 | 74.4 | 44.4 | 47.8 | 36.7 | 52.2 | 22.2 | 17.8 | 7.8 | 0.0 |
| F | 80 | 93.8 | 96.3 | 75.0 | 75.0 | 62.5 | 42.5 | 27.5 | 13.8 | 13.8 | 0.0 |
| G | 87 | 97.7 | 83.9 | 0.0 | 9.2 | 18.4 | 28.7 | 28.7 | 3.4 | 11.5 | 0.0 |
| H | 76 | 94.7 | 98.7 | 97.4 | 65.8 | 60.5 | 32.9 | 21.1 | 11.8 | 11.8 | 9.2 |
| I | 84 | 94.0 | 78.6 | 45.2 | 9.5 | 10.7 | 42.9 | 1.2 | 4.8 | 10.7 | 0.0 |
| J | 91 | 93.4 | 93.4 | 56.0 | 46.2 | 53.8 | 42.9 | 13.2 | 6.6 | 2.2 | 0.0 |
| K | 79 | 72.2 | 97.5 | 32.9 | 92.4 | 82.3 | 55.7 | 24.1 | 12.7 | 6.3 | 29.1 |
| L | 84 | 79.8 | 85.7 | 17.9 | 22.6 | 19.0 | 48.8 | 21.4 | 7.1 | 7.1 | 0.0 |
| M | 58 | 44.8 | 81.0 | 19.0 | 41.4 | 34.5 | 25.9 | 0.0 | 17.2 | 5.2 | 0.0 |
| N | 82 | 86.6 | 86.6 | 36.6 | 53.7 | 48.8 | 22.0 | 6.1 | 9.8 | 7.3 | 0.0 |
| O | 73 | 53.4 | 78.1 | 39.7 | 79.5 | 61.6 | 37.0 | 1.4 | 8.2 | 1.4 | 0.0 |
| P | 75 | 96.0 | 98.7 | 92.0 | 65.3 | 22.7 | 69.3 | 65.3 | 52.0 | 32.0 | 41.3 |
| Q | 91 | 97.8 | 98.9 | 95.6 | 90.1 | 53.8 | 58.2 | 54.9 | 42.9 | 30.8 | 0.0 |
| R | 86 | 94.2 | 100.0 | 80.2 | 82.6 | 58.1 | 68.6 | 72.1 | 9.3 | 17.4 | 10.5 |
| S | 85 | 97.6 | 97.6 | 8.2 | 30.6 | 4.7 | 40.0 | 17.6 | 7.1 | 8.2 | 0.0 |
| T | 96 | 95.8 | 100.0 | 96.9 | 100.0 | 56.3 | 89.6 | 84.4 | 13.5 | 13.5 | 0.0 |
| U | 77 | 97.4 | 90.9 | 40.3 | 1.3 | 16.9 | 55.8 | 44.2 | 37.7 | 0.0 | 0.0 |
| V | 72 | 100.0 | 95.8 | 44.4 | 59.7 | 83.3 | 63.9 | 63.9 | 25.0 | 18.1 | 1.4 |
| W | 50 | 88.0 | 74.0 | 30.0 | 4.0 | 4.0 | 26.0 | 26.0 | 10.0 | 0.0 | 0.0 |
| X | 65 | 95.4 | 98.5 | 66.2 | 64.6 | 36.9 | 46.2 | 36.9 | 18.5 | 1.5 | 0.0 |

CVS: Cardiovascular, ECG: Electrocardiogram

*Intermediate outcome of care measures*

The mean results of fasting glucose, systolic and diastolic blood pressure, cholesterol, creatinine, BMI and HbA1c are shown in Table 9.10. Differences in results related to gender are demonstrated. Women have significantly higher levels of systolic and diastolic blood pressure, total cholesterol and body mass index. Mean creatinine levels were significantly higher in men. Table 9.11 shows the achieved standards based on the targets used for the outcome of care scores (Section 4.4.5) and table 9.12 shows the results across the regions demonstrating wide variations of results.

***Table 9.10 Intermediate outcomes of care results***

| Outcome | n | Mean | Median | IQ range | Men | Women | p-value[1] | Lowest centre[2] | Highest centre[2] |
|---|---|---|---|---|---|---|---|---|---|
| Fasting glucose[3] (mmol/l) | 2071 | 10.2 | 9.9 | 3.7 | 10.1 | 10.3 | 0.07 | 8.3 | 12.1 |
| SBP (mmHg) | 2060 | 139.1 | 140 | 23.3 | 136.3 | 140.8 | <0.001 | 128.2 | 150.6 |
| DBP (mmHg) | 2059 | 80.5 | 80 | 10.1 | 79.5 | 81.1 | <0.001 | 73.8 | 87.8 |
| Total cholesterol[3] (mmol/l) | 1520 | 4.9 | 4.8 | 1.4 | 4.7 | 5.1 | <0.001 | 3.6 | 6.0 |
| Creatinine[3] (μmol/l) | 1027 | 85.0 | 79.6 | 14.0 | 90.1 | 81.8 | <0.001 | 71.5 | 108.0 |
| BMI (kg/m$^2$) | 819 | 27.9 | 27.6 | 5.7 | 26.3 | 29.1 | <0.001 | 22.8 | 32.0 |
| HbA1c (%) | 171 | 8.9 | 8.6 | 3.0 | 8.7 | 9.0 | 0.55 | x | x |

An average of each patient's results was calculated based on all measurements available.

[1] Using ANOVA

[2] Health centres with results for less than five patients for any measure excluded

[3] All results presented are plasma glucose, cholesterol and creatinine

IQ: Inter-quartile, SBP: Systolic blood pressure, DBP: Diastolic blood pressure, BMI: Body mass index

***Table 9.11 Achieved standards of outcomes of care***

| Outcome | Total | Standard | Percentage | n |
|---|---|---|---|---|
| Fasting glucose | 2071 | ≤ 7.8mmol/l (good control) | 20.8 | 431 |
| | | ≥11.1mol/l (poor control) | 34.6 | 717 |
| Blood pressure | 2059 | ≤140/80mmHg (good control) | 44.1 | 907 |
| | | ≥160/95mmHg (poor control) | 14.1 | 290 |
| Total cholesterol | 1520 | ≤5mmol/l | 55.9 | 851 |
| Body mass index | 819 | ≤25kg/m$^2$ | 29.8 | 244 |

*Table 9.12* ***Intermediate outcomes of care results by region***

| Region | n | Glucose (mmol/l) | | SBP (mmHg) | | DBP (mmHg) | | Cholesterol (mmol/l) | | Creatinine (µmol/l) | | BMI (kg/m²) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Mean | IQ range | Mean | IQ range | Mean | IQ range | Mean | IQ range | Mean | IQ range | Mean | IQ range |
| A | 96 | 10.2 | 3.5 | 138 | 30 | 82 | 12 | 5.5 | 1.7 | 76.2 | 25.5 | 29.0 | 7.1 |
| B | 75 | 10.6 | 4.2 | 142 | 20 | 85 | 9 | 5.3 | 1.4 | 80.1 | 18.4 | 30.2 | 9.0 |
| C | 99 | 10.6 | 3.6 | 132 | 20 | 79 | 6 | 5.2 | 1.5 | 83.6 | 29.5 | 28.8 | 6.9 |
| D | 75 | 9.9 | 3.3 | 138 | 25 | 80 | 14 | 5.1 | 1.1 | 81.1 | 30.5 | x | x |
| E | 93 | 10.0 | 3.8 | 140 | 19 | 80 | 9 | 5.0 | 1.2 | 93.8 | 17.0 | x | x |
| F | 84 | 10.8 | 4.3 | 138 | 29 | 80 | 13 | 4.8 | 1.5 | 80.4 | 17.0 | 27.1 | 7.5 |
| G | 88 | 11.3 | 3.5 | 146 | 19 | 84 | 9 | 5.8 | 1.1 | 83.3 | 25.4 | x | x |
| H | 87 | 10.4 | 4.1 | 132 | 18 | 77 | 9 | 5.3 | 1.5 | 74.3 | 24.6 | 30.0 | 6.5 |
| I | 90 | 9.7 | 3.1 | 137 | 26 | 80 | 11 | 4.0 | 1.5 | x | x | 26.9 | 8.5 |
| J | 97 | 10.0 | 3.2 | 133 | 23 | 78 | 15 | 4.7 | 1.4 | 85.5 | 30.9 | 26.1 | 5.5 |
| K | 87 | 10.3 | 3.5 | 146 | 28 | 86 | 11 | 4.7 | 1.0 | 84.0 | 17.5 | 27.7 | 6.2 |
| L | 95 | 9.7 | 3.9 | 143 | 19 | 81 | 6 | 4.9 | 1.2 | 81.4 | 30.6 | 26.8 | 6.3 |
| M | 71 | 9.1 | 3.2 | 149 | 20 | 86 | 10 | 4.7 | 1.7 | x | x | 31.3 | 6.6 |
| N | 94 | 9.2 | 2.9 | 133 | 22 | 77 | 9 | 4.2 | 0.9 | 87.7 | 17.9 | 25.0 | 6.8 |
| O | 100 | 10.7 | 5.1 | 134 | 28 | 79 | 10 | 4.5 | 1.3 | 103.9 | 44.8 | 24.5 | 6.7 |
| P | 100 | 11.3 | 5.0 | 136 | 25 | 79 | 9 | 5.1 | 1.2 | 81.2 | 24.0 | 28.2 | 6.9 |
| Q | 99 | 9.6 | 3.0 | 140 | 16 | 80 | 6 | 5.2 | 1.5 | 91.5 | 37.5 | 32.3 | 6.7 |
| R | 99 | 10.4 | 4.0 | 146 | 21 | 83 | 8 | 5.5 | 1.7 | 95.6 | 27.3 | 27.5 | 5.3 |
| S | 96 | 10.4 | 3.1 | 139 | 24 | 79 | 10 | 4.7 | 1.7 | 77.9 | 28.0 | 29.3 | 6.7 |
| T | 100 | 9.4 | 3.2 | 132 | 22 | 78 | 9 | 4.6 | 0.9 | 78.5 | 11.5 | 29.3 | 8.6 |
| U | 97 | 10.8 | 3.8 | 147 | 25 | 83 | 9 | 4.5 | 1.7 | 89.6 | 35.4 | 29.4 | 6.7 |
| V | 92 | 10.2 | 3.4 | 143 | 21 | 80 | 9 | 5.2 | 1.3 | 88.5 | 38.6 | 27.5 | 6.1 |
| W | 61 | 10.9 | 4.8 | 140 | 25 | 77 | 12 | 5.1 | 1.1 | 92.6 | 25.2 | 26.2 | 5.3 |
| X | 85 | 9.8 | 3.6 | 142 | 20 | 83 | 11 | 4.4 | 1.2 | 79.5 | 21.0 | 28.5 | 7.8 |

x - Results for less than five patients available

## 9.5 Longitudinal analysis

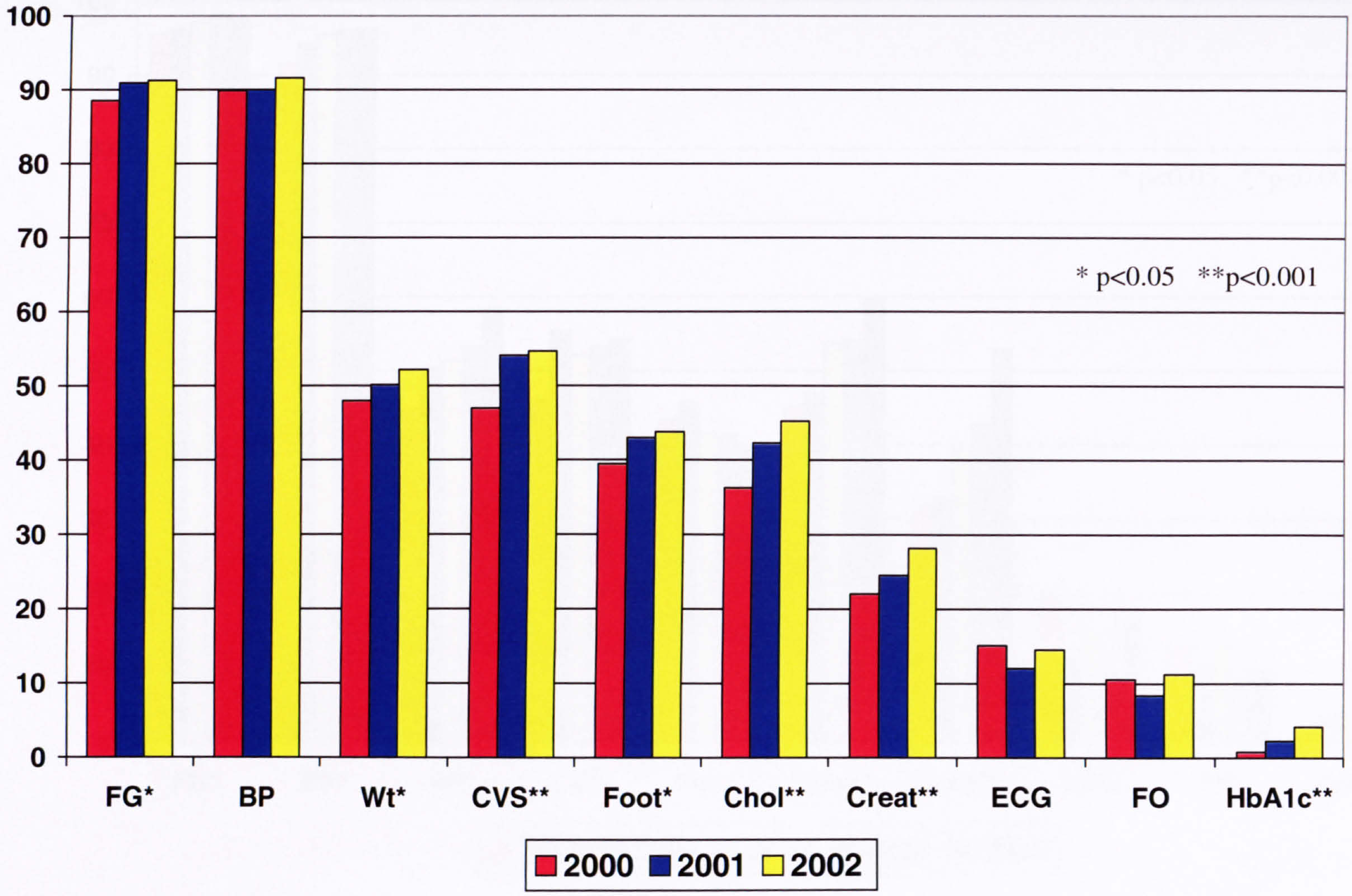
*Processes of care*

Comparisons of processes of care nationally (2000 to 2002) are shown in Figure 9.2 and for the subset of seven regions in the south (2000 to 2004) in Figure 9.3 (data presented in table form in Appendix 9.3). All of the process of care measures improved over the 3-year period with the exception of ECG and eye examinations. Cholesterol, creatinine, HbA1c and cardiovascular (CVS) examinations in particular showed highly significant improvements over the short time period. Over the longer time period in the southern cohort, most process measures continued to improve with the additional exceptions of the clinical examinations of the foot and CVS. The same trends of improved care are noted when only patients with type 2 diabetes are analysed (Appendix 9.3).

The process of care measures of the 940 patients who had visits to the health centre recorded in each consecutive year from 2000 to 2002 are shown in Figure 9.4 (data presented in table form in Appendix 9.3). These results are less impressive; only blood pressure, cholesterol and creatinine measurements show a significant improvement and electrocardiogram recording significantly fell during the three-year time period. 394 patients from the subset of seven regions had visits to the health centre recorded in each consecutive year from 2000 to 2004 and their process of care measures are shown in Figure 9.5 (data presented in table form in Appendix 9.3). Over the longer time period, only creatinine measurements continued to show a statistically significant improvement whereas the recording of four other processes significantly fell.

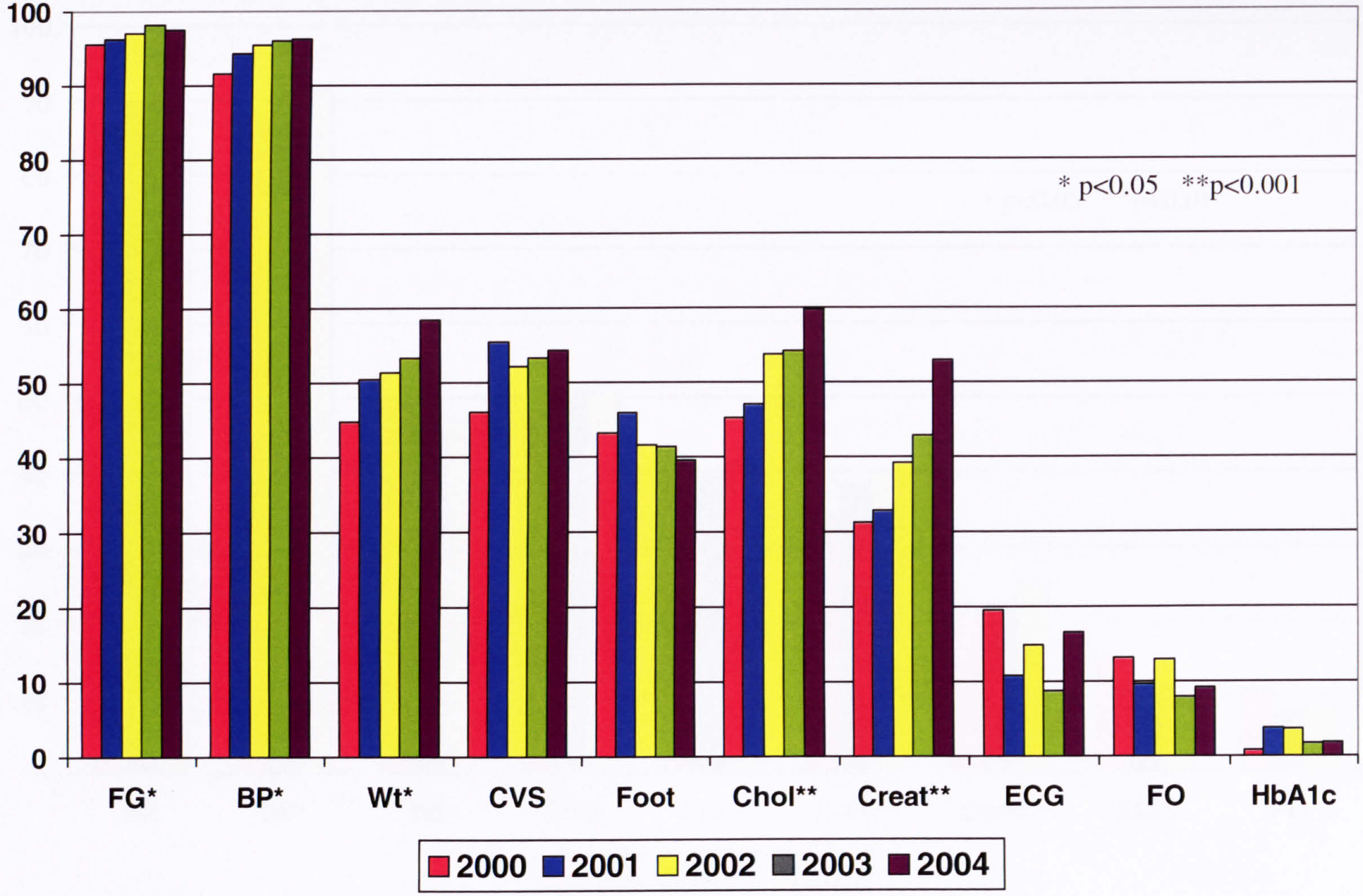
The data for patients with type 2 diabetes only are shown in Appendix 9.3 and show similar trends.

*Figure 9.2* ***Process measures performed each year (%) in the national cohort: 2000 to 2002***



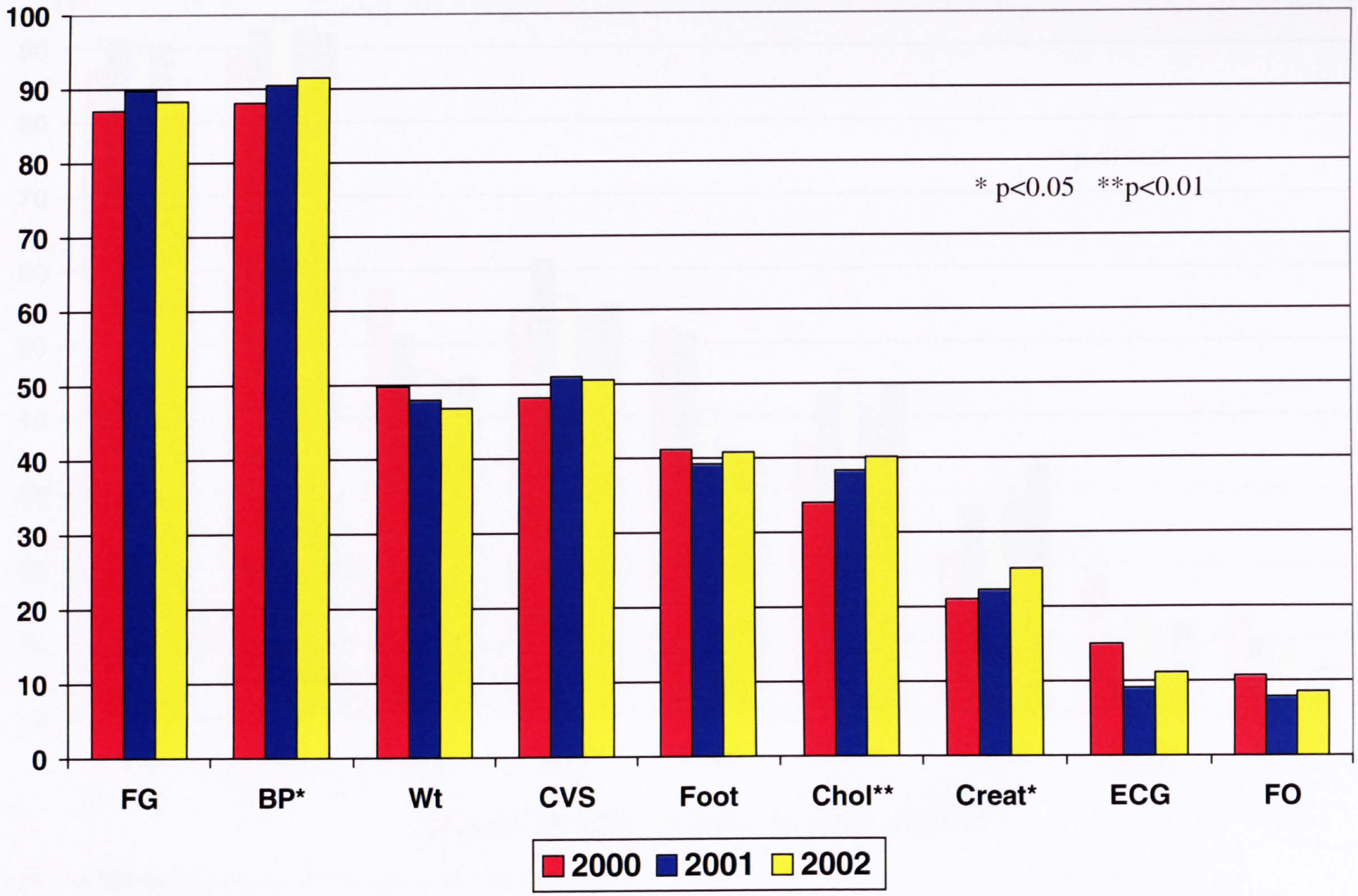
FG: Fasting glucose, BP: Blood pressure, Wt: Weight, CVS: Cardiovascular examination, ECG: Electrocardiogram, FO: Fundoscopy

*Figure 9.3 Process measures performed each year (%) in the southern cohort: 2000 to 2004*



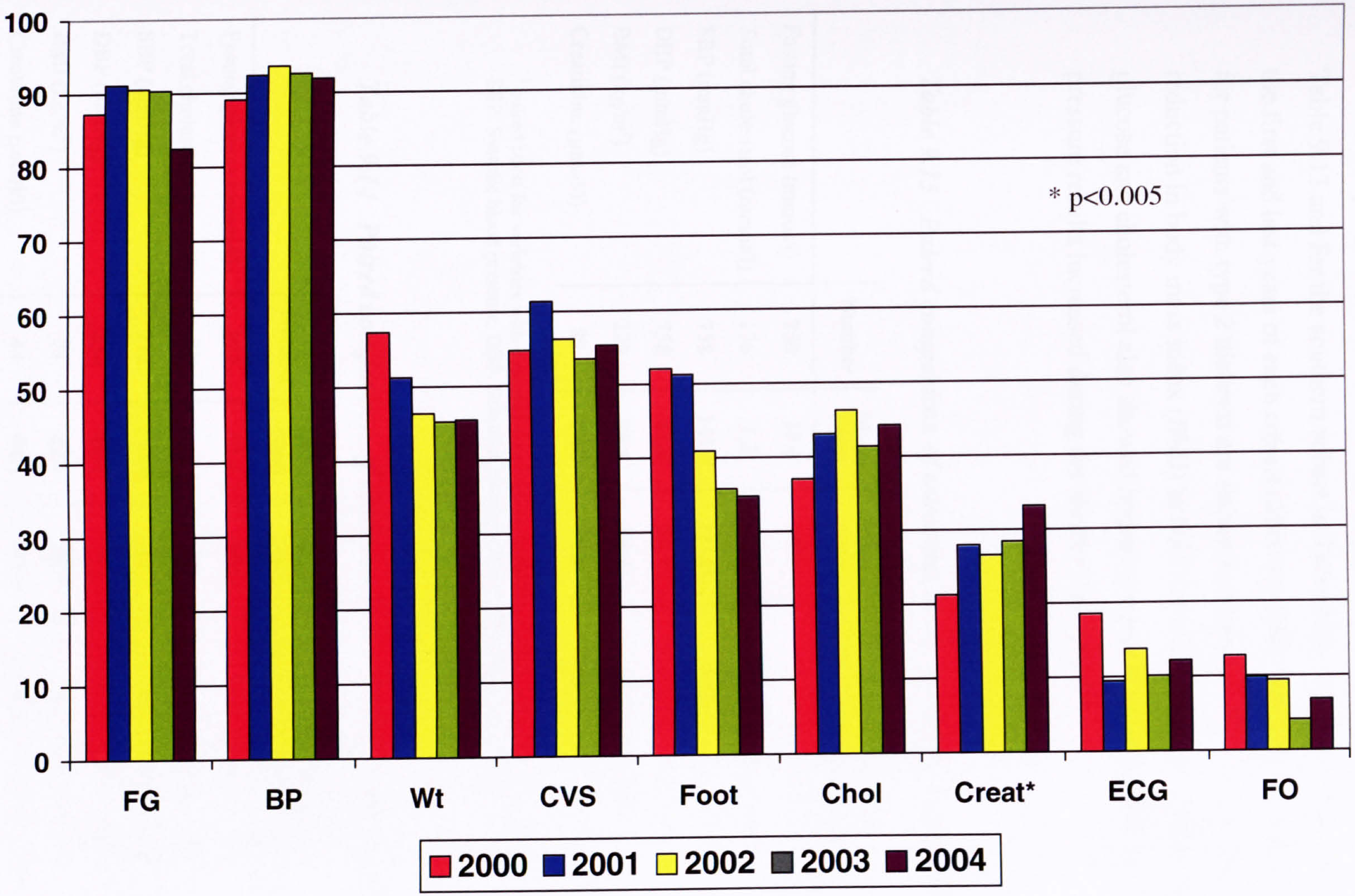
FG: Fasting glucose, BP: Blood pressure, Wt: Weight, CVS: Cardiovascular examination, ECG: Electrocardiogram, FO: Fundoscopy

*Figure 9.4* ***Process measures performed (%) in patients seen every year in the national cohort: 2000 to 2002.***



FG: Fasting glucose, BP: Blood pressure, Wt: Weight, CVS: Cardiovascular examination, ECG: Electrocardiogram, FO: Fundoscopy

*Figure 9.5* ***Process measure performed (%) in patients seen every year in the southern cohort: 2000 to 2004.***



FG: Fasting glucose, BP: Blood pressure, Wt: Weight, CVS: Cardiovascular examination, ECG: Electrocardiogram, FO: Fundoscopy

*Intermediate outcome of care measures*

Paired comparisons of outcomes of care from the national cohort are demonstrated in Table 9.13 and for the southern subset in Table 9.14, using patients with data from the first and last years of each cohort (2000 vs. 2002 and 2000 vs. 2004). The data for patients with type 2 diabetes are shown in Appendix 9.3. There was a significant reduction in body mass index (BMI) in both cohorts of patients. Mean fasting glucose and cholesterol also showed improvements. Creatinine and diastolic blood pressure results increased during the shorter time period.

***Table 9.13 Paired comparison of outcomes in the national cohort: 2000 and 2002***

| | Number | Mean 2000 | Mean 2002 | Mean difference (95% Confidence intervals) | t or z statistic | p-value[1] |
|---|---|---|---|---|---|---|
| Fasting glucose (mmol/l) | 750 | 10.4 | 10.1 | 0.31 (0.07 to 0.55) | t=2.56 | 0.011 |
| Total cholesterol (mmol/l) | 176 | 5.2 | 5.2 | 0.02 (-0.16 to 0.20) | t=0.24 | 0.81 |
| SBP (mmHg) | 758 | 141.7 | 141.6 | 0.06 (-1.16 to 1.27) | t=-0.17 | 0.86 |
| DBP (mmHg) | 758 | 81.0 | 81.7 | -0.74 (-1.48 to 0.00) | t=-2.21 | 0.028 |
| BMI (kg/m$^2$) | 222 | 28.8 | 28.3 | 0.49 (0.29 to 0.70) | t=4.70 | <0.001 |
| Creatinine (μmol/l) | 89 | 87.2 | 99.3 | -12.06 (-22.37 to −1.75) | z=-2.41 | 0.016 |

[1] paired t-test for variables with a normal distribution, otherwise Wilcoxon signed rank test
SBP: Systolic blood pressure, DBP: Diastolic blood pressure, BMI: Body mass index

***Table 9.14 Paired comparison of outcomes in the southern cohort: 2000 and 2004***

| | Number | Mean 2000 | Mean 2004 | Mean difference (95% Confidence intervals) | t or z statistic | p-value[1] |
|---|---|---|---|---|---|---|
| Fasting glucose (mmol/l) | 222 | 10.6 | 10.1 | 0.45 (-0.03 to 0.95) | t=1.83 | 0.07 |
| Total cholesterol (mmol/l) | 69 | 5.2 | 5.0 | 0.29 (0.03 to 0.55) | t=2.55 | 0.028 |
| SBP (mmHg) | 212 | 141.9 | 142.7 | -0.80 (-3.19 to 1.59) | t=-0.65 | 0.51 |
| DBP (mmHg) | 212 | 80.1 | 79.6 | 0.49 (-0.82 to 1.80) | t=0.73 | 0.46 |
| BMI (kg/m$^2$) | 78 | 29.1 | 28.7 | 0.42 (0.06 to 0.77) | t=2.34 | 0.022 |
| Creatinine (μmol/l) | 44 | 94.0 | 101.0 | -7.03 (-19.28 to 5.22) | z=-0.68 | 0.49 |

[1] paired t-test for variables with a normal distribution, otherwise Wilcoxon signed rank test
SBP: Systolic blood pressure, DBP: Diastolic blood pressure, BMI: Body mass index

Similar results were seen using the cohort of patients who had data available for each consecutive year (Tables 9.15 and 9.16; data for type 2 patients in Appendix 9.3). In this cohort, fasting glucose as well as BMI reduced significantly in both groups. Diastolic blood pressure increased significantly in the national cohort but conversely, improved significantly in type 2 patients in the southern subset.

***Table 9.15 Trend of outcomes in the national cohort: 2000 to 2002***

| | Number | Mean 2000 | Mean 2001 | Mean 2002 | f statistic | p-value[1] |
|---|---|---|---|---|---|---|
| Fasting glucose (mmol/l) | 721 | 10.4 | 10.2 | 10.1 | 6.65 | 0.010 |
| Total cholesterol (mmol/l) | 102 | 5.3 | 5.3 | 5.3 | 0.01 | 0.93 |
| SBP (mmHg) | 761 | 141.0 | 143.0 | 141.4 | 0.55 | 0.46 |
| DBP (mmHg) | 761 | 80.7 | 82.1 | 81.5 | 4.89 | 0.027 |
| BMI ($kg/m^2$) | 224 | 28.5 | 28.4 | 28.0 | 20.78 | <0.001 |
| Creatinine (μmol/l)[2] | 58 | 89.1 | 86.7 | 99.4 | 2.52 | 0.12 |

[1] ANOVA test for repeated measures
[2] logarithmic transformation made
SBP: Systolic blood pressure, DBP: Diastolic blood pressure, BMI: Body mass index

***Table 9.16 Trend of outcomes in the southern cohort: 2000 to 2004***

| | Number | Mean 2000 | Mean 2001 | Mean 2002 | Mean 2003 | Mean 2004 | f statistic | p-value[1] |
|---|---|---|---|---|---|---|---|---|
| Fasting glucose (mmol/l) | 193 | 10.5 | 10.4 | 10.1 | 9.9 | 10.1 | 4.15 | 0.043 |
| Total cholesterol (mmol/l) | 23 | 5.5 | 5.4 | 5.4 | 5.1 | 5.5 | 1.32 | 0.26 |
| SBP (mmHg) | 191 | 142.2 | 144.1 | 142.5 | 142.1 | 142.6 | 0.13 | 0.71 |
| DBP (mmHg) | 191 | 80.2 | 80.9 | 80.5 | 79.3 | 79.7 | 2.48 | 0.12 |
| BMI ($kg/m^2$) | 59 | 30.2 | 30.4 | 29.9 | 30.0 | 29.8 | 6.54 | 0.013 |
| Creatinine (μmol/l)[2] | 19 | 89.9 | 84.7 | 93.8 | 92.32 | 87.3 | 0.35 | 0.56 |

[1] ANOVA test for repeated measures
[2] logarithmic transformation made
SBP: Systolic blood pressure, DBP: Diastolic blood pressure, BMI: Body mass index

*Changes in medication prescribing*

Changes in prescribing of medications between 2000 and 2002 in the national cohort and 2000 and 2004 in the southern cohort are shown in Tables 9.17 and 9.18. Highly significant increases in prescribing of ACE inhibitors were noted in both cohorts and for lipid-lowering medications in the national cohort.

***Table 9.17 Prescribing trends in the national cohort, 2000 to 2002***

| Treatment (%) | 2000 *(n=877)* | 2001 *(n=1197)* | 2002 *(n=1433)* | p – value[1] |
|---|---|---|---|---|
| Diet only | 2.4 | 2.6 | 3.2 | 0.22 |
| Oral hypoglycaemic agents | 91.3 | 91.0 | 89.9 | 0.24 |
| Insulin | 9.5 | 11.1 | 12.4 | 0.030 |
| Anti-hypertensive agents | 48.2 | 49.4 | 49.4 | 0.60 |
| ACE inhibitor | 1.9 | 4.9 | 7.8 | <0.001 |
| Lipid lowering agents | 8.5 | 11.9 | 14.7 | <0.001 |

[1] Chi-squared test for trend

***Table 9.18 Prescribing trends in the southern cohort, 2000 to 2004***

| Treatment (%) | 2000 *(n=230)* | 2001 *(n=334)* | 2002 *(n=394)* | 2003 *(n=423)* | 2004 *(n=458)* | p – value[1] |
|---|---|---|---|---|---|---|
| Diet only | 3.3 | 3.6 | 3.5 | 2.1 | 1.3 | 0.07 |
| Oral hypoglycaemic agents | 88.7 | 88.9 | 88.6 | 87.0 | 85.8 | 0.27 |
| Insulin | 11.7 | 14.4 | 15.0 | 16.1 | 16.8 | 0.07 |
| Anti-hypertensive agents | 49.2 | 52.4 | 50.8 | 55.8 | 56.8 | 0.06 |
| ACE inhibitor | 5.8 | 8.9 | 12.5 | 22.7 | 25.8 | <0.001 |
| Lipid lowering agents | 10.4 | 13.2 | 16.0 | 15.1 | 14.2 | 0.15 |

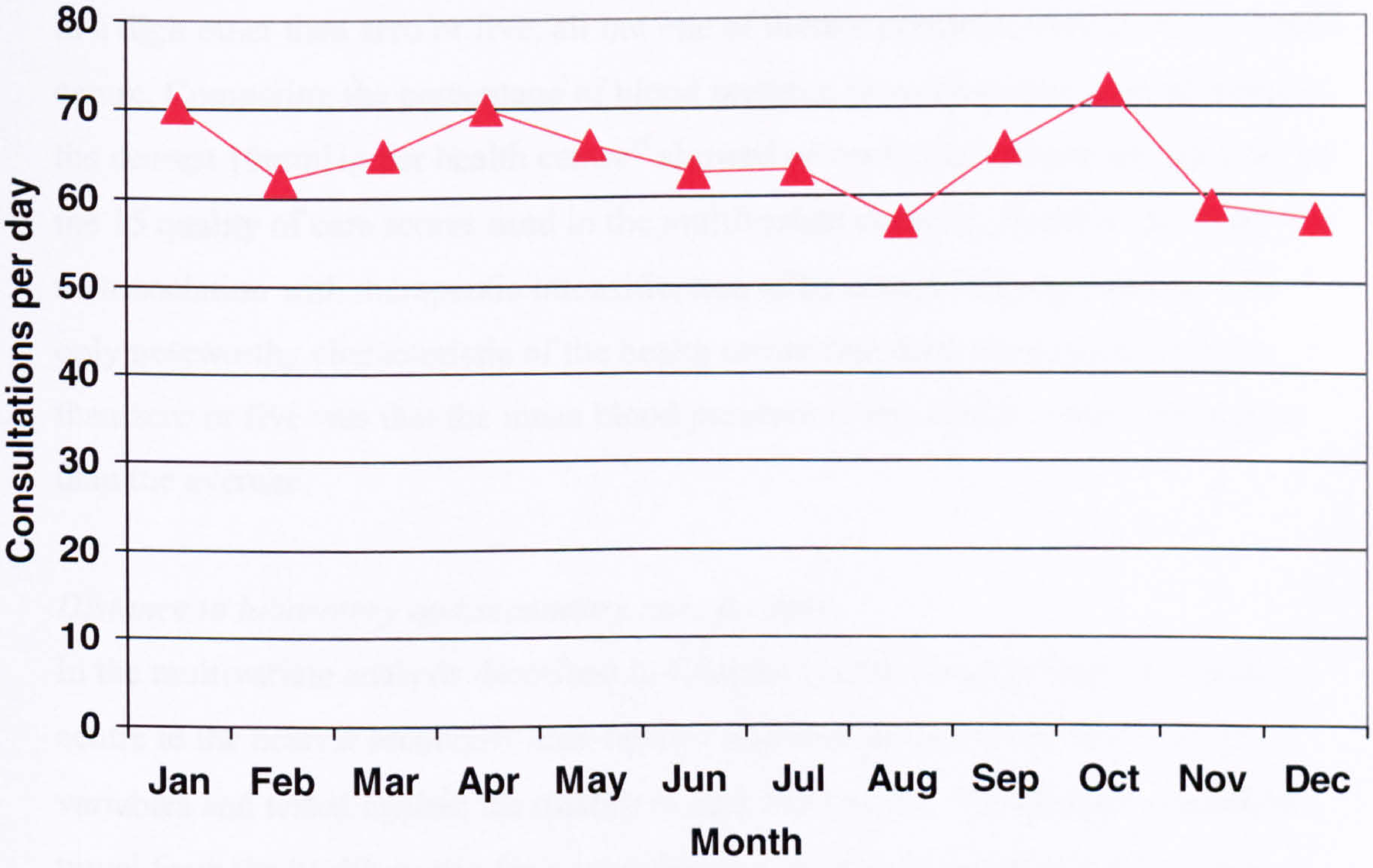
[1] Chi-squared test for trend

## 9.6 Additional analyses

*Seasonal variation of attendance*

The number of visits made by patients per month, using all visits by the 2160 patients recorded in 2000 to 2004, was calculated. Figure 9.6 demonstrates the number of visits per day per month to account for the variable number of days in a month. Clear dips in number of consultations can be seen in the colder winter months (November and December) and the hottest summer month (August).

***Figure 9.6 Number of consultations per month***



*Influence of Ramadan on attendance and outcomes*

Based on the 23,374 consultations made by the 2160 patients, 1,657 (7.1%) consultations were made during the 30-day months of Ramadan in 2000 to 2004, compared to an expected number of 1,920 (8.2%) ($p<0.001$, chi-squared test). The mean level of fasting glucose recorded during the months of Ramadan was 10.7mmol/l (n=1,115), significantly higher than the mean level recorded in the other 11 months of 10.2mmol/l (n=14,736) ($p<0.001$, ANOVA). Mean levels of systolic and diastolic blood pressure, total cholesterol, creatinine and HbA1c were not significantly different during Ramadan compared to the rest of the year. These analyses have not had confounding factors excluded, such as patients' age, sex, type of diabetes and health centre. The analyses could have been conducted using multiple linear regression to exclude these factors. In addition, further analysis studying the time of the blood test during the month of Ramadan might provide further insights into the effect of fasting on glycaemic control.

*Terminal digital preference*

Of the 36,190 systolic and diastolic blood pressure recordings included in the study, 34,948 (96.6%) were rounded up or down to the nearest 10mmHg. 1,189 (3.3%) recordings were rounded to the nearest 5mmHg. Only 53 recordings (0.15%) ended in a digit other than zero or five; all but one of these recordings were from one health centre. Comparing the percentage of blood pressure recordings that were rounded to the nearest 10mmHg per health centre[vi] showed no statistical correlation with any of the 15 quality of care scores used in the multivariate analysis; in particular there was no association with therapeutic intensification of treatment of hypertension. The only noteworthy characteristic of the health centre that used terminal digits other than zero or five was that the mean blood pressure at this health centre was higher than the average.

*Distance to laboratory and secondary care facilities*

In the multivariate analysis described in Chapter 10, the distance from the health centre to the nearest secondary care facility was used as one of the explanatory variables and tested against the quality of care indicators. The distance needed to travel from the health centre for a specific examination or analysis (fundoscopy, electrocardiogram, creatinine and cholesterol measurement) was also tested against the uptake of that measurement per health centre among the patients seen in the preceding year. None of the four measurements showed a significant relationship between the distances the patients had to travel from the health centre to undertake a test, and the uptake of that test.

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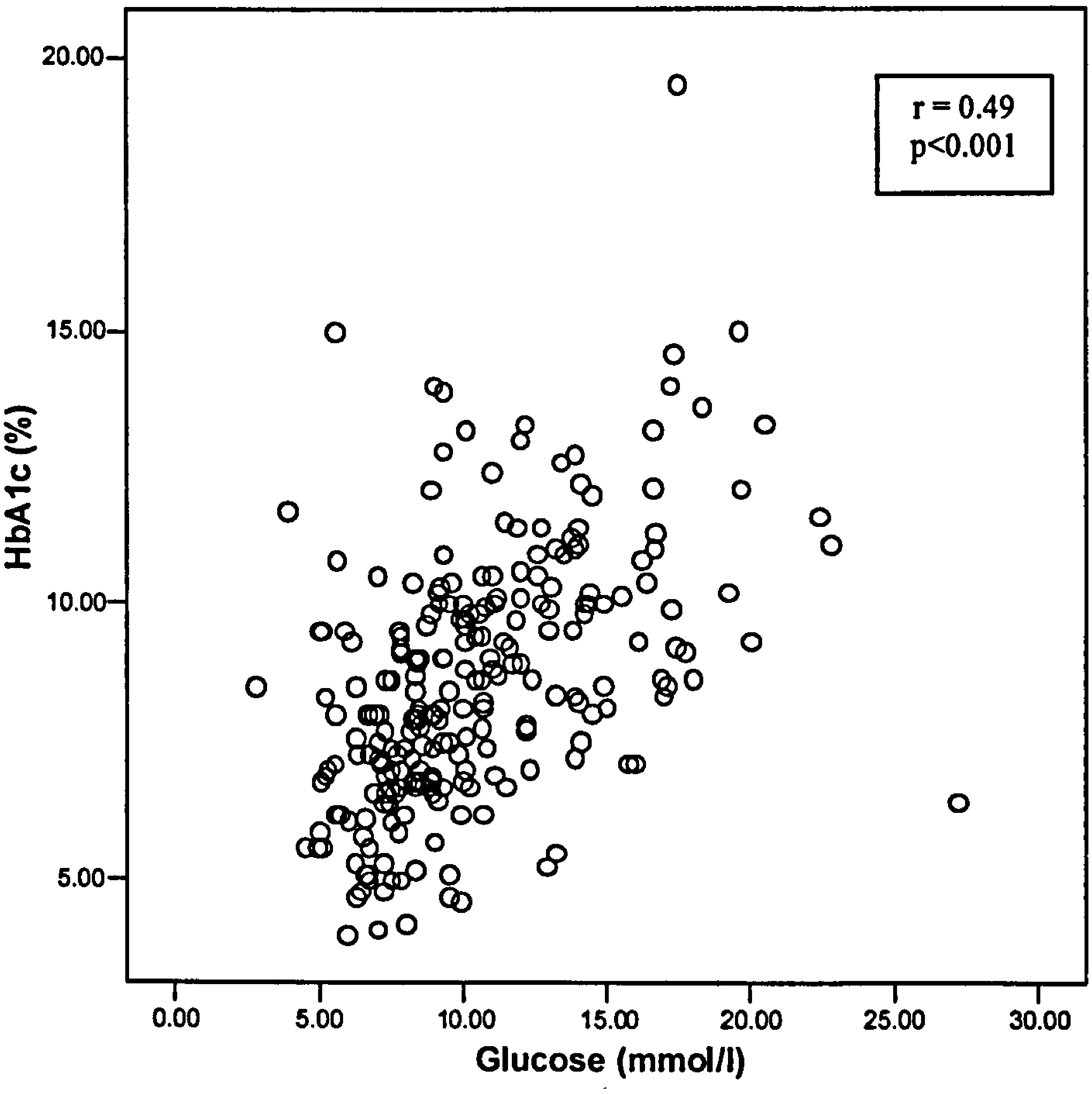
[vi] Percentage of blood pressure recordings rounded to the nearest 10mmHg per centre was not normally distributed so it was converted into a simple categorical variable consisting of centres with high and low percentages. ANOVA was used for the statistical comparison with the quality indicators.

*Fasting glucose correlation with HbA1c.*

Measurements of both fasting glucose and HbA1c were recorded in 244 consultations. Figure 9.7 shows the correlation between the measurements (Pearson correlation 0.49, p<0.001). The model to predict HbA1c including fasting glucose (FG) was expressed by the equation HbA1c = 0.295FG + 5.546. Thus the targets of fasting glucose used in the outcome of care scores of <=7.8mmol (good control) and >=11.1mmol/l (poor control) correspond to HbA1c levels of 7.9 and 8.8 respectively.

***Figure 9.7 Correlation of fasting glucose and HbA1c values***



## 9.7 Summary

Details of the 2160 patients and 48 randomly selected health centres are shown. Wide variations of the patient and health centre variables between health centres are demonstrated. Standards of care based on processes and intermediate outcomes of care also show striking variations between health centres and across regions. Significant improvements appear to have occurred in some processes and intermediate outcomes of care since 2000. In addition to describing in detail the care of patients with diabetes in primary care, the quantitative data has been used to analyse the factors that may be influencing care and causing the apparent improvements in care, as shown in the following chapter.

# Chapter 10: Multivariate analysis of factors associated with the quality of care

## 10.1 Introduction

This final results chapter presents the results of the multivariate analysis of factors associated with the quality of care of patients with diabetes managed in primary care in Tunisia, the last objective of the study. The results of testing 57 potential factors (listed in Tables 4.1 – 4.3) associated with quality of care indicators based on processes, outcomes and prescribed medications are presented.

## 10.2 Patient selection

Three different groups of patients were used for the multivariate analysis:

1. Patients who had attended a health centre for review of their diabetes at least once in the previous year (n=1899, 87.9%). This data set was used for the process of care analyses.
2. Patients who had at least one recording of an intermediate outcome of care measurement used in the outcome of care score (i.e. fasting glucose, blood pressure, cholesterol or BMI (n=2135, 98.9%)). This data set was used for the outcome of care analyses.
3. All patients (n=2160). This data set was used for the medication analyses.

Comparison of patient characteristics of the three groups showed no significant differences.

## 10.3 Quality of care indicators

The 15 quality of care indicators used in the study are based on processes of care (four cumulative scores), intermediate outcomes of care (two cumulative scores and mean results of four variables) and medication prescribing (five indicators) as described in Section 4.4.5.

### 10.3.1 Process and outcome of care scores

Four process of care scores and two intermediate outcome of care scores were used as quality indicators and their mean scores, standard deviations and ranges are shown in Table 10.1. All scores were normally distributed. Results of Cronbach's alpha test for reliability were high for the process scores and low for the outcome scores, as shown in Table 10.1.

The regional distributions of both process and outcome scores are shown in Table 10.2 showing wide variations across the 24 regions of Tunisia.

***Table 10.1 Quality of care scores***

| Score | n | Mean | SD | Lowest[1] | Highest[1] | Cronbachs |
|---|---|---|---|---|---|---|
| **Process of care scores (n=1899)** | | | | | | |
| NWPOC: Non-weighted process of care score | 10 | 4.48 | 2.22 | 0.61 | 8.30 | 0.839 |
| WPOC: Weighted process of care score | 16 | 9.89 | 3.18 | 2.46 | 14.24 | 0.808 |
| ClinPOC: Clinical process of care score | 4 | 2.45 | 1.33 | 0.46 | 3.96 | 0.812 |
| RefPOC: Referral process of care score | 6 | 2.03 | 1.37 | 0.15 | 4.35 | 0.794 |
| **Intermediate outcome of care scores (n=2135)** | | | | | | |
| 4vOOC: Four variable outcome of care score | 4 | 1.48 | 1.15 | 0.64 | 2.45 | 0.584 |
| 2vOOC: Two variable outcome of care score | 4 | 2.93 | 1.70 | 1.65 | 3.88 | 0.290 |

n=maximum score (number of variables used to calculate the score with the exception of WPOC in which fasting glucose and blood pressure measurement were both given scores of four rather than one)

[1] Lowest and highest scores per health centre

SD: standard deviation

NWPOC: Non-weighted process of care score is the proportion of 10 measures patients have had undertaken in the preceding 12 months.

WPOC: The weighted process of care score assigns a weight of four to blood pressure and fasting glucose measurements and one to the other eight measures.

ClinPOC: Clinical process of care score is the proportion of four clinical measures patients have had undertaken in the preceding 12 months.

RefPOC: Referral process of care score is the proportion of six measures requiring referral, patients have had undertaken in the preceding 12 months.

4vOOC: 4 variable outcome of care score is based on achieving a target for fasting glucose, blood pressure, total cholesterol and body mass index.

2vOOC: 2 variable outcome of care is based on achieving low and high targets for blood pressure and fasting glucose only.

*Table 10.2 Regional process and outcome scores*

| Region | NWPOC score (Max. 10) | WPOC score (Max. 16) | 4vOOC score (Max. 4) | 2vOOC score (Max. 4) | Date of data collection[1] |
|---|---|---|---|---|---|
| A | 3.38 | 8.51 | 1.20 | 3.28 | Nov 2002 |
| B | 4.82 | 10.50 | 1.00 | 2.52 | Dec 2002 |
| C | **6.53** | 12.09 | 1.64 | 2.80 | Feb 2003 |
| D | 4.63 | 10.46 | 1.52 | 3.36 | Mar 2003 |
| E | 3.92 | 8.82 | 1.56 | 3.28 | May 2003 |
| F | 5.00 | 10.70 | 1.64 | 2.80 | June 2003 |
| G | 2.82 | 8.26 | **0.76** | 2.96 | July 2003 |
| H | 5.04 | 10.84 | 1.56 | 3.40 | Nov 2003 |
| I | 2.98 | 8.15 | 1.68 | 3.40 | Dec 2003 |
| J | 4.08 | 9.68 | 1.80 | 3.08 | Jan 2004 |
| K | 5.05 | 10.14 | 1.52 | **2.00** | Feb 04/Jun 05 |
| L | 3.10 | 8.06 | 1.40 | 3.04 | Mar 2004 |
| M | 2.69 | **6.47** | 0.92 | 3.12 | April 2004 |
| N | 3.57 | 8.77 | 2.12 | **3.84** | May 2004 |
| O | 3.60 | 7.55 | 1.88 | 3.08 | June 2004 |
| P | 6.35 | 12.19 | 1.48 | 2.20 | July 2004 |
| Q | 6.23 | 12.13 | 1.36 | 3.04 | Dec 2004 |
| R | 5.93 | 11.76 | 1.04 | 2.00 | Jan 2005 |
| S | 3.12 | 8.98 | 1.48 | 3.04 | Feb 2005 |
| T | 6.50 | **12.38** | **2.20** | 3.16 | Mar 2005 |
| U | 3.84 | 9.49 | 1.32 | 2.24 | Apr 2005 |
| V | 5.56 | 11.43 | 1.24 | 2.68 | May 2005 |
| W | **2.62** | 7.48 | 1.40 | 3.24 | June 2005 |
| X | 4.65 | 10.46 | 1.52 | 3.04 | July 2005 |

Outcome scores: n=2135. Process scores: n=1899.
Highest and lowest scores are highlighted
[1] Date of data collection has been included in the table because time was shown to be a confounding factor (scores improved over time).

### 10.3.2 Intermediate outcomes of care

Mean fasting glucose, systolic and diastolic blood pressure and total cholesterol were used as quality indicators. The mean fasting glucose per centre correlated closely with the mean total cholesterol (p=0.003) but neither of these variables correlated well with the systolic or diastolic blood pressure. As expected, there was a very high correlation between systolic and diastolic blood pressure ($p<0.001$). Mean results are shown in the previous chapter in Table 9.10.

### 10.3.3 Medication indicators

Five quality of care indicators were calculated based on medication prescribing. The average and range of results per centre are shown in Table 10.3.

*Table 10.3 Overall results of quality indicators based on medication prescribing*

| Outcome Measure | % | n | Lowest HC (%) | Highest HC (%) |
|---|---|---|---|---|
| **Therapeutic Intervention of BP:** Proportion of visits with uncontrolled BP[1] where therapy was increased or started. | 14.5 | 982/6759 | 2.7 | 42.1 |
| **Therapeutic Intervention of FG:** Proportion of visits with uncontrolled FG[2] where therapy was increased or started. | 14.3 | 1150/8047 | 1.2 | 26.0 |
| **ACE-I prescribing:** Proportion of patients on anti-hypertensive agents, being prescribed ACE-I. | 32.2 | 350/1087 | 0 | 96.1 |
| **BP prescribing:** Proportion of patients with hypertension[3] on any anti-hypertensive medication. | 78.0 | 543/696 | 55.0 | 96.1 |
| **LLM prescribing:** Proportion of patients with hypercholesterolaemia[4] prescribed LLM. | 40.2 | 70/174 | 0 | 100 |

Definitions: [1]Blood pressure ≥165/90, [2]Fasting glucose ≥11.1mmol/l, [3]Blood pressure >140/80, [4]Total cholesterol ≥5mmol/l
BP: Blood pressure, FG: Fasting glucose, ACE-I: Ace-inhibitor agents, HC: Health centre, LLM: Lipid-lowering medication.

## 10.4 Multilinear regression modelling

Univariate analysis demonstrated a potential association ($p<0.15$) between 15 and 17 of the 57 explanatory factors with the two total cumulative process of care scores respectively (NWPOC, WPOC) as shown in Table 10.4. Similar analysis of the outcome of care scores demonstrated potential associations with 13 (4vOOC) and 11 (2vOOC) of the explanatory factors (Table 10.5). The results of univariate analyses of the other 11 indicators are shown in Appendix 10.1.

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### *Table 10.4 Univariate analysis of explanatory variables with the two cumulative process of care scores*

(only variables significantly associated with at least one of the scores are shown)

| Explanatory Variable | NWPOC | | | WPOC | | |
|---|---|---|---|---|---|---|
| | *ß co-efficient | 95% CI | p-value | *ß co-efficient | 95% CI | p-value |
| *Patient factors* | | | | | | |
| Type 1 diabetes[1] | 3.86 | 0.28 to 7.44 | 0.036 | 4.70 | -0.06 to 9.46 | 0.053 |
| Family history of diabetes | 0.02 | -0.00 to 0.04 | 0.062 | 0.03 | 0.00 to 0.06 | 0.046 |
| No formal education | -0.02 | -0.05 to 0.01 | 0.110 | -0.02 | -0.06 to 0.1 | 0.144 |
| Insulin treatment | -0.02 | -0.06 to 0.01 | 0.19 | -0.04 | -0.08 to 0.01 | 0.145 |
| Punctuality of attendance | 0.05 | 0.02 to 0.08 | 0.004 | 0.07 | 0.03 to 0.11 | 0.002 |
| Adherence to treatment[2] | 5.69 | | 0.022 | 4.93 | | 0.033 |
| *Health professional factors* | | | | | | |
| Motivation of clinicians[2] | 8.90 | | 0.001 | 8.03 | | 0.001 |
| Time commitment of clinicians | 0.81 | 0.06 to 1.57 | 0.034 | 1.15 | 0.17 to 2.14 | 0.023 |
| Presence of a nutritionist[2] | 1.83 | | 0.18 | 2.90 | | 0.095 |
| *Organisational factors* | | | | | | |
| Development of health centre[2] | 2.65 | | 0.046 | 2.87 | | 0.034 |
| Regional affluence | 0.15 | 0.00 to 0.31 | 0.044 | 0.27 | 0.07 to 0.46 | 0.008 |
| Presence of DSMR[2] | 10.76 | | 0.002 | 9.91 | | 0.003 |
| Presence of disease register[2] | 7.98 | | 0.007 | 9.23 | | 0.004 |
| Use of patient held records[2] | 4.14 | | 0.052 | 4.23 | | 0.049 |
| Adherence to chronic disease clinics[2] | 14.00 | | 0.001 | 14.28 | | <0.001 |
| Use of chronic disease clinics | 0.04 | 0.02 to 0.07 | 0.003 | 0.05 | 0.02 to 0.09 | 0.004 |
| Equipment: glucometer[2] | 3.27 | | 0.078 | 3.86 | | 0.056 |

* Or F statistic for categorical variables analysed using one-way analysis of variance (ANOVA)

[1] Logarithmic transformation used for these variables.

[2] ANOVA used for these variables (all others use linear regression)

Significance was set at 0.15 to include all potential associations in the subsequent multivariate analyses.

All analyses were weighted for the number of patients per centre (using the WLS option in SPSS).

CI: Confidence interval, DSMR: Disease-specific medical records.

NWPOC: Non-weighted process of care score is the proportion of 10 measures patients have had undertaken in the preceding 12 months.

WPOC: The weighted process of care score assigns a weight of four to blood pressure and fasting glucose measurements and one to the other eight measures.

### *Table 10.5* ***Univariate analysis of explanatory variables with the outcome of care scores***

(only variables significantly associated with at least one of the scores are shown)

| | 4vOOC | | | 2vOOC | | |
|---|---|---|---|---|---|---|
| **Explanatory Variable** | *ß co-efficient | 95% CI | p-value | *ß co-efficient | 95% CI | p-value |
| *Patient factors* | | | | | | |
| Age | -0.01 | -0.02 to 0.00 | <0.001 | -0.007 | -0.01 to 0.00 | 0.030 |
| Male gender | 0.004 | 0.001 to 0.006 | 0.003 | 0.001 | -0.001 to 0.003 | 0.22 |
| Family history of diabetes | 0.001 | 0.00 to 0.002 | 0.110 | 0.001 | 0.00 to 0.001 | 0.110 |
| Distance reside from health centre[2] | 0.81 | | 0.37 | 2.22 | | 0.143 |
| Insulin treatment | 0.003 | 0.001 to 0.004 | 0.003 | 0.001 | -0.001 to 0.002 | 0.37 |
| Associated illness: CVD[1] | 0.27 | 0.02 to 0.51 | 0.033 | 0.18 | -0.04 to 0.41 | 0.104 |
| Associated illness: RD[1] | 0.24 | -0.06 to 0.54 | 0.109 | 0.04 | -0.25 to 0.32 | 0.79 |
| Associated illness: DYS[1] | 0.42 | 0.09 to 0.75 | 0.014 | 0.31 | 0.00 to 0.62 | 0.053 |
| *Health professional factors* | | | | | | |
| Number of clinicians | -0.02 | -0.04 to 0.00 | 0.17 | -0.01 | -0.03 to 0.00 | 0.141 |
| Presence of a nutritionist[2] | 1.49 | | 0.23 | 3.28 | | 0.077 |
| *Organisational factors* | | | | | | |
| Development of health centre[2] | 1.55 | | 0.21 | 1.99 | | 0.113 |
| Regional affluence | 0.01 | 0.00 to 0.02 | 0.018 | 0.00 | 0.00 to 0.01 | 0.25 |
| Total number of patients[1] | 423 | 36 to 812 | 0.033 | 183 | -140 to 506 | 0.26 |
| Presence of DSMR[2] | 3.89 | | 0.055 | 2.68 | | 0.109 |
| Completion of DSMR | 0.008 | -0.002 to 0.017 | 0.100 | 0.007 | -0.001 to 0.014 | 0.086 |
| Availability of medication[2] | 2.95 | | 0.043 | 0.47 | | 0.71 |
| Affluence of all patients | 0.003 | 0.001 to 0.005 | 0.002 | 0.001 | -0.001 to 0.002 | 0.23 |
| Patient education sessions[2] | 2.01 | | 0.17 | 3.97 | | 0.056 |

* Or F statistic for categorical variables analysed using one-way analysis of variance (ANOVA)

[1] Logarithmic transformation used for these variables.

[2] ANOVA used for these variables (all others use linear regression)

Significance was set at 0.15 to include all potential associations in the subsequent multivariate analyses.

All analyses were weighted for the number of patients per centre (using the WLS option in SPSS).

CI: Confidence interval, CVD: Cardiovascular disease, RD: Renal disease, DYS: Dyslipidaemia, DSMR: Disease-specific medical records.

4vOOC: 4 variable outcome of care score is based on achieving a target for fasting glucose, blood pressure, total cholesterol and body mass index.

2vOOC: 2 variable outcome of care is based on achieving low and high targets for blood pressure and fasting glucose only.

All regression analyses were weighted for the number of patients per centre. For each indicator, the explanatory variables with a p value of <0.15 were analysed in three intermediate multivariate models grouped into patient, health professional and organisational variables, including time of clinic visit as a potential confounding factor in all analyses and weighing for the number of patients per centre.. The three intermediate models for each of the fifteen indicators are available for review in Appendix 10.1. All explanatory variables with a p value of <0.15 in the intermediate models were then included in a final multivariate model for each quality indicator.

### 10.4.1 Process of care indicators

The final multivariate models for the process of care indicators are demonstrated in Table 10.6; the final models explained 71.3% (NWPOC), 62.7% (WPOC), 33.1% (ClinPOC) and 51.1% (RefPOC) of the variations in scores. The explanatory variables significantly and independently associated with higher process of care scores are regional affluence, clinician motivation and adherence to chronic disease clinics. Other less significant factors are a family history of diabetes, punctuality of attendance at the health centre, the use of patient-held records and the presence of a nutritionist.

### 10.4.2 Outcome of care indicators

The final multivariate models for the outcome of care indicators are demonstrated in Table 10.7; the final models explained 64.4% (4vOOC), 55.9% (2vOOC), 27.3% (mean fasting glucose), 81.3% (mean systolic blood pressure), 41.0% (mean diastolic blood pressure) and 52.1% (mean cholesterol) of the variations in scores. Younger age and availability of medication are significantly and independently related to higher outcomes of care scores. Other less significant factors related to the cumulative scores are a lower number of patients at the health centre, presence and completion of the new medical records, male gender and presence of a nutritionist. A large number of factors were related to lower mean levels of the individual outcome variables; patient factors such as younger age, male gender, higher schooling level and associated dyslipidaemia; health professional factors such as lower number of clinicians, clinician motivation and gender and the presence of a nutritionist; and organisational factors such as a longer distance to secondary care, presence of the new medical records, less developed health centres with less frequent clinics, the availability of medication, the use of patient education sessions and the presence of a glucometer.

### 10.4.3 Medication indicators

The final multivariate models for the medication indicators are demonstrated in Table 10.8; the final models explained 48.3% (therapeutic intensification of anti-hypertensive agents), 61.8% (therapeutic intensification of oral glycaemic agents), 63.6% (use of ACE inhibitors), 53.4% (use of anti-hypertensive agents) and 28.2% (use of lipid-lowering agents) of the variations in scores. A number of explanatory variables were associated with the drug therapy indicators. Only a negative association with doctor training was associated with more than two of the five indicators. Most of the factors significantly and independently related to individual medication indicators are reported above as also associated with the process and/or outcome indicators (family history of diabetes, higher schooling level, punctuality at clinic appointments and patient education sessions).

***Table 10.6 Final multivariate regression models of factors associated with process of care indicators***

All factors are positively associated with higher process of care scores (i.e. higher quality of care)

| Independent variable | Factor | ß coefficient (standardised) | 95% CI | p-value |
|---|---|---|---|---|
| **Non-weighted process of care score (NWPOC)** | | | | |
| Motivation of clinicians | H P | 0.55 | -0.05 to 2.21 | 0.06 |
| Regional affluence | Org | 0.51 | -0.07 to 0.54 | 0.11 |
| Adherence to CDCs | Org | 0.17 | -0.04 to 0.06 | 0.59 |
| Punctuality of attendance | Pat | - 0.10 | 0.08 to -0.06 | 0.73 |
| Use of patient held records | Org | 0.05 | -1.45 to 1.78 | 0.82 |
| Type 1 diabetes[1] | Pat | -0.03 | -6.58 to 7.50 | 0.92 |
| **Weighted process of care score (WPOC)** | | | | |
| Regional affluence | Org | 0.51 | 0.12 to 0.53 | 0.003 |
| Motivation of clinicians | H P | 0.37 | 0.22 to 1.68 | 0.013 |
| Adherence to CDCs | Org | 0.36 | 0.01 to 0.70 | 0.029 |
| Family history of diabetes | Pat | 0.22 | -0.01 to 0.05 | 0.10 |
| Presence of a nutritionist | H P | 0.05 | -1.16 to1.66 | 0.72 |
| Punctuality of attendance | Pat | 0.02 | -0.05 to 0.06 | 0.91 |
| **Clinical process of care score (ClinPOC)** | | | | |
| Motivation of clinicians | H P | 0.29 | -0.07 to 0.84 | 0.09 |
| Adherence to CDCs | Org | 0.33 | 0.00 to 0.04 | 0.10 |
| Punctuality of attendance | Pat | 0.12 | -0.04 to 0.02 | 0.51 |
| **Referral process of care score (RefPOC)** | | | | |
| Regional affluence | Org | 0.46 | 0.00 to 0.24 | 0.045 |
| Adherence to CDCs | Org | 0.29 | 0.00 to 0.03 | 0.11 |
| Motivation of clinicians | H P | 0.24 | -0.10 to 0.63 | 0.14 |
| Insulin treatment | Pat | -0.15 | -0.04 to 0.02 | 0.48 |
| Schooling level (mean score) | Pat | 0.08 | -0.56 to 0.88 | 0.65 |
| Punctuality of attendance | Pat | 0.08 | -0.02 to 0.03 | 0.66 |

[1] Logarithmic transformation used for these variables.

CI: Confidence interval, CDC: Chronic disease clinics.

Type of variable: Pat; patient, H P: Health professional, Org: Organisational.

All models were weighted for the number of patients per centre (using the WLS option in SPSS), and included time of visit to the centre as a potential confounding factor.

***Table 10.7 Final multivariate regression models of factors associated with outcome of care indicators***

All factors are positively associated with higher outcome of care scores or lower mean results (i.e. higher quality of care)

| Independent variable | Factor | ß coefficient (standardised) | 95% CI | p-value |
|---|---|---|---|---|
| **4 variable outcome of care score (4vOOC)** | | | | |
| Younger age | Pat | -0.35 | -0.02 to 0.00 | 0.016 |
| Availability of medication | Org | 0.27 | 0.00 to 0.06 | 0.04 |
| Lower number of patients[1] | Org | 0.23 | -45.1 to 660.1 | 0.09 |
| Presence of DSMRs | Org | -0.10 | -0.11 to -0.03 | 0.23 |
| Gender (male) | Pat | 0.18 | 0.01 to 0.01 | 0.25 |
| **2 variable outcome of care score (2vOOC)** | | | | |
| Less developed health centres | Org | -0.43 | -0.09 to 0.04 | 0.37 |
| Patient education sessions | Org | -0.28 | -0.21 to 0.11 | 0.48 |
| Completion of DSMRs | Org | -0.33 | -0.05 to 0.03 | 0.51 |
| No comorbidity with dyslipidaemia[1] | Pat | 0.20 | -0.65 to 0.98 | 0.65 |
| Presence of DSMRs | Org | -0.16 | -0.27 to 0.18 | 0.68 |
| Lower number of clinicians | H P | -0.14 | -0.08 to 0.06 | 0.74 |
| Presence of a nutritionist | H P | -0.07 | -0.28 to 0.25 | 0.89 |
| **Mean fasting glucose** | | | | |
| Longer distance to secondary care | Org | -0.35 | -0.27 to –0.03 | 0.018 |
| Schooling level (mean score) | Pat | -0.35 | -0.02 to 0.00 | 0.030 |
| Motivation of clinicians | H P | -0.23 | -0.51 to -0.06 | 0.12 |
| **Mean systolic blood pressure** | | | | |
| Younger age | Pat | 0.39 | 0.24 to 0.97 | 0.002 |
| Lower number of clinicians | H P | 0.45 | 0.82 to 4.02 | 0.005 |
| Presence of DSMR | Org | 0.26 | -0.57 to 9.30 | 0.028 |
| Less developed health centres | Org | 0.21 | -0.40 to 2.28 | 0.16 |
| Patient education sessions | Org | 0.06 | -2.12 to 3.55 | 0.61 |
| Presence of a nutritionist | Org | 0.02 | -3.21 to 3.95 | 0.84 |
| **Mean diastolic blood pressure** | | | | |
| Lower frequency of clinics | Org | 0.33 | -1.57 to 5.24 | 0.27 |
| Equipment: Glucometer present | Org | 0.20 | -4.14 to 11.12 | 0.35 |
| No comorbidity with renal disease[1] | Pat | -0.22 | -20.60 to 7.80 | 0.35 |
| Availability of medication | Org | -0.16 | -2.79 to 1.21 | 0.42 |
| Female gender of clinicians | H P | 0.17 | -2.14 to 3.87 | 0.55 |
| **Mean cholesterol** | | | | |
| Longer distance to secondary care | Org | -0.43 | -0.16 to –0.05 | <0.001 |
| Male gender | Pat | 0.41 | 0.01 to 0.02 | 0.001 |

[1] Logarithmic transformation used for these variables.

CI: Confidence interval, DSMR: Disease-specific medical records.

Type of variable: Pat; patient, H P: Health professional, Org: Organisational.

All models were weighted for the number of patients per centre (using the WLS option in SPSS), and included time of visit to the centre as a potential confounding factor.

***Table 10.8 Final multivariate regression models of factors associated with medication indicators***

All factors are positively associated with higher prescribing indicators (i.e. higher quality of care) unless stated otherwise

| Independent variable | Factor | ß coefficient standardised | 95% CI | p-value |
|---|---|---|---|---|
| **Therapeutic intervention of BP** | | | | |
| Type 1 diabetes[1] | Pat | -0.42 | -4.97 to 50.9 | 0.10 |
| Shorter distance patient resides from HC | Pat | -0.28 | -10.4 to 1.82 | 0.16 |
| Equipment: Height measurer (negative) | Org | 0.32 | -2.82 to 15.7 | 0.16 |
| Equipment: ECG machine | Org | -0.08 | -8.45 to 6.11 | 0.74 |
| Higher workload of doctors | H P | -0.02 | -0.25 to 0.23 | 0.93 |
| **Therapeutic intervention of FG** | | | | |
| Schooling level (% level 0) | Pat | 0.46 | 0.02 to 0.19 | 0.016 |
| Motivation of clinicians | H P | 0.32 | -0.29 to 5.14 | 0.08 |
| Alcohol consumption[1] | Pat | 0.27 | -2.92 to 27.6 | 0.11 |
| Female gender of clinicians | H P | 0.28 | -0.61 to 5.10 | 0.12 |
| Family history of diabetes | Pat | 0.22 | -0.04 to 0.19 | 0.18 |
| Shorter distance to secondary care | Org | 0.21 | -0.44 to 1.71 | 0.23 |
| Training of clinicians (negative) | H P | -0.14 | -3.64 to 1.63 | 0.43 |
| Milieu of health centre (rural) | Org | 0.06 | -4.48 to 5.92 | 0.77 |
| **ACE-I prescribing** | | | | |
| Training of clinicians (negative) | H P | -0.32 | -15.5 to -1.77 | 0.016 |
| Punctuality at clinics | Pat | 0.29 | 0.05 to 0.93 | 0.031 |
| Affluence of all patients | Org | 0.25 | -0.02 to 1.30 | 0.06 |
| Interest in diabetes of doctors | H P | -0.24 | -36.5 to 1.21 | 0.07 |
| Number of nurses | H P | 0.23 | -0.20 to 3.13 | 0.08 |
| **BP prescribing** | | | | |
| Patient education sessions | Org | 0.56 | 1.80 to 23.78 | 0.026 |
| Shorter duration of diabetes | Pat | -0.20 | -5.84 to 3.16 | 0.53 |
| Training of clinicians (negative) | H P | -0.15 | -11.0 to 7.01 | 0.64 |
| Co-morbidity with renal disease[1] | Pat | -0.10 | -58.1 to 40.0 | 0.69 |
| **LLM prescribing** | | | | |
| Clinician time commitment | H P | 0.38 | 4.03 to 30.5 | 0.012 |
| Family history of diabetes | Pat | 0.37 | 0.13 to 1.10 | 0.015 |

CI: Confidence interval, DSMR: Disease-specific medical records, HC: Health centre, BP: Blood pressure, FG: Fasting glucose, ACE-I: Ace-inhibitor agents, LLM: Lipid-lowering medication.

[1] Logarithmic transformation used for these variables.

Type of variable: Pat; patient, H P: Health professional, Org: Organisational.

All models were weighted for the number of patients per centre (using the WLS option in SPSS), and included time of visit to the centre as a potential confounding factor.

## 10.5 Correlation of outcome variables

Table 10.9 shows the correlation between the 15 quality of care indicators used. Correlation statistics on the variables based on the same data (for example, NWPOC and WPOC with ClinPOC and RefPOC) have been omitted. In general, the process of care scores correlate significantly with the outcome of care scores suggesting that there is a strong relationship between the recording of care and the intermediate outcomes of care for patients. The non-weighted process of care score was more closely related to outcomes than the weighted score; the outcome score based on levels of blood pressure and fasting glucose was more closely related to the process of care scores than the outcome score based on targets of all four outcomes (fasting glucose, blood pressure, cholesterol and BMI). The average individual results of glucose, blood pressure and cholesterol correlated less well to the process scores than the overall outcome scores; only average systolic blood pressure was significantly related to the clinical process score.

Overall, the medication indicators correlated less well to other indicators than the process and outcome of care scores. Therapeutic intensification (TI) of blood pressure correlated significantly to three other indicators (outcome of care score, average cholesterol and use of ACE-inhibitors), as did ACE-inhibitor use (TI of blood pressure, average cholesterol and use of anti-hypertensive agents). In contrast, therapeutic intensification of glucose only correlated to average fasting glucose, and use of lipid-lowering medication correlated significantly with no other indicators.

*Table 10.9 Correlation of outcome variables*

| | | NW POC | W POC | Clin POC | Ref POC | 4v OOC | 2v OOC | Mean FG | Mean SBP | Mean DBP | Mean TC | TI-BP | TI-FG | ACE use | OHA use | LLM use |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *NWPOC* | Correlation | 1 | | | | .306 | -.411 | -.076 | -.231 | -.161 | .028 | -.092 | .147 | .258 | -.053 | .048 |
| n=48 | p-value | | | | | **0.035** | **0.004** | 0.61 | 0.11 | 0.28 | 0.85 | 0.53 | 0.32 | 0.08 | 0.72 | 0.76 |
| *WPOC* | Correlation | | 1 | | | .272 | -.421 | .002 | -.221 | -.177 | .040 | -.061 | .186 | .223 | -.034 | .057 |
| n=48 | p-value | | | | | 0.06 | **0.003** | 0.99 | 0.13 | 0.23 | 0.79 | 0.68 | 0.21 | 0.13 | 0.82 | 0.72 |
| *ClinPOC* | Correlation | | | 1 | | .369 | -.261 | -.143 | -.293 | -.138 | -.069 | -.098 | .216 | .221 | -.076 | -.087 |
| n=48 | p-value | | | | | **0.010** | 0.07 | 0.33 | **0.043** | 0.35 | 0.65 | 0.51 | 0.15 | 0.13 | 0.61 | 0.58 |
| *RefPOC* | Correlation | | | | 1 | .142 | -.485 | .030 | -.088 | -.141 | .142 | -.058 | .013 | .233 | -.008 | .208 |
| n=48 | p-value | | | | | 0.34 | **<0.001** | 0.84 | 0.55 | 0.34 | 0.34 | 0.70 | 0.93 | 0.11 | 0.96 | 0.19 |
| *2vOOC* | Correlation | .306 | .272 | .369 | .142 | 1 | | | | | | .470 | .228 | .273 | -.019 | .006 |
| n=48 | p-value | **0.035** | 0.06 | **0.010** | 0.34 | | | | | | | **0.001** | 0.12 | 0.06 | 0.90 | 0.97 |
| *4vOOC* | Correlation | -.411 | -.421 | -.261 | -.485 | | 1 | | | | | .236 | .207 | -.170 | -.057 | -.027 |
| n=48 | p-value | **0.004** | **0.003** | 0.07 | **<0.001** | | | | | | | 0.11 | 0.16 | 0.25 | 0.70 | 0.86 |
| *Mean FG* | Correlation | -.076 | .002 | -.143 | .030 | | | 1 | .038 | -.062 | .437 | -.138 | -.530 | -.218 | -.020 | .130 |
| n=48 | p-value | 0.61 | 0.99 | 0.33 | 0.84 | | | | 0.80 | 0.68 | **0.002** | 0.35 | **<0.001** | 0.14 | 0.89 | 0.41 |
| *MeanSBP* | Correlation | -.231 | -.221 | -.293 | -.088 | | | .038 | 1 | | .296 | -.285 | -.071 | .030 | .100 | -.166 |
| n=48 | p-value | 0.11 | 0.13 | **0.043** | 0.55 | | | 0.78 | | | **0.043** | 0.05 | 0.63 | 0.84 | 0.45 | 0.29 |
| *MnDBP* | Correlation | -.161 | -.177 | -.138 | -.141 | | | -.062 | | 1 | .210 | -.277 | -.082 | .070 | .193 | -.041 |
| n=48 | p-value | 0.28 | 0.23 | 0.35 | 0.34 | | | 0.68 | | | 0.16 | 0.06 | 0.58 | 0.64 | 0.19 | 0.80 |
| *Mean TC* | Correlation | .028 | .040 | -.069 | .142 | | | .437 | .296 | .210 | 1 | -.490 | -.224 | -.354 | .012 | .260 |
| n=48 | p-value | 0.85 | 0.80 | 0.65 | 0.34 | | | **0.002** | **0.043** | 0.16 | | **<0.001** | 0.13 | **0.015** | 0.94 | 0.10 |
| *TI-BP* | Correlation | -.092 | -.061 | -.098 | -.058 | .470 | .236 | -.138 | -.285 | -.277 | -.490 | 1 | .163 | .342 | .012 | .261 |
| n=48 | p-value | 0.54 | 0.68 | 0.51 | 0.70 | **0.001** | 0.11 | 0.35 | 0.05 | 0.06 | **<0.001** | | 0.28 | **0.017** | 0.94 | 0.10 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *TI-FG* | Correlation | .147 | .186 | .216 | .013 | .228 | .207 | -.530 | -.071 | -.082 | -.224 | .163 | 1 | .152 | .054 | .139 |
| n=47 | p-value | 0.32 | 0.21 | 0.15 | 0.93 | 0.12 | 0.16 | **<0.001** | 0.63 | 0.58 | 0.13 | 0.28 | | 0.31 | 0.72 | 0.38 |
| *ACE-I* | Correlation | .258 | .223 | .221 | .233 | .273 | -.170 | -.218 | .030 | .070 | -.354 | .342 | .152 | 1 | .370 | .014 |
| n=48 | p-value | 0.08 | 0.13 | 0.13 | 0.11 | 0.06 | 0.25 | 0.14 | 0.84 | 0.64 | **0.015** | **0.017** | 0.31 | | **.010** | 0.93 |
| *OHAuse* | Correlation | -.053 | -.034 | -.076 | -.008 | -.019 | -.057 | -.020 | .100 | .193 | .012 | .012 | .054 | .370 | 1 | .067 |
| n=48 | p-value | 0.72 | 0.82 | 0.61 | 0.96 | 0.90 | 0.70 | 0.89 | 0.50 | 0.19 | 0.94 | 0.94 | 0.72 | **0.010** | | 0.67 |
| *LLMuse* | Correlation | .048 | .057 | -.087 | .208 | .006 | -.027 | .130 | -.166 | -.041 | .260 | .261 | .139 | .014 | .067 | 1 |
| n=42 | p-value | 0.76 | 0.72 | 0.58 | 0.19 | 0.97 | 0.86 | 0.41 | 0.29 | 0.80 | 0.10 | 0.10 | 0.38 | 0.93 | 0.67 | |
| | | NW POC | WPOC | Clin POC | Ref POC | 4vOOC | 2vOOC | Mean FG | Mean SBP | Mean DBP | Mean TC | TI-BP | TI-FG | ACE use | OHA use | LLM use |

Correlation: Pearson's correlation, p-value: 2-tailed significance, p values <0.05 shown in bold.
NWPOC: Non-weighted process of care score is the proportion of 10 measures patients have had undertaken in the preceding 12 months.
WPOC: The weighted process of care score assigns a weight of four to blood pressure and fasting glucose measurements and one to the other eight measures.
ClinPOC: Clinical process of care score is the proportion of four clinical measures patients have had undertaken in the preceding 12 months
RefPOC: Referral process of care score is the proportion of six measures requiring referral patients have had undertaken in the preceding 12 months
4vOOC: 4 variables outcome of care score is based on achieving a target for fasting glucose, blood pressure, total cholesterol and body mass index.
2vOOC: 2 variable outcome of care is based on achieving low and high targets for blood pressure and fasting glucose only.
FG: Fasting glucose, SBP: Systolic blood pressure, DBP: Diastolic blood pressure, TC: Total cholesterol
TI-BP: Therapeutic intensification of blood pressure, TI-FG: Therapeutic intensification of fasting glucose
ACE-I: Ace-inhibitor agents, OHA: Oral hypotensive agents, LLM: Lipid-lowering medication

## 10.6 Summary

The fifteen quality indicators were tested against 57 potential explanatory variables. The rationale for undertaking the multilinear regression analysis was to ascertain those factors that were significantly associated with the quality of care indicators, independent of other factors. The variables independently and significantly related to the process of care indicators were doctor motivation, adherence to chronic disease clinics and regional affluence. Variables significantly and independently associated with the cumulative outcome of care scores were younger age and availability of medication. A number of factors were associated with individual intermediate outcomes and the medication indicators. These results are correlated with the qualitative findings in the following chapter.

# Chapter 11: Summary of results

## 11.1 Introduction

The previous six chapters have presented individually the results of the various qualitative and quantitative components of this thesis. In this chapter a summary of these results will be combined and presented; firstly, a description of diabetes care and secondly, an exploration of the factors influencing the care of patients with diabetes in primary care in a low/middle income country.

## 11.2 Descriptive results

A detailed description of diabetes care in primary care health centres in Tunisia has been presented at a variety of levels, and presented in Chapters 5, 6, 8 and 9.

### 11.2.1 Nationwide level

The annual regional reports demonstrate that large numbers of patients with diabetes and hypertension are managed in primary care and it appears that the numbers of new cases are increasing.

### 11.2.2 Health centre level

A detailed description of the care of patients with diabetes at health centres has been presented relating to patient and health centre characteristics. Large differences between health centres of most variables have been demonstrated.

### 11.2.3 Standards of care

The process and outcome of care results demonstrate wide variations in care between health centres and across regions. High standards of care are being achieved in some centres suggesting that good quality diabetes care is possible in primary care in Tunisia.

### 11.2.4 Improvements in quality of care

Significant improvements appear to have occurred in some intermediate outcomes of care and prescribing of ACE inhibitors and lipid-lowering medications since 2000.

There is a suggestion that some processes of care have improved nationally but these improvements may not have been sustained.

### 11.2.5 Cultural themes

The ethnographic analysis revealed that the overriding cultural theme, particularly for the patients, is the primacy of access to medications at the health centre. Patients see the purpose of their visit to the health centre is to acquire medicines and all other issues are either related to this or are of secondary importance. Emotional factors are highlighted, particularly the role of shock, anger and stress in the causation of diabetes, hypertension and high levels of sugar. Local concepts of food are dichotomised into 'brothers' or 'enemies' of diabetes rather than as a means of treating diabetes. Patients have an external locus of control and perceive the management of their diabetes to be in the hands of the doctor and God. Finally, there is the perception from all participants that the care at health centres has improved but problems remain and a variety of suggestions are offered.

These themes give a detailed description of the culture of care at health centres but in addition, have revealed potential factors that may be influencing care (see following section).

## 11.3 Factors influencing the quality of care

Chapters 7 and 10 present the results of identifying and testing the factors influencing the care of diabetes in Tunisian primary care health centres; the qualitative content analysis and the quantitative multilinear regression modelling, respectively. Several of the cultural themes that emerged are also potential influencing factors.

### 11.3.1 Factors emerging from the ethnographic analysis

The cultural themes that emerged from the ethnographic analysis as potential factors are access to medications, the importance of money, dietary adherence, doctors characteristics and various patients health beliefs, such as the causation of their illness, locus of control and spiritual beliefs.

### 11.3.2 Factors emerging from the content analysis

The content analysis of the qualitative data revealed over 400 potential barriers to or facilitators of care of patients with diabetes. The most commonly cited factor was the availability of medication at the heath centres. Other frequently observed organisational factors were the existence of chronic disease clinics and the large number of patients consulting at the health centres. The most commonly mentioned health professional factors were clinician motivation and the role of the nurses. Frequently cited patient factors were financial constraints, patient education, gender, adherence and attendance issues and the use of herbal medicines. The relative importance given to factors differed according to the source (doctors, paramedical staff, patients, observer, and other informants).

### 11.3.3 Factors tested in the quantitative analysis

Three variables were independently and significantly related to the cumulative process of care scores: clinician motivation, adherence to chronic disease clinics and regional affluence. Two other variables were significantly and independently associated with the outcome of care scores: younger patient age and availability of medication. A number of factors were associated with individual intermediate outcomes and the medication indicators.

### 11.3.4 Summary of factors

A major strength of this study is the combination of multiple methodologies, both qualitative and quantitative, used to identify and test the factors potentially influencing care. This section presents the variables that either emerged or were tested in the study. They are grouped into patient, health professional and organisational variables and presented in Tables 11.1 – 11.3. Within each table the variables have been separated into: variables that were found to be significantly associated with quality of care from the quantitative analysis; variables that emerged from the data but were either not found to be significantly associated with quality of care or were not tested formally in the study; variables that did not emerge from the data and tested negatively in the quantitative analysis.

*Table 11.1 Patient variables emerged and/or tested as factors influencing the quality of care*

| **Explanatory variable** | **Emerged from qualitative data** | | **Associated with QOC (quantitative data[2])** | |
|---|---|---|---|---|
| | *Content[1]* | *Cultural* | *Process* | *Outcome* |
| *Significantly associated with QOC* | | | | |
| Age (younger) | | | | Strong |
| Schooling level | | | | Weak |
| *Emerged but not significantly associated* | | | | |
| Lack of money | Strong | Theme | | |
| Gender | Strong | | | |
| Adherence to treatment | Strong | | | |
| Attendance issues | Weak | | | |
| *Emerged but not tested* | | | | |
| Adherence to diet | Strong | Theme | | |
| Use of herbal medicine | Strong | | | |
| Patient education | Strong | | | |
| Health beliefs | | Theme | | |
| Adherence to referrals | Weak | | | |
| *Tested but not significantly associated* | | | | |
| Employment | | | | |
| Residence distance to clinic | | | | |
| Marital status | | | | |
| Duration of diabetes | | | | |
| Insulin treatment | | | | |
| Smoking habit | | | | |
| Alcohol consumption | | | | |
| Associated illnesses | | | | |
| Type 1 diabetes | | | | |
| Family history of diabetes | | | | |
| Obesity | | | | |

[1] Defined as strong if included in the ten most frequently mentioned factors overall (Table 7.4), and weak if included in one of the ten most frequently mentioned factors when grouped into patient, health professional and organisational variables (Tables 7.1 – 7.3).

[2] Defined as strong if independently and significantly associated with a cumulative process or outcome of care score (WPOC, NWPOC, 2vOOC and 4vOOC), and weak if independently and significantly associated with one of the additional process or outcome measures. Secondary indicators (based on medication prescribing) are not included in these summaries.

QOC: Quality of care

*Table 11.2 Health professional variables emerged and/or tested as factors influencing the quality of care*

| **Explanatory variable** | **Emerged from qualitative data** |  | **Associated with QOC (quantitative data[2])** |  |
|---|---|---|---|---|
|  | *Content[1]* | *Cultural* | *Process* | *Outcome* |
| *Significantly associated with QOC* |  |  |  |  |
| Clinician motivation | Strong |  | Strong |  |
| Number of clinicians (lower) |  |  |  | Weak |
| *Emerged but not significantly associated* |  |  |  |  |
| Workload of clinicians[3] | Strong |  |  |  |
| Time commitment of clinicians | Weak |  |  |  |
| Clinician training | Weak |  |  |  |
| *Emerged but not tested* |  |  |  |  |
| Role of nurses | Weak |  |  |  |
| Shortage of staff | Weak |  |  |  |
| Teamwork | Weak |  |  |  |
| Placement of doctors | Weak |  |  |  |
| Characteristics of doctors |  | Theme |  |  |
| Lack of feedback from specialists | Weak |  |  |  |
| *Tested but not significantly associated* |  |  |  |  |
| Clinician gender |  |  |  |  |
| Clinician interest in diabetes |  |  |  |  |
| Nutritionist present |  |  |  |  |
| Number of nurses |  |  |  |  |

[1] Defined as strong if included in the ten most frequently mentioned factors overall (Table 7.4), and weak if included in one of the ten most frequently mentioned factors when grouped into patient, health professional and organisational variables (Tables 7.1 – 7.3).

[2] Defined as strong if independently and significantly associated with a cumulative process or outcome of care score (WPOC, NWPOC, 2vOOC and 4vOOC), and weak if independently and significantly associated with one of the additional process or outcome measures. Secondary indicators (based on medication prescribing) are not included in these summaries.

[3] The 'workload of clinicians' variable in the quantitative analysis corresponds to 'large number of patients' in the content analysis and could equally have been classified as an organisational factor.

QOC: Quality of care

***Table 11.3 Organisational variables emerged and/or tested as factors influencing the quality of care***

| Explanatory variable | Emerged from qualitative data | | Associated with QOC (quantitative data[2]) | |
|---|---|---|---|---|
| | *Content*[1] | *Cultural* | *Process* | *Outcome* |
| *Significantly associated with QOC* | | | | |
| Availability of medication | Strong | Theme | | Strong |
| Chronic disease clinics | Strong | | Strong | |
| Regional affluence | | | Strong | |
| Distance to specialists/secondary care | Weak | | | Weak[3] |
| Presence of DSMR | | | | Weak |
| *Emerged but not significantly associated* | | | | |
| Availability of HbA1c testing[4] | Weak | | | |
| Lack of resources/Presence of equipment | Weak | | | |
| *Emerged but not tested* | | | | |
| Waiting time at health centre | Weak | | | |
| Waiting time to see specialists | Weak | | | |
| Organisation of centre | Weak | | | |
| Problems with the managers | Weak | | | |
| *Tested but not significantly associated* | | | | |
| Urban/rural | | | | |
| Development of health centre | | | | |
| Distance to Tunis | | | | |
| Motivation of regional director | | | | |
| Size of health centre | | | | |
| Proportion of patients with diabetes | | | | |
| Presence of disease register and PHRs | | | | |
| Affluence of patients attending the centre | | | | |
| Patient education sessions | | | | |

[1] Defined as strong if included in the ten most frequently mentioned factors overall (Table 7.4), and weak if included in one of the ten most frequently mentioned factors when grouped into patient, health professional and organisational variables (Tables 7.1 – 7.3).

[2] Defined as strong if independently and significantly associated with a cumulative process or outcome of care score (WPOC, NWPOC, 2vOOC and 4vOOC), and weak if independently and significantly associated with one of the additional process or outcome measures. Secondary indicators (based on medication prescribing) are not included in these summaries.

QOC: Quality of care, DSMR: Disease-specific medical records, PHR: Patient-held records

[3] Association between longer distance and higher quality of care.

[4] Availability of HbA1c testing at a health centre level was analysed retrospectively and found to not be associated with the outcome and medication quality indicators.

## 11.4 Summary

These summary tables demonstrate three factors that emerged strongly from the qualitative data and found to be significantly associated with quality of care: availability of medication, use of chronic disease clinics and clinician motivation. These factors were the three most frequently mentioned factors from the content analysis and three of only five factors that were significantly and independently associated with quality of care (based on the cumulative quality indicators). Other factors that emerged from both the qualitative and quantitative data were distance to secondary care and financial issues, where affluence on a regional level rather than an individual level was found to be associated with the quality indicators. Patient age was the only factor found to be significantly associated with a cumulative quality of care score that did not emerge from the qualitative data. The most important factors generated from the qualitative data that were not tested formally in the study were all patient variables: adherence to diet, use of herbal medicines and patient education.

A discussion of these findings including a comparison with other work is covered in the final chapter.

# Chapter 12: Discussion

## 12.1 Introduction

This final chapter presents a discussion of the results within the context of previous relevant work and highlights the important emerging factors influencing the care of patients with diabetes. The most important findings that are relevant for diabetes care in Tunisia and elsewhere are discussed in more depth. Strengths and limitations of the study are presented as well as implications for clinical practice and recommendations for future research.

## 12.2 The context: Diabetes care in a low/middle income country

This thesis describes one of the first national, primary care studies of diabetes care in a low/middle income country. In addition to providing data for an analysis of the factors that influence the quality of care, it offers a unique and detailed picture of diabetes care in a resource-constrained setting. The context of patient care is all-important, including the wider socio-economic background, underlying cultural assumptions, characteristics of the population and how these factors change over time. This information is an essential requisite to understanding the context of the factors influencing care and to ultimately use them to implement interventions to improve care.[250]

### 12.2.1 Patient characteristics

In general, the characteristics of the patients included in the study match other studies of patients with diabetes in Tunisia and similar countries, although there are some notable differences. The mean age of patients corresponds closer to surveys from the developed world[131,251] rather than developing countries[31,34,76,252], probably due to the relatively long life expectancy of Tunisians in relation to their economic status. The low proportion of patients with type 1 diabetes is expected given that the national program is predominantly intended to guide the management of type 2 patients and most patients with type 1 attend secondary care facilities.

Compared to national data of the Tunisian population, the patients in the study are older, less educated, more likely to be female, less likely to work and less likely to be married than the average Tunisian.[253] All these findings are expected given the older age distribution of patients with type 2 diabetes. A recently published study of familial aggregation of patients with type 2 diabetes in Tunisia reported a family history within first-degree relatives of 70%[254], higher than the 55% found in our study. This may be due to under-reporting in normal clinical practice. Gender differences demonstrated in this study are discussed in greater depth in Section 12.4.4.

The smoking rates in the study (39% among men and 4% among women) are similar to published smoking rates from Tunisia for the age group corresponding to the study population.[255] This suggests that smoking cessation advice for Tunisians with diabetes is either not being offered or not being followed. The low rate of reported alcohol usage is expected from a Muslim country where alcohol is officially forbidden but easily obtainable. Finally, the rates of complication among the study population appear similar to other surveys from similar settings[29,34] given that the figures do not specify the type or grade of complication.

### 12.2.2 Delivery of care

A wide variation in the delivery of care between health centres is demonstrated, despite the presence of a structured, centralized national program for diabetes care. There are marked variations in attendance rates, numbers of patients with diabetes and the implementation of the components of the national program, such as chronic disease clinics, disease-specific medical records, disease registers, patient-held records and education sessions. Wide variations in delivery of diabetes care have been shown in all primary care settings worldwide[33,75,189,256,257] and continues to be a cause of concern and debate.

There are large differences in the number and composition of health professionals employed at the health centres. The workload of primary health care physicians varies but does generally appear heavy with a relatively short consultation length, certainly compared to European countries.[104,258] The average Tunisian doctor according to these results consults 26 patients in 2½ hours (i.e. less than six minutes per patient).

The national program recommends three-monthly visits for patients with diabetes and the results show that most health centres are following these suggestions, with an average attendance rate approaching four per year. The number of visits per year to a general practitioner for diabetes care varies internationally, such as from 2.8 to 7.0 across five European countries.[257] A relatively high number of patients (nearly one in four) attend their consultations at least two weeks late; the findings from the ethnographic analysis suggest that this maybe due to appointment dates being a relatively new, and culturally foreign, concept.

The distance patients reside from their local health centre is short, demonstrating that the Tunisian health system has succeeded in ensuring local primary care services for the population. However, the distance patients are required to travel to attend secondary care, and thus certain aspects of diabetes care such as ophthalmoscopy, is long for a population generally without access to private transportation. Finally, bad weather, both too hot and too cold, emerged as a potential barrier to attendance; a seasonal variation was noted with fewer attendees at the height of summer and winter.

### 12.2.3 Standards of care

*Processes of care*

The majority of patients in the study have their blood pressure and fasting glucose checked annually and around half have most of the other measures performed. The higher rates of recording blood pressure and fasting glucose were expected, as they are required three-monthly within the national program, whereas the other measurements are recommended annually. The results compare favourably with studies from similar countries,[15,27,28,29,33,80,259] particularly regarding examinations undertaken on site at the health centre (blood pressure recording, weight, foot and cardiovascular examinations). Indeed, some studies from western countries such as the United Kingdom (prior to the introduction of the new Quality and Outcomes Framework), United States and Australasia show similar results for these data.[17,18,19,23,25,105,151,176]

Fewer patients are recorded as having an electrocardiogram (ECG), eye examination and HbA1c measurement. The latter is almost certainly due to the fact that this test is not generally available yet within primary care in the public sector. Although it is unfortunate that measurement of HbA1c is not yet widely available, it has been suggested that where resources are short, glucose testing is a reliable indicator of poor control.[69,243] The low recording of eye and ECG examinations may be due to the fact that these tests are often performed in secondary care; primary care physicians report difficulties in persuading patients to attend and receiving the results from secondary care.

Blood pressure recording at all but one health centre demonstrated levels of terminal digit preference (where terminal digit zero is recorded more than would be expected) approaching 100%, much higher than previously reported elsewhere.[240] This is almost certainly due to the Tunisian custom of verbally expressing blood pressure results per 10mmHg; for example, a blood pressure of 160/90 mmHg is expressed as 'sixteen/nine'. This may have clinical relevance as a link between terminal digit preference and increased mortality has been suggested.[240]

There are wide variations in recording of processes of care across the health centres and across the regions of Tunisia and similar variations have been demonstrated in all settings worldwide.[15,18,75,76,105]

This study demonstrates that high levels of care can be achieved within primary care in Tunisia; several health centres achieve 100% recording of some of the measures and over 50% of most of the other measures each year.

### *Intermediate outcomes of care*

As with the processes of care, the overall mean results compare favourably with results from similar countries.[27,33,75] Large variations in mean results across the regions and health centres suggests once again that high levels of quality of care are being attained in some, but not all, primary care health centres. Wide variations in metabolic control have been demonstrated between primary care clinicians and practices in other settings.[14,168,260]

Women have significantly higher levels of systolic and diastolic blood pressure, total cholesterol and body mass index but lower mean creatinine levels than men. These results confirm previous studies in Tunisia showing higher risk factors among women.[66] In addition, higher blood pressure levels among women may be a measurement artefact secondary to higher rates of obesity: large blood pressure cuffs are necessary to record blood pressure accurately in obese patients but they are rarely used in practice. Lower serum creatinine levels are found in women due to lower rates of creatinine production from a smaller amount of muscle mass.[261]

### *Medication*

A significant difference between the management of patients in this study and those in primary care in Europe is the much lower number of patients treated with diet alone in Tunisia. For example, a large, cross-sectional study of nearly 8000 patients with type 2 diabetes in the UK revealed that 31% of patients were being managed with diet alone with a huge range between practices of 16% to 73%.[262] This contrasts with under 5% in Tunisia. The dissimilarity may be due to patients in Tunisia being diagnosed later and therefore requiring earlier initiation of treatment. Alternatively, a more likely reason is the emphasis placed on the prescribing of medication at Tunisian primary care health centres, as discussed below, and these figures support the conclusion that medication is perceived to be the prime reason for patients to attend the health centre. Studies from other low/middle income countries report figures of under 10%,[34,76] in contrast with studies from high income countries with figures usually over 20%,[25,257] although this figure may be decreasing.[131] This may suggest that the importance placed on accessibility to medication is related to the affluence of the setting and the likelihood of medication being available.

The proportion of patients in Tunisia on insulin is also lower than is the case for high-income nations[23,131,257,263] and more similar to other low/middle income countries.[34,76,252] This difference may be due to differences in the population, particularly the fact that our sample excludes patients managed in secondary care. Equally it may be due to reluctance on behalf of clinicians in low resource nations to commence patients on insulin when its consistent supply cannot be guaranteed.[264] The choice of oral hypoglycaemic agents seems to be dictated by their accessibility, as metformin and glibenclamide alone are widely available in the public health sector in Tunisia. Treatment for hypertension is more variable and appears to be dictated by availability and price. Only fibrates are currently available for the treatment of hypercholesterolaemia, which may be cost-related or due to the influence of French prescribing behaviour.[265]

### 12.2.4 Improvements in care

This study found some significant improvements in the quality of care of patients with diabetes managed in the primary care setting in Tunisia over a three-year period from 2000 to 2002. The improvements in outcomes and prescribing seem to have continued up to 2004 in a subset of patients from the south of the country. In contrast, the improvement in processes has not been sustained and shows some possible decline.

*Processes of care*

Most processes of care measures improved nationally between 2000 and 2002 with blood pressure, cholesterol and creatinine recording showing consistent, significant improvements. In the subset studied up to 2004, only creatinine recording continued to improve significantly. A plateau effect would be expected once results reach close to 100% and this may explain the lack of continued improvement in blood pressure and fasting glucose recording. However, a number of the other processes show a clear decline in the southern subset, particularly recording of weight, foot examination and fundoscopy. The reasons for this are unclear. It may be that initial enthusiasm for improving diabetes care after the launch of the national program in the late 1990s has been replaced by despondency, as illustrated by clinicians' comments in Section 7.5. This phenomenon has been demonstrated among health professionals in other contexts.[266,267]

*Intermediate outcomes of care*

Improvements in intermediate outcomes of care are notoriously difficult to achieve and a lack of change in intermediate outcomes has been a fairly consistent, though not uniform[268,269], finding in observational studies.[23,76,131,270] The improvements seen in some of the intermediate outcomes of care since 2000 are therefore particularly significant.

The significant improvement in body mass index, even over a time period of only three years, suggests that patients are heeding dietary advice. These improvements are contrary to the usual finding of increased weight over time in patients with diabetes.[9,23,269] The significant improvements in fasting glucose and diastolic blood pressure over the study period are encouraging, although the lack of similar improvements in systolic blood pressure and cholesterol suggests that more needs to be done to control these risk factors. Although one half of patients in the study are being prescribed anti-hypertensive agents, the results seem to suggest that further therapeutic intensification is required for many of these patients. One in six of the study patients are being prescribed lipid-lowering agents. These are not always available free-of-charge and this may explain the lack of improvement of mean cholesterol.

*Medications*

Significant changes in medications prescribed were found despite the short time frame. The increase in numbers of patients prescribed insulin may be due to improved therapeutic intervention by clinicians. The significant increases in the proportion of patients prescribed lipid-lowering medications and ACE inhibitors suggest that primary care clinicians in Tunisia are following worldwide guidelines on diabetes management. Such increases may also be due to improved availability of these medications within the primary care setting and similar trends in prescribing have been demonstrated in primary care in comparable settings.[76]

*Summary*

Improvements in care are apparent across some of the quality of care indicators used. An understanding of the factors that influence these quality indicators, outlined in the following section, should signify the reasons for the improvements noted.

## 12.3 The factors that influence diabetes care: What this study adds to the literature

The previous chapter combined and summarized the qualitative and quantitative results of the factors that are influencing diabetes care in Tunisia. This section will compare the results of this study with results from the previous literature reported in Chapter 2, within the established sub-headings of patient, health professional and organisation. It is important to stress once again that previous evidence for most of the factors has come from work in developed countries and that this is one of the first studies of its kind from a low/middle income nation. It is important to acknowledge the dynamic interplay and interactions of factors from the three areas as described by other authors.[109] It is also clear that factors from all three groups play a part in influencing the care of patients with diabetes in Tunisia. Factors from each area emerged from all the analyses undertaken. As such, it is inadequate to focus on only one sphere when seeking to study and improve quality of patient care.

### 12.3.1 Patient factors

Patient factors seem to be less significantly associated with the quality of care indicators in the quantitative analysis than health professional and organisational factors. They did, however, feature strongly in both the qualitative analyses (content and ethnographic). This may be a consequence of the difficulty in testing patient-related factors, such as adherence, education and beliefs, in quantitative analyses. In addition, using the health centre as the unit of analysis may have limited the power of the study to reveal patient-level differences between health centres (see Section 4.4.4.4).

Comparing the factors found in this study (Table 11.1) to those proposed in the previous literature[vii] (Table 2.1), this study:

- Supports the evidence for the crucial role of adherence. Adherence issues emerged as commonly cited factors in the qualitative work. An attempt was made to include adherence as a factor in the quantitative analysis. The new disease-specific medical records allocate a box for the doctors to indicate whether the patient has been compliant with their medication, based on self-reporting by the patient. Unfortunately, these data were rarely recorded and thus their lack of relationship with the quality indicators must be treated with caution. It was not possible within the scope of this study to assess patient medication adherence more accurately, such as using data from pharmacy records, due to poor and varied methods of recording this data at the health centres. Adherence is a complex issue and medication adherence is notoriously difficult to measure accurately[271] and even the use of dispensing data from pharmacies has flaws.[112]
- Adds new evidence to other qualitative studies proposing that patient health beliefs and education are important factors (see following discussion).
- Supports some evidence linking younger age with improved intermediate outcomes. Patient age was the only patient-related factor significantly associated with a cumulative quality indicator. The association of younger age with only the outcome of care score based on four variables (fasting glucose, blood pressure, cholesterol and BMI) may be related to the inclusion of BMI and cholesterol. The national nutrition survey in Tunisia 10 years ago demonstrated the close association of age with body mass index and cholesterol in Tunisia, as in other countries.[66]
- Provides additional evidence for the relationship between socio-economic factors and quality of care. Patient financial issues emerged as an important potential factor from both qualitative analyses. Although there was no association found between quality indicators and poverty on a patient or health-centre level, regional affluence

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[vii] The references for previous work are provided in the tables in Chapter 2 and will generally not be repeated in the following section.

was found to be significantly and independently related. There was also a probable link with lower educational levels, as has been reported elsewhere.

- Provides new insight into the relationship between gender and diabetes care, and the use of herbal medicine by patients with diabetes, in low/middle income countries (Section 12.4).
- Shows no association between quality of care and a number of previously proposed factors: duration of illness, obesity, insulin treatment, co-morbid diseases, smoking and family history of diabetes. These negative associations may be due to analyzing the data at the health centre level rather than at the individual patient level.

### 12.3.2 Health professional factors

Numerically, health professional factors appear less important than patient or organisational factors (Table 11.2). In comparison with factors proposed in previous research (Table 2.2), this study:

- Reveals that clinician motivation is the most important health professional factor in this setting. Clinician motivation emerged as the second most frequently mentioned factor in the content analysis and the only health professional factor to be significantly and independently associated with the cumulative quality of care scores. The significant influence of clinician motivation is perhaps the most unexpected finding of this study (further discussion in Section 12.4).
- Supports evidence for the need to develop the role of nurses in clinical care. Unlike previous studies, no association was found between the presence of a dietician and improved quality of care.
- Provides evidence for the lack of association between clinician variables and training with quality of care. Although participants in the study, particularly clinicians, suggested that training was important it was not found to be associated with the quality indicators. Equally, clinician workload was identified as important by participants, but not found to be associated in the quantitative analysis.
- Supports evidence from the developed world that clinical inertia is an important factor. There is a significant correlation of the therapeutic intervention indicators with a number of the other quality of care indicators in this study. This confirms previous work from high income countries showing that clinical inertia, a failure of health care providers to initiate or intensify therapy when indicated, is a problem in diabetes care. It is difficult to compare therapeutic intensification data accurately

due to differences in patient selection and outcome definitions, but the rate of therapeutic intervention in Tunisia appears comparable to work elsewhere.[173,174]

- Supports the idea that shortages of staff, teamwork and primary/secondary care communication are all potentially important areas.

### 12.3.3 Organisational factors

Organisational factors appear to be vitally important in the care of patients with diabetes (Table 11.3). In comparison with factors proposed in the previous literature (Table 2.3), this study:

- Provides new evidence for the crucial role of accessibility to medication. This emerged as the most important factor overall from the qualitative analysis and was also found to be associated with improved outcomes of care at health centres, suggesting a direct link between intermediate patient outcomes and medication availability (further discussion in Section 12.4).
- Supports evidence from the developed world for the use of some components of the national program, such as the implementation of weekly chronic disease clinics and the use of new disease-specific medical records. Unlike previous studies, no similar evidence was found to support the use of other components of the national program (chronic disease registers, patient-held records and patient education sessions).
- Supports the evidence that affluence influences diabetes care. Unlike the individual poverty indicators, regional affluence was significantly associated with quality of care indicators. This may suggest that the regional poverty indicators based on United Nations statistics are more sensitive than the patient and health centre level indicators based on health insurance coverage. Alternatively it may be the case that socio-economic factors influence the quality of care at a regional rather than an individual level.
- Does not support the relationship between longer distance to health care facilities and poorer glycaemic control suggested by a smaller, previous study in Tunisia[90] and other authors.[187] Although a longer distance to secondary care facilities emerged from the content analysis as a potential barrier to care, it was in fact associated with an improved mean fasting glucose. The reason for this is unclear and no other associations were found with any of the other quality indicators. In addition, no

specific relationships were discovered between the distance needed to travel from the health centre for a specific test and the uptake of that test.

- Proposes a number of other potential barriers to care, such as long waiting times and problems with health managers.
- Suggests that the size and location of the health centre are not important factors in this setting.

*Processes versus outcomes of care*

Unlike other similar quantitative studies[75], a correlation was found in this study between the process of care and intermediate outcome of care scores. However, the factors that emerged as significantly and independently associated with higher process scores were different factors to those associated with higher outcome scores. Other authors have similarly failed to link identical explanatory factors with both processes and outcomes[110], which may be due to both the complexity of diabetes care and the number of different variables involved influencing the quality of care. In contrast, reassuringly, almost all of the factors associated with the quality scores also emerged from the exploratory qualitative work. In particular, the three factors that emerged most strongly from the qualitative data were also found to be significantly associated with the quality of care indicators (availability of medication, use of chronic disease clinics, clinician motivation).

## 12.4 A discussion of the main findings of the study

A number of themes emerged as crucial areas in relation to the factors influencing diabetes care in Tunisia and how these findings can be translated into improving practice. These themes are the primacy of access to medication, clinician motivation, patient health beliefs and the influence of gender. These will be discussed at greater length as they have important implications for improving health care in Tunisia and other similar settings.

### 12.4.1 Access to medications

This study has confirmed the importance of medication availability for chronic illnesses and also revealed the perceived, primary importance placed on their accessibility by patients and health professionals.

### *Availability of medication*

In the Tunisian public sector, medications are free on payment of a small consultation fee. If the medications are unavailable, patients are required to buy them privately from pharmacists and many are unable to do so. The Tunisian Ministry of Health has made attempts to prioritize the supply of medications for chronic illnesses at primary health care facilities and the findings from this study would strongly support these actions. The importance of accessibility to medicines for chronic illnesses in low/middle income countries is now recognized and is a key component to the World Health Organisations global initiative to improve chronic disease care in these countries.[6] Surveys from various countries have confirmed the problems of availability and affordability of medicines and context-specific policies have been recommended to improve access.[272]

### *Perceived central importance of access to medications*

The ethnographic analysis demonstrated that the central theme at health centres, linked to all other important themes, was the perception of the prime importance of access to medications as 'the only thing that matters'. Attendance at a primary care health centre is perceived by patients to be a method of obtaining medicines rather than a consultation with a health professional. This corroborates anthropological work in Tanzania where patients were reported to be "using the medical system as an elaborate form of self-treatment; the clinic and the doctor are merely instrumental in obtaining the drugs".[273] This emphasis on the drugs may be an illustration of the belief that medications are the sole means of controlling diabetes. As the physician William Osler (1849–1919) stated, "the desire to take medicine is perhaps the greatest feature which distinguishes man from animals".[274] In addition, there may be an underlying faith in the power of being handed a prescription by a doctor. The portrayal of the handing over of a prescription as a symbol of the doctor's care and a protection from the bad consequences of illness has emerged from work by Michael Balint in the United Kingdom.[275] In contrast, Balint's idea of the 'doctor as a drug' appears to be an alien concept; here, the doctor is merely the provider of the drug. Short consultation times may also create the perception that receiving a prescription is the central purpose of the interaction between the patient and clinician.

*Relation to adherence and resource issues*

An apparent paradox is the importance placed on medication availability in contrast to the acknowledged lack of adherence to treatment. It appears that the primary reason for lack of adherence is the lack of affordable medication at the health centres and that adherence would not be an issue if medications were always available. The link between finances and ability to buy medication emerged from this study in the qualitative analyses and has similarly been noted in other African settings.[264,276] For example, ethnographic work by de Aikins in Ghana revealed that biomedical management was the preferred choice of care for most participants, but high costs drove people to seek alternative systems of care.[86] The influence of cost on medication adherence exists even in affluent nations. A survey of elderly Americans showed that 19% of respondents had cut back on their use of medication in the previous year because of cost.[123]

### 12.4.2 Clinician motivation

Previous qualitative and survey studies have postulated that health professional attitudes about diabetes may be more important than their knowledge[84,118,169,170], yet this hypothesis has not been formally tested until now. This is the first quantitative study of this type to show a formal association between motivated doctors and improved quality of care. The subjective method of quantifying motivation in this study is acknowledged and further investigation is required using more formal methods, such as validated questionnaires or surveys, to confirm the place and role of clinician motivation.

*Theory of planned behaviour*

Motivation is a complex issue. In this study it was assessed in line with the 'theory of planned behaviour' (TPB) in which motivation (intention) is influenced by three variables: attitudes, subjective norms (social pressure to perform certain behaviours) and perceived behavioural control (the degree of control an individual feels they have over a behaviour).[277] Doctor motivation in this study seems to incorporate all the components of the TPB.

Attitudes were often eluded to, particularly the idea of the doctor's own inner conscience/conviction (for example, see quote in Section 7.5). Although participants often seemed aware of this issue they were also rather despondent, perhaps understandably, about the prospects of influencing attitudes.

Subjective norms also appear relevant as social pressure to provide good care was notable by its absence. There appeared to be pressure on doctors to consult quickly and consequently to potentially provide lower quality care. Patients attended early and spent the morning waiting to be seen. There was additional pressure from the paramedical staff who wanted to finish their responsibilities promptly.

Perceived behavioural control is also key. There was often the sense from doctors that they started with good intentions but outside factors soon de-motivated them (quote in Section 7.5). Doctor motivation is closely linked to systematic factors. Tunisians clinicians blame issues such as lack of resources as de-motivating factors. This is in line with qualitative studies elsewhere.[119,151,156] This might suggest that improving the health system with increased personnel and resources for example, may improve clinician motivation and therefore quality of care.

*Causes of low motivation*

Doctor frustration and de-motivation may be understandable given the heavy clinical workload and short time available to see patients. The current situation in Tunisia appears on the surface similar to primary care in the United Kingdom (UK) in the past. This may give the impression that improving chronic disease care is simply a matter of evolution and will occur automatically as a country develops economically. However, the issue is more complex and cultural differences are involved as described below.

A further issue in Tunisia, as with the UK in the past, is the low value given to primary care clinicians. They receive no postgraduate training and are not required to pass any postgraduate examinations (Section 1.3.5). The perception that primary care doctors are 'failed specialists' compounds the problem. Moves are currently underway to develop postgraduate training of primary care doctors in Tunisia through the launch of faculties of family medicine in the four medical schools.

As with most of the important factors, there is a strong interplay between clinician motivation and other barriers to good care. The interviews with clinicians suggest that even a motivated doctor might not be able to implement improvements to care if there are too many existing contextual barriers. A comparison of health centres B and C is illuminating. Both centres had clinicians who were initially motivated but one clinician admitted that he had failed to improve care, due to a lack of financial resources and personnel.

*Incentives to improve motivation*

Recent developments in primary care in the United Kingdom appear to suggest that financial incentives are an effective and relatively simple means of improving clinician motivation and quality of care. Since the introduction of the Quality and Outcomes Framework (QOF) in 2004, there have been substantial improvements in quality of care, based on QOF indicators, for care processes in clinical conditions that are subject to incentive payments, such as diabetes.[278,279] Similar improvements for conditions not incentivised do not appear to have occurred[280], suggesting that "if you pay for physicians to record something, they will record it".[281] However, many clinicians are concerned that the unintended outcomes of financial coercion are ultimately a loss of core values and a loss of motivation, based upon evidence showing that using external incentives to drive behaviour decreases internal motivation.[282] Even if Tunisia and other resource-limited countries had the required finances, this may not be an effective solution to improving clinical motivation and ultimately quality of care.

### 12.4.3 Patient health beliefs

Patient health beliefs appear to be playing a crucial role in diabetes care in Tunisia. Many of the issues that have emerged are not currently being addressed and warrant further debate and exploration.

*'Sugar'*

Worldwide, diabetes is often known as 'sugar' or 'sugar disease' in local dialects[153,273,283] as it is in Tunisia. Although this may be seen as a translation issue, a study of rural African-Americans demonstrated that patients who believed that they had 'sugar' had higher glucose levels than those who said that they had 'diabetes'.[153] Despite labeling their illness as 'sugar', Tunisians with diabetes perceive a closer link between emotional factors rather than dietary factors and their illness. This seems to be in contrast with the ideas of Ibn Khaldoun[1] from the fourteenth century who clearly perceived illnesses to be related strongly to diet and exercise (see quotes in Sections 6.3.2 and 6.3.3).

### *Ethnomedical models*

The local explanatory model of diabetes presented in this thesis is remarkably similar to models developed among Mexicans and American Hispanics where 'susto' (a fright or scare) and 'coraje' (anger or rage), similar to the Tunisian concepts of 'fejaa' and 'ghosh' respectively, are perceived to be the primary causes of diabetes.[128,155,283] Other causes noted amongst Mexicans are pregnancy/childbirth, diet, hereditary, exercise and God. Work amongst the Ojibway-Cree community of Northern Ontario, demonstrated a close association between the diet, in their case eating 'white man's junk food', and diabetes.[208] Stress and emotional triggers featured less significantly but a similar absence of physical activity was part of the local ethnomedical model. Medicines, both western and traditional, featured as treatments, but unlike our model, diet was also seen as a significant treatment modality.

In ethnographic work in Tanzania and among British Bangladeshis, diet emerged as the most important causal factor with anxiety and stress playing less significant roles.[152,273] An explanatory model from work in Cameroon did not include any emotional factors but did, like Tunisia, include mention of supernatural influences.[273] Similarly, ethnographic work in Ghana showed dietary and lifestyle theories to be predominant with spiritual causal theories also playing a role.[86]

The role of stressful life events in the onset of diabetes has been seldom studied in the developed world and the results are inconclusive.[284,285] Whether or nor they play a role, this perception can strongly influence patients behaviour and adherence to health advice.

### *Religious influences*

This study has shown a link between Tunisians religious practices and beliefs and diabetes care. Firstly, the month of fasting (Ramadan) has an effect on both consultations (reduced) and mean fasting glucose (increased). The ramifications of fasting on diabetes care are largely unknown.[286] A multinational study has showed that nearly half of Muslim patients with type 1 diabetes and a majority of patients with type 2 diabetes, fasted during Ramadan, with a significant increase in severe hypoglycaemic episodes.[239] Secondly, patient's religious convictions appear to be influencing their health beliefs. Although little research has been reported on the effect of Islam on health beliefs and behaviours, work has been done with African

American Christians with diabetes and theoretical models discovered may be relevant.[287,288] In one study, three types of effect of spirituality on diabetes care, particularly self-management, were conceptualised: God being in the background and the patient having primary responsibility for their care; God being in the forefront and thus the patient having little responsibility; God being the healer and the responsibility of the patient was to have enough faith to be healed.[288] Findings of this study would suggest that Tunisian Muslims with diabetes fall into the second group. Authors from the Middle East have reported the detrimental influence of fatalism on diabetes management in which poor adherence, uncontrolled diabetes and the presence of diabetes complications may be attributed to God's will.[87,289] Fatalism has been argued to be a key characteristic of Arab belief[224], which has serious implications if patients are to be encouraged to self-manage their diabetes. Patients with diabetes in Tunisia appear to have an external locus of control and believe that health outcomes are outside of their control, and this may put them at a special risk for health-related problems.[290] It is important to find educational interventions that work effectively with this concept.

### *Influence on adherence*

Prominent health beliefs appear to have an impact on patient adherence particularly to dietary recommendations. The omission of diet in the patients' explanatory model of diabetes may be the main cause of poor dietary adherence. This may be due to lack of patient education. Clinicians, the major providers of clinical care, do not appear to highlight the importance of dietary modifications, possibly due to lack of time. Most health centres do not have access to dietetic advice and other paramedical staff are not generally used in direct clinical care or patient education. If, as Haynes argues[94] (Section 2.5), interventions that address adherence are more important that effective medical treatments, then addressing patients' causal theories of diabetes is crucial.

### *Use of herbal medicines*

The use of herbal medicines was often referred to in the qualitative work but their use was generally not seen to be a barrier to the use of prescribed medicines. These results support increasing evidence from the developed world that the use of complementary and alternative medicine is not a barrier to use of conventional medical services.[126,127,128] The three most commonly mentioned herbs for the treatment of diabetes have all been quoted in the literature as potential hypoglycaemic agents, and are also used in other parts of the Arab world and India: *shiih* (white wormwood)[291], *qliil* (thyme)[292] and *zata* (rosemary).[293,294]

*Concept of time*

Waiting times to see the doctor and the time spent with the doctor did not emerge as leading factors, in contrast with studies from the western world where these are strongly related to patient satisfaction.[295] This is likely to be due to cultural differences regarding the concept of time and its importance.[296] The time spent by the clinicians in the health centres was strongly associated with process of care indicators in the univariate analysis, but this was found to be dependent on, and less important than, doctor motivation. Although evidence elsewhere suggests that longer consultation times are associated with higher quality of care[104], further work is needed in cultures with different perceptions of the concept of time

*Summary*

A cultural appreciation of people's understanding of their illness, its causation and its treatment is an essential step towards developing health interventions.[154,208,297] Several strong cultural health beliefs have emerged from this study that must be taken into account in order to tackle patient-related barriers to care.

### 12.4.4 Gender

The link between gender and diabetes care revealed a number of relevant issues.

*Attendance*

The high female to male ratio of patients attending for diabetes care in our study is striking. Over 60% of patients attending health centres for diabetes care are women, despite the fact that the prevalence is only slightly higher in women than men.[63] Although studies in the primary care setting from other countries have also demonstrated this disparity[31,34,76,298] it appears to be more pronounced in Arab countries.[299] This study has offered a number of explanations. Most participants considered that men were under represented at primary health care facilities. Reasons given for men not attending were practical (health centres are only open during working hours), financial (men can afford to pay for private health care) and behavioural (men tend to neglect their health). This would correspond to empirical research supporting the belief that men are reluctant to seek help from health professionals.[300,301,302] Although subject to cultural variation, findings from studies linking masculinity, culture and health can be generalised by the following statement by Williams[303]:

> "Beliefs about masculinity and manhood that are deeply rooted in culture and supported by social institutions play a role in shaping the behavioural patterns of men in ways that have consequences for health. Men are socialised to project strength, individuality, autonomy, dominance, stoicism and physical aggression, and to avoid demonstrations of emotion or vulnerability that could be construed as weakness."

Participants perceived women to be 'iller' and requiring more care. Reasons cited for the excess morbidity in women were hardship, suffering, family and home responsibilities. There was a belief that some women attended health care facilities more often than required. Some participants described health centres as a female domain at which women congregated to socialise, a female equivalent to the male-dominated coffee shops. This area of apparent inequality needs to be addressed in order to improve the quality of care of patients with diabetes in primary care.

*Quality of care*

Patient gender was not shown in this study to be associated with quality of care. However, many differences between men and women have been shown in addition to the disparate proportion of women attending the health centres. Women with diabetes attending health centres are younger than men, less likely to have type 1 diabetes, less educated, less likely to be working, less likely to be smokers and drink alcohol and more likely to have cardiovascular disease. These findings are to be expected in the Tunisian setting.[66,253] However, other significant gender differences are also shown; women are less likely to have their care recorded in the new medical records, their information is less complete and the time period until their next appointment is longer. This may suggest some positive bias towards the care of men with diabetes, which would support work by other authors that suggests differences in diabetes care of men and women with diabetes in other countries.[16,136]

## 12.5 Strengths and limitations of the study

*Principal strength*

This is one of the largest and most expansive studies undertaken so far on the factors influencing the care of diabetes in a low/middle income country. The major strength of this study is the combination of qualitative and quantitative approaches allowing thorough triangulation of the data and thus increasing both the validity and reliability of the findings. The strong correlation of findings from the different approaches confirms the value of this approach. Notably, the identical top three factors emerged with the strongest associations in both the quantitative and qualitative work (availability of medication, use of chronic disease clinics and clinician motivation). The combined approach has provided both breadth and depth to the topic under study. In addition, because this study is one of the first to be carried out in a low/middle income country the findings are more likely to be transferable to similar contexts than previous work in developed countries.

*Strengths of the qualitative work*

- The rigorous application of multiple qualitative methods ensured a broad range of opinions, though the utility of this aspect of the study does not depend on the generalisability of their results but on their utility in generating hypotheses and exploring them in some depth.
- The multiple qualitative methodologies allowed triangulation of the data and input from a variety of participants.
- The ethnographic approach has fully taken into account the cultural aspects of health care.
- The unique position of the researcher as an insider (medical professional) but also an observer (foreigner) facilitated effective participant observation.
- The use of a reflective approach takes into account subjective aspects of the research and thus improves the validity of the results.
- The detailed description of patient care at the health centres provides the context to the factors that influence care.

*Strengths of the quantitative work*

- The study includes an unusually large sample of patients with diabetes, considering it involved the manual collection of data from non-computerised records.

This size of sample is unlikely to be repeatable in most resource-constrained countries.

- The study covers the entire country and is thus nationally representative of the primary care, public health system in Tunisia.
- Patients and health centres were selected randomly thus reducing the confounding effects of other contextual factors that may have influenced the quality of care during the study.
- The study is one of the first anywhere to incorporate an extensive number and range of potential variables, including patient, health professional and organisational factors.
- The multivariate regression modelling allows for confounding variables and selects independent relationships with the quality of care indicators. The high $r^2$ values from the final models suggest that most of the variations in care are attributed to variables included in the study.
- The analysis was undertaken using the health centres as the unit of randomisation to allow for cluster randomisation, as recommended in primary care studies, in order to reduce the problem of contamination in patient randomised trials.[241,304] Weighted means were used to account for different numbers of patients selected per health centre.[305]
- The longitudinal study used appropriate statistical analyses for comparisons, such as repeated measures data for the outcome of care measures to exclude any potential bias caused by patient differences.
- A broad range of quality indicators was used based on processes, intermediate outcomes and medications prescribed.

Finally and perhaps most importantly, recent literature has highlighted the effectiveness and importance of undertaking operational research embedded in local programmes, including an understanding of the barriers to successful care and interventions.[306] Appropriately, the study was undertaken within the department that co-ordinates the Tunisian national program of diabetes, making the results immediately accessible and available to real-life practice (see examples in Section 12.6).

*Principal limitation*

The principal limitation of the overall study is that the qualitative and quantitative aspects of the study were undertaken simultaneously. Ideally, the qualitative work, including both the content and ethnographic analyses, would have been completed first in order to generate a list of hypotheses to be tested in the quantitative work. Undertaking the stages simultaneously has produced a number of hypothesized factors that were not included in the quantitative analyses (see Tables 11.1 – 11.3). Many of these factors were suggested from the literature reviews but were considered to be too complex to measure quantitatively, such as adherence issues, patient education and health beliefs. The quantitative data collection was commenced early to allow more time for language acquisition necessary for the qualitative interviews and focus groups. In addition, for the qualitative health centres to be purposively selected from known health centres, a sufficient number of centres had to be visited first within the quantitative data collection.

*Limitations of the qualitative work*

- The limited use of a second researcher. Ideally a team of qualitative researchers analyses data collaboratively. I sought, but was unable to find, a Tunisian experienced in qualitative research to assist in the analytic process.
- A potential bias of the study is the central role played by the researcher in the participant observation, interviews and data analysis. As mentioned above, the reflexive approach to the study has sought to use this as an advantage rather than a limitation.
- Listening to the recorded interviews revealed that some of the questions were closed rather than open, particularly in the patient focus groups. This may have prevented new themes and ideas from emerging. Interviewing patients in the health care environment where they have just seen a doctor or other health care professional may have discouraged them from talking negatively about their experiences. The perception that I was representing the DSSB and therefore the Ministry of Health may have also influenced participant's responses. In addition, responses of participants within the focus groups may have been influenced by social desirability.
- Although I studied Tunisian Arabic while living in Tunisia for three years prior to commencing the transcription/translation of the interviews and also used two

language assistants, a native Tunisian Arabic speaker may have picked up additional linguistic and cultural signs.

*Limitations of the quantitative work*

- The inclusion of over 50 potential factors, though more than previous studies, is not exhaustive and other unexplored factors may be playing a role. Although it is reassuring to note that the final models did explain most of the variations in quality scores observed, several factors emerged as other potential hypotheses from the qualitative, exploratory work.
- There are always risks when interpreting data from a descriptive study. An association between two variables does not infer causality and if one feature is associated with better quality of care indicators it may not be the case that its widespread introduction will improve control.
- Certain explanatory variables could be subject to bias. For example, availability of medication was based on reports from staff rather than an objective measure. In addition, doctor motivation was assessed subjectively and at a health centre level rather than on an individual clinician basis and thus variations in individual doctor characteristics could not be assessed.
- Process of care data relied on recording by clinicians in the medical records, and thus the process of care indicators are a measure of the quality of recording as much as quality of care. This is discussed at more length in Section 1.2.2 and is compensated by the use of multiple quality indicators including outcomes of care and medications prescribed. Poor availability of data in primary care records is an acknowledged practical barrier to measuring quality of care even in non-resource-limited countries.[307]
- The outcome of care measures are intermediate rather than long-term. Data on long-term complication rates, morbidity and mortality are not available in most settings and intermediate measures are the norm in this type of research.
- There were considerable problems with the national level data as discussed at length in Section 4.3, and therefore few strong conclusions have been drawn from these results.
- The quantitative data collection took longer than expected and time of data collection was clearly a potential bias considering the improvement in the quality

indicators observed. This was compensated for by including time of data collection as a variable in the univariate and multivariate linear regression analyses.

- Ideally HbA1c results would have been used as the proxy for good glycaemic control rather than fasting glucose, but the reality for most low/income countries is that this test is expensive and not readily available.[26,29,33,259] As expected, the fasting glucose values correlate closely to the available HbA1c results in the study patients, although the equivalent levels of HbA1c (7.8mmol/l for good control, 8.8mmol/l for poor control) used as quality indicators are higher than would be recommended currently. Similarly, LDL-cholesterol and triglycerides levels would ideally be used rather than total cholesterol but they have only recently become available.
- The intraclass coefficients (Cronbach's) are low for the outcome of care scores. Previous authors have commented on the finding that correlations are usually higher for process than for outcome variables due to outcomes being determined predominantly by individual characteristics rather than health centre characteristics.[15,76]

### 12.6 Implications for clinical practice

This study has important implications for clinical practice in Tunisia and other low/middle income countries. In particular, many of the cultural findings are likely to be transferable to the Arab world and Arabs living in other nations. Ideally all the findings should be evaluated in other settings but it is unlikely that such a large, encompassing study can be undertaken in every context, particularly in resource-limited nations. The implications will be discussed within the context of the Tunisian setting, but it is also recommended that clinicians, managers and health policy makers from other low/middle income countries take these results into consideration in order to develop and implement culturally appropriate, quality improvement interventions. The implications will first be considered within the context of the chronic care model. Important issues regarding the national program, the role of health professionals and resource allocation will then be covered prior to offering a number of other potential national and health centre-level strategies. Finally, strategies to disseminate the results nationally and internationally will be presented.

### *Chronic Care Model*

The Chronic Care Model (CCM) and the Innovative Care for Chronic Conditions (ICCC) framework, described in Section 1.1.5, aim to help healthcare systems improve chronic disease care.[37,38] A review of the literature suggests that most successful chronic disease improvement strategies are consistent with concepts and components of these models.[308] It is therefore useful to place the implications of the findings of this study within the context of the components of these models.

1. Self-management support. Self-management of diabetes in Tunisia is limited and initiatives to enable patients to care better for their illness would seem appropriate. These initiatives must take into account the patient health beliefs that emerged from this study, such as the ethnomedical model of diabetes causation and the perceived central importance of access to medications.
2. Delivery system design. In order to significantly improve care, the primary health care system in Tunisia needs to adapt. Culturally-sensitive ways of allowing clinicians more time with patients are needed and perhaps more importantly, the roles of non-physician members of the clinical team should be developed (see next section).
3. Decision support. No evidence was found in this study for the didactic, hospital-based training in diabetes that clinicians were being offered within the national program. The co-ordinators of the Tunisian national program have started to seek methods of providing healthcare providers with access to the expertise necessary to care for patients through alternative means, such as clinical-based workshop seminars.
4. Clinical information systems. This study has shown an association between the use of chronic disease clinics (and possibly disease-specific medical records) and improved quality indicators. Their continued use and other information systems, such as audit and feedback[309] should be considered within the Tunisian context.

In addition to these four components of the CCM, the ICCC, which was adopted particularly for use in developing countries, includes community and policy components. At the community level, this study has illustrated the strong influence of family within Tunisia (Section 6.3.12). Employing the use of family members, or developing local community health workers, to aid patient adherence and education, could be potential developments. At the policy level, the establishment of the national program of diabetes and hypertension in Tunisia displays the willingness of the Ministry of Health to address these important conditions. Some components of the national program appear to be associated with improved care and it seems appropriate, therefore, to endorse the WHO recommendations that each country introduce its own national program[310], with the proviso's discussed below. The ICCC framework also stresses the importance of consistent financing, an area which will need to be addressed at a governmental level.

In addition, the framework calls for organised, well-equipped and motivated health care teams. The findings of this study confirm the importance of these elements; nonetheless, incorporating improvement strategies is a difficult task in practice. A program to investigate further the issue of motivation is described below.

### *The national program*

A foundational issue that the findings of this study address is the controversial debate surrounding culture versus science. Can a chronic disease national program based on western evidence and western clinical practice be employed in an eastern setting with the same expected results? This study suggests that the answer is both yes and no. It does appear that good diabetes care can be achieved in some Tunisian health centres and some of the components of the national program are associated with improved quality care indicators (such as chronic disease clinics). However, the qualitative components of this study suggest that there are several areas where cultural and resource issues have not been addressed. The national program appears to have caused heavy reliance on the provision of medication to the detriment of other issues such as dietary modification. The lack of adherence to dietary and exercise advice may be due to attempts to promote a western, individualistic form of healthy lifestyle, inappropriate in a setting where society and the family strongly dictate what an individual does and eats.[224] No reference is made in the Tunisian national program or its components to issues such as maintaining doctor motivation, patient's explanatory ideas of diabetes or resource location. Patient education emerged as an important factor but no association was found between patient education sessions recommended in the national program and improved quality of care at the health centres. This suggests that the education provided may not be effectively dealing with relevant patient ideas and beliefs.

This study strongly supports the idea that quality improvement strategies must be culturally appropriate and based on an understanding of contextual barriers to and facilitators of good care. The Tunisian national program must be developed to incorporate Tunisian cultural characteristics and health beliefs and practices.

### *Role of health professionals*

A key issue in the Tunisian primary care setting that needs addressing is the clinician's heavy workload. Doctors cannot be expected to provide a high level of care in less than six minutes, with the additional pressure of a large number of patients waiting to be consulted. The provision of additional physicians has heavy and probably unrealistic resource implications. Instigating appointment times may appear to be a straightforward solution but culturally may not be acceptable or appropriate. A more suitable solution may be found in increasing the role of paramedical staff. This study has illustrated the primary role that doctors take in clinical care with nurses predominantly taking clerical roles. A transfer of clinical roles for procedures such as blood pressure examination could improve patient care and may develop teamwork and improve staff motivation. Equally, patient education could be carried out by paramedical staff. Doctors in Tunisia acknowledge that they don't have time to educate patients adequately. In contrast, nurses were found to be more aware of dietary adherence issues and their lack of a clinical role may be one of the reasons for poor patient dietary adherence. In developed nations, nurses are increasingly replacing clinicians in caring for patients with diabetes. A systematic review from developed countries suggested that appropriately trained nurses can produce as high quality care as primary care doctors and achieve as good health outcomes for patients.[311]

### *Resource allocation*

Resource allocation is a crucial issue for all countries, but particularly for low and middle-income countries. Interventions need to be chosen carefully to make the most effective use of the limited resources available for diabetes care. The 'circle of blame' (Section 6.3.8) illustrates the central role that resources play in all aspects of care and these issues must be addressed. Health intervention programs involving high levels of resource, such as information technology, cannot be imitated in most countries. Original ideas may need to be developed and tested in each context, such as using family members or key members of the community to educate and follow-up patients. All new intervention strategies should ideally be evaluated and their cost-effectiveness assessed.

*Other national-level strategies*

The central themes that emerged form this study (Section 12.4) suggest a number of areas that need consideration by health policy managers at a national level.

- Access to medication is perceived and demonstrated to be of vital importance in the management of diabetes at primary care health centres. The majority of regions have made the provision of medication for patients with diabetes and hypertension a priority and this should be encouraged. In addition, health professionals must be made aware that their patients perceive the prescription to be *the* reason for attendance, and should appropriately encourage self-management and adherence to other elements of diabetes care, such as diet and exercise.
- Doctor motivation is one of the most important factors affecting care. Further work is vital to discover the various aspects of motivation within this context. Measures should be taken to improve the motivation of doctors working in the health centres. Audit and feedback, rewarding good care (noting the problem of incentives described in Section 12.4.2) and addressing systemic de-motivating factors are all potential means of improving motivation and warrant further evaluation.
- Socio-economic factors are relevant particularly at a regional level. Measures should be sought to positively assist less affluent patients and in particular to assist health centres in less affluent regions.
- Gender issues, particularly the attendance discrepancy warrant attention. Although men with diabetes may be attending care elsewhere, it is recommended that steps are taken to make the health centres more accessible to men and, when appropriate, to address the issue of gender and health-seeking behaviour.

*Health centre-level strategies*

All the implications discussed so far have broad national and international implications. This study also reveals a large number of health-centre level strategies that could potentially improve patient care. The finding that high levels of care are potentially achievable at some primary care health centres, despite resource and systemic constraints, suggests that health centre-level changes are feasible and potentially significant. Suggestions based on this study, particularly 'good practice ideas' listed in Appendix 6.3, are:

- Implementing a 'circuit of care' in which patients are seen in turn by various paramedical staff as well as the physician.
- Encouraging the efficient use of the time patients are required to wait, such as the provision of culturally-sensitive health education.
- Encouraging health professionals to address the issue of patient adherence and lifestyle issues.
- Suggesting clinical teams meet to discuss their care of patients with chronic illnesses in order to encourage contextually appropriate interventions.
- Encouraging clinicians to record blood pressure accurately, rather than to the nearest 10mmHg.
- Suggesting practical ways of training paramedical staff.
- Addressing the area of self-monitoring and cultural health beliefs on a local level.
- Involving the use of the family and local community in maintaining patient adherence and self care.

*Dissemination of results within Tunisia*

A full report of the study was translated in to French and submitted to the Tunisian Ministry of Health for consideration. A list of recommendations was proposed by myself and my colleagues at the primary care department (Appendix 12.1) based on the implications for clinical practice described above. In addition, the results of the study have been presented at meetings of the regional national program medical co-ordinators and the regional medical directors. A summary of the results by region has been given to the 24 regional health directors. As a result, a number of regional co-ordinators are using the study findings to initiate quality improvements in their local areas.

The emerging results of the study were discussed at each stage of the project with the coordinators of the national program. They would offer their comments and feedback and discuss the practical application of the results to the program. Examples of findings from the study that have already influenced the national program are:

- Early quantitative results which demonstrated very low levels of eye examinations encouraged the development and training of general practitioners undertaking fundoscopy and the provision of ophthalmoscopes at some health centres.

- The lack of association between doctor training and quality of care, which confirmed the impression that the style of teaching (didactic and hospital-based) was inappropriate. This helped to stimulate the introduction of seminar workshops.
- The evidence that some components of the national program are associated with improved quality of care, which has encouraged the continuation and development of those elements (chronic disease clinics and disease-specific medical records).

The co-ordinators of the national program are keen to continue the development and testing of further interventions, as described below, particularly around the area of doctor motivation.

*Dissemination of results internationally*

In addition to assisting Tunisia, it is hoped that the results of this study will be helpful to other low/middle income countries as they seek to improve the care of growing numbers of patients with diabetes. With this in mind, the results have been presented at several international conferences (International Diabetes Federation, Pan Arab Congresses on Endocrinology and Diabetes, DiabetesUK, Alfediem, European Association of the Study of Diabetes, International Diabetes Epidemiology Group Meeting and the Conference on the Metabolic Syndrome and Prediabetes) and a number of papers have been published to publicise the findings.

Two papers were published based on the early quantitative results, demonstrating the wide variation in care but also highlighting the fact that high quality care is possible in countries such as Tunisia.[249,312] An analysis of the interim results showed clear improvements in care related to the new disease-specific medical records and the results were published to encourage their introduction in settings without the resources to use computer technology.[313] A paper reporting the apparent improvements in standards of care since 2000 has been published.[314] The final results of the multi-variate analysis are to be published in *Diabetes Care*, describing the five significant factors significantly associated with the cumulative process and outcomes of care.[315]

The results of the content analysis have been reported and are being considered for publication. A paper based on the ethnographic results, particularly highlighting the prime importance of medication, is in preparation. Plans are underway to report the ethnomedical model that emerged, with an anthropologist who undertook similar work in Cameroon and Tanzania. Reports have been published on the national program[316] and the barriers and facilitators to care[317] and two letters published in primary care journals.[318,319] Copies of all published papers have been included in Appendix 12.2.

## 12.7 Future research needs

Future research needs following this study can broadly be grouped into three areas: within Tunisia, within similar low/middle income countries and worldwide.

*Within Tunisia*

These results provide evidence of the factors influencing the care of patients with diabetes in primary care in Tunisia. A follow-on project has been proposed to identify, design and test feasible interventions that could further improve the quality of care. These steps follow the Medical Research Council (MRC) framework for the development and evaluation of complex interventions.[297] The project has four stages:

1. A theory-based interview survey of primary healthcare professionals to define and detail the role of doctor motivation and other modifiable factors in determining the quality of care.
2. Engaging stakeholders within primary care in the systematic identification and development of targeted, feasible and sustainable interventions to improve the quality of diabetes care.
3. Pilot the implementation of promising interventions in a number of primary health care centres.
4. A randomized, controlled, quality improvement trial within primary care health centres to test and evaluate the candidate interventions.

The identification, design and testing of appropriate and feasible interventions will be integrated into the existing system and carried out using the resources available for eventual scale-up.[306]

*Within other low/middle income countries*

Although the results of this study are more transferable to other similar contexts than previous work from high-income nations, the findings need to be tested and confirmed elsewhere. In particular, factors that emerged as potential barriers or facilitators to care that were not tested quantitatively, such as the issue of patient education and health beliefs, need to be evaluated. Ideally, quality improvement trials as proposed for Tunisia (see above) should be instigated within other similar contexts of clinical care.

*Worldwide*

Many of the factors that have emerged from this study as potentially influencing diabetes care have not been evaluated even in high-income countries. Further research is needed in all settings worldwide to assess the influence of factors such as clinician motivation, the use of herbal medicine and the role of gender, on diabetes care. The role of cultural health beliefs must be evaluated in all multicultural societies. International collaborations to compare and contrast factors affecting care in different contexts would assist health policy makers in selecting and implementing culturally-appropriate and feasible health interventions worldwide.

## 12.8 Summary

The context of care of patients with diabetes in the primary care setting in Tunisia has been described and discussed. The most important identified factors influencing quality of care are the availability of medications, doctor motivation and the use of chronic disease clinics. Additional major themes that emerged from this study are the perceived central importance of access to medications, the influence of patient health beliefs, gender and financial issues. The results have major implications for Tunisia and other similar countries seeking to initiate and improve culturally-relevant intervention strategies for diabetes care.

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