

School of Physiotherapy

The prevalence of urinary continence among women in Oman

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Declaration

To the best of my knowledge and belief this thesis contains no material previously published by any other person except where due acknowledgment has been made.

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university.

Signature:

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The location of Oman



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Abstract

Background

Urinary incontinence (UI) is widespread among women globally; however, most data is from women in developed nations. In Oman the prevalence and population specific risk factors for UI are unknown. To establish the prevalence of UI among Omani women and the impact it has on their daily lives will inform and justify the development of health education and treatment programs including physiotherapy. Moreover access to treatment for affected women is extremely limited, particularly in rural areas. In Oman the role of physiotherapists in relation to continence and women's health is not widely recognised despite good evidence that physiotherapy treatments are effective for UI. At present in Oman continence physiotherapy services are very limited and only available in the capital city Muscat.

A variety of risk factors for UI have been identified, the impact of which appears to differ between age groups, hormonal status, and racial and cultural backgrounds. The importance of individual risk factors on UI appears to differ although it should be acknowledged that some of these apparent differences may also relate to differences in study design. The present study focused on the following risk factors; age, pregnancy, childbirth, parity, obesity, lower urinary tract infection, diabetes, drugs, constipation, menopause and coffee consumption

The general aim of this doctoral research was to investigate the prevalence of urinary incontinence in Omani women. The study was conducted in three main parts; the development of a questionnaire, the testing of the questionnaire on a smaller test group to determine appropriateness, and the application of a finalised questionnaire to survey a group of 800 women over all regions of Oman. The details of the three parts are described below.

Aims

- A) The aim of this study was to develop a valid and reliable questionnaire to determine the prevalence of UI, UI subtypes, risk factors, severity, associated bother, and care seeking among Muslim Omani women.
- B) The aim of this study was to pilot test the prevalence of UI in Omani women in Seeb sub-region (Wilayah) and to determine the risk factors associated with UI.
- C) The aim of this study was to investigate the prevalence of UI among Omani women within all Oman regions and to determine the risk factors associated with UI, and the influence of UI on their daily lives.

Study Design

The current cross-sectional study covers the whole of Oman, sampling women ≥ 18 years old from each region of Oman. This was achieved by designing a valid and reliable questionnaire that was administered to Omani women via a structured interview in either English or Arabic to determine the prevalence of UI, UI subtypes, risk factors, severity, care seeking and bothersome among Omani women. Items incorporated include demographic characteristics; gynaecological and obstetric history; UI and the UI subtypes; risk factors; severity; and the impact of UI on lifestyle that has been previously identified.

Consistency of responses to the questionnaire was first tested with 15 Muslim women by administering the questionnaire twice, once in English and once in Arabic one week apart.

Following that a pilot study was conducted to test the prevalence of UI in Omani women in the Seeb Wilayah (district) of Muscat, the capital of Oman, and to determine the risk factors associated with UI. One hundred and twenty women aged

≥18 years were recruited from randomly selected households within Seeb. Data were collected door-to-door using the above-mentioned questionnaire and non-Muslim or non-Omani women were excluded. This study enabled the sampling, data collection and data management process to be evaluated and fine-tuned prior to the national study.

Study Population

The study sample for the development of the questionnaire (Part A) recruited 15 Muslim women, 10 from Perth and 5 from Oman, who were fluent in both Arabic and English languages. Each participant was interviewed with both the Arabic and English language versions of the questionnaire to determine the reliability of the questions.

The Seeb field study (Part B) collected data from 120 women living in Seeb, Muscat. Omani women aged ≥18 years were recruited, study subjects were randomly selected from households from census maps. Each participant was interviewed in either English or Arabic to test the sampling and methods, and to identify any problematic questions.

The final, main study (Part C) recruited 800 Muslim Omani women aged ≥18 years. The study sample was recruited from randomly selected households in all regions of Oman. Study subjects were randomly selected from households from census maps. The current study sample included women from urban and rural areas. Non Muslim women were excluded.

Part A

The results for Part A showed the questionnaire was reliable with semantic equivalence between languages.

Part B

Part B was conducted in Seeb, Muscat. One hundred and twenty women were recruited, and 118 accepted to participate. The prevalence of UI among the study population was 52.5% (62), of which 53.2% (33) had stress UI, 22.6% (14) had urge UI and 24.2% (15) had mixed UI. Severity of UI was slight in 26 (42%) women, moderate in 28 (45.0%) women and severe in 8 (13%) women. Bivariate logistic regression showed that sneezing related to allergy, obesity, lower urinary tract symptoms, and chronic cough were significantly associated with UI with odds ratio (OR) and 95% confident interval (CI) = (7.1; 2.2-22.4), (2.2; 1.05-4.7), (2.3; 1.02-5.2) and (3.8; 1.005-14.4) respectively. However, stepwise logistic regression analysis revealed that sneezing was the only variable significantly associated with UI. Minimal changes for the questions and questionnaire format were undertaken prior to commencing Part C.

Part C

Overall 792 of 800 women approached agreed to participate, response rate of 99%. Prevalence of UI was 42.9% , 22.7% had stress UI, 3.3% had urge UI, and 16.9% had mixed UI. Mean (SD) parity was 5.3 (4), 18.7% of women were post-menopausal 12.8% peri-menopausal and 68.6% pre-menopausal. Risk factors associated with UI included lower urinary tract symptoms (OR 2.7; 95% CI 1.9-3.7), obesity (OR 2.2; 95% CI 1.6-3.0), sneezing associated with allergy (OR 1.7; 95% CI 1.2-2.4), nocturia (OR 1.1; 95% CI 1.3-2.3), constipation (OR 1.5; 95% CI 1.1-2.1), parity (OR 2.6; 95% CI 1.7-3.8), and coffee consumption (OR 1.4; 95% CI 1.0-1.9). Of affected women, 28.3% reported UI caused difficulties performing prayers, 29.1% these difficulties extremely affected their routine of prayer, 88.5% needed to change their clothes but only 20.5% consulted a health professional and only 28%

were bothered by the condition UI. Severity of UI was, slight in 74.7% (n=592), moderate in 14.3% (n=113) and severe in 11% (n=87) Circumcision, diuretics, chronic cough, menopausal status and diabetes were not predictors of UI.

Conclusion

A suitable questionnaire was developed to administer as an interview to Muslim women in English or Arabic and determine whether they have UI.

The prevalence of UI **was** high among Omani women in the Seeb wilayah in Muscat.

The risk factors associated with UI are amenable to prevention and treatment with increasing the level of awareness among the community. Consequently, this might significantly help the health professional in the management of UI symptoms; therefore, reducing the burden of this condition.

There is a high prevalence of UI among a national sample of Omani women. Many of the women who were affected were bothered by the condition, particularly with respect to praying, an important feature of daily life in this culture. Risk factors associated with UI are consistent with previous studies in other countries. These findings support the need for UI treatment programs for women in Oman

Key Words: Epidemiology, Prevalence, Urinary incontinence, Omani women, Women's health

List of Conference Presentations

The prevalence, risk factors, severity, quality of life and care-seeking of urinary incontinence among Omani women in Seeb. In Abudhabi for a conference (1st UAE International meeting on diagnosis and treatment of the neurologic bladder in children and adolescents (March 20th Abudhabi 2008).

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The Prevalence, Risk Factors, Severity, Care Seeking and Impact of Urinary Incontinence in Omani Women: Abstract accepted WCPT 2011 Amsterdam

List of Abbreviations

APA	Australia Physiotherapy Association
ADL	Activities of Daily Living
AIHW	Australian Institute of Health and Welfare
BC	Before Christ
BMI	Body Mass Index
BFLUTS	Bristol Female Lower Urinary Track Symptoms ‘International
CI	Confidence Interval
Eg	For example
EPICONT	Epidemiology of Incontinence in the County of Nord –Trondelag
ICC	Interclass Correlation Coefficient
ICS	International Continence Society
ICIQ-SF	International Consultation Incontinence Questionnaire Short Form’
IEA	International Epidemiology Association
IRDM	Insulin-requiring
FGM	Female circumcision or female genital mutilation
FLUTS	Females Lower Urinary Tract Symptoms
GCC	Gulf co-operation council
GP	General Practitioner
HR	Human Research
K	kappa
LUTI	Lower Urinary Tract Infection
LUTS	Lower Urinary Tract Symptom
MUI	Mixed Urinary Incontinence
n	Number
NIRDM	Non-Insulin-Requiring
NSW	New South Wales
OR	Odds Ratio
OAB	Overactive bladder

PASW	Predictive Analytic Software
PHC	Primary Health Care
PFM	Pelvic Floor Muscle
QoL	Quality of life
RR	Relative Risk
RDD	Random Digit Dialling
SPSS	Statistics Package for the Social Science
SQUH	Sultan Qaboos University Hospital
SUI	Stress Urinary Incontinence
UAE	United Arab Emirate
U I	Urinary incontinence
UK	United Kingdom
UNICAMP	University of Campinas
USA	United States of America
UUI	Urge Urinary Incontinence
WA	Western Australia
WHO	World Health Organisation

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Chapter 1 Introduction

Urinary incontinence (UI) is a worldwide problem. Approximately 200 million people suffer from the condition (Abrams et al. 1999). Urinary incontinence affects both women and men however the prevalence among women is approximately three times higher than among men (Minassian et al. 2003). Anatomical and physiological differences between males and females, such as female reproductive and hormonal changes associated with pregnancy and menopause may cause the symptoms of UI to be more common among women (Avellanet et al. 2003). Those changes are some of the risk factors for UI. More risk factors and additional detail will be included in the literature review (Chapter Two). Risk factor such as frequency and time of leakage are the tool to measure the UI severity (Sandvik et al. 2000).

Urinary incontinence has major social and hygiene consequences for those who are affected. It has unique implications for Muslim women who need to pray five times daily and cannot do so if their clothing is even minimally soiled. Consequently, affected Muslim women may need to change their clothes several times each day (Rizk et al. 1999; Saleh et al. 2005). Few studies about the prevalence; risk factors and consequences of UI have been conducted in the Gulf Co-operation Council countries (GCC), (Bahrain, Kuwait, Oman, Qatar, Saud Arabia and United Arab Emirates (UAE), however, two studies in the UAE and Qatar have reported that women who suffer from UI have difficulties performing their prayers (90% and 64% respectively) (Rizk et al. 1999; Saleh et al. 2005).

Although the physical effects may not be clinically life threatening, the symptoms can have a demoralizing effecting on QoL of those affected (Abrams et al. 1999; Getliffe and Dolman 2003). In general, UI adversely affects daily activities, social

relationships, health and wellbeing. Women who are suffering from UI have reported depression, higher levels of anxiety, more stigmatisation and have poorer life satisfaction in all age-groups compared with women who are continent (Getliffe and Dolman 2003; Hägglund et al. 1999; Saleh et al. 2005). It follows that UI and the disability associated with UI have economic inferences for the affected individual, their career, family and society (O'Donnell et al. 2005). Embarrassment and ignorance about the condition prevents many people from seeking help (Getliffe and Dolman 2003; Saleh et al. 2005).

1.1 Significance of the study

More studies are necessary for two main reasons. Firstly the impact of incontinence on the health of affected women; both physical and psychological, and secondly the economic cost of urinary incontinence, which is difficult to estimate but which is known to be considerable. There are effective treatments for UI. Physiotherapy and other treatments of UI are both justified by improvement in the QoL of women suffering from UI (Bø 2003; Steg 1992).

To date, the majority of studies have been conducted in white women living in developed nations. As there is now an abundance of crude prevalence data for these women, the International Continence Society (ICS) recommends further epidemiological studies in the developed countries should be analytical in nature and make use of validated tools. Longitudinal studies in these groups are desirable to better understand the predictors and cofactors. In contrast, in developing countries such as Oman, where prevalence is not known, the ICS strongly encourages descriptive epidemiology and recommends studies should be “tailored to the cultural, economic and social environment of the population of interest” (Abrams et al. 1999).

Anecdotal evidence and the lifestyle characteristic of Omani women suggest that the prevalence of UI may be high. Establishing the prevalence of UI in Oman will inform the development of health education and treatment programs for local women. Although all affected Omani women are likely to benefit from such interventions, younger women may be more inclined to seek treatment. Therefore it is also important to gather data on the knowledge of older women about UI and the impact it has on their lifestyle.

In developed nations, physiotherapists are involved in promoting the health of women through antenatal exercises, management of UI with pelvic floor exercises, biofeedback, cone therapy and electrical stimulation, as well as health education. However, in Oman, the role of Physiotherapists in relation to women's health education and UI treatments is not widely available. Limited inroads have been made, starting 15 years ago, but they remain limited to the capital city only (Muscat). Therefore there is a need to establish the scope of the problem of UI to justify the requirement for more physiotherapy services specialising in this area, and for better collaboration between urologists, gynaecologists and physiotherapists. Collaboration between disciplines will be essential to develop better health services for for Omani women with UI.

This is a pioneer study intended to determine the prevalence of UI in Oman. The result of this study will be a key for the promotion of physiotherapy to tackle the problem and therefore reduce the number of women suffering from UI.

1.2 Statement of the problem

Urinary incontinence has already been identified as a public health problem internationally, and can affect the QoL for women living with this condition.

In Oman, this problem has not yet been addressed adequately, either because of shortage of expertise, or because of cultural beliefs associated with UI among Omani women. Reluctance to discuss UI results in many women facing this problem suffering in silence rather than seeking help. As there are effective treatments available, untreated UI may lead to unnecessary disabilities, plus social and psychological problems.

1.3 Aims of the study

The aims of this study were to investigate the prevalence and risk factors for UI in Omani women and to determine how much of a negative influence UI had on their daily life.

1.3.1 Specific Objectives

1.3.1.1 Part A

Generate a suitable survey tool to be administered as an interview to Omani women to determine whether they have UI and, if so, whether their symptoms are of stress urinary incontinence (SUI), urge urinary incontinence (UUI) or mixed urinary incontinence (MUI). Data to examine relationships between putative risk factors and UI will be collected in the same survey. As there is not a universal first language in Oman, the survey tool was required be suitable to be administered in more than one language. Arabic and English are the predominant first languages in Oman; hence the survey tool was developed for use in both languages.

1.3.1.2 Part B

Pilot test the sampling and survey methods in 120 women from one wilayat (suburb) Seeb, Muscat region. This pilot study would generate data regarding the prevalence, severity and risk factors of UI in Omani women in the suburb Seeb located in Muscat the capital city of Oman. Secondary aims were to establish whether UI bothered

those women affected; what impact it had on their activities of daily living, particularly on their routine of prayer; and whether and where they would seek care for it.

1.3.1.3 Part C

In a population based study to determine the prevalence of UI in Oman, plus the severity and risk factors of UI in Omani women. Secondary aims were to establish whether affected women were bothered by UI; the impact it had on their activities of daily living, particularly on their routine of prayer; and whether a they would seek treatment for it.

1.4 Review of the chapters

In this chapter the topic of the thesis has been introduced including a statement of the problem, aims and objectives.

In Chapter 2 of the relevant literature relating to UI is reviewed. The prevalence, incidence, risk factors and the continence promotion by physiotherapy services are highlighted.

In Chapter 3 the research methodology is outlined including the process used to collect data and the methods employed to analyse the data. The chapter describes the research setting, the study design, the study sample, the pilot study and the reliability of the research instruments. Finally, the ethical considerations regarding the study are reported.

Chapter 4: Presents results of the data of these studies.

Part A: The development of a questionnaire to, study the epidemiology of urinary incontinence among Muslim women in Oman

Part B: The Prevalence, risk factors, severity, quality of live and care-seeking of Urinary Incontinence among Omani Women in Seeb

Part C: The prevalence, Risk Factors, Severity, Care Seeking and Impact of Urinary Incontinence (UI) IN Omani Women

Chapter 5: Discusses the results of the study, recommendations and conclusion.

Chapter 2 Literature Review

2.1 Introduction

Urinary incontinence is a common symptom that may affect women of all ages. (Wagg et al. 2007). The International Incontinence Society (ICS) defines UI as the complaint of any involuntary leakage of urine (Abrams et al. 2009). Urinary incontinence has been divided into a number of different types according to the presenting symptoms and underlying pathology. Types include stress urinary incontinence (SUI), urge urinary incontinence (UII), and mixed (MUI) (Abrams et al. 2003; Abrams et al. 2009; Hunskaar et al. 2000; O'Donnell et al. 2005).

2.2 Definition of Urinary Incontinence

2.2.1 Stress Urinary Incontinence (SUI)

Stress Urinary Incontinence is defined by the ICS as the “complaint of involuntary leakage on effort or exertion” (Abrams et al. 2009 p335). It occurs in the absence of detrusor contraction during activities such as exercises, lifting or when there is a sudden increase in intra-abdominal pressure such as occurs with coughing, sneezing or laughing (Abrams et al. 2003; Diokno 2003; Laycock and Holmes 2003).

2.2.2 Urge urinary incontinence (UII)

Urge urinary incontinence is the “complaint of involuntary leakage accompanied by or immediately preceded by urgency”. Urge UI is often part of a collection of symptoms involving urinary urgency, frequency and nocturia and together they are termed overactive bladder (OAB) syndrome. Urge incontinence is usually unpredictable and can range from a few drops of urine to total loss and can occur in any position and any time, day or night. The leakage in UII can be triggered by various factors such as “key in door” syndrome, emotional factors, changes in body

position, or the sight or sound of the running water, and can be worsened by caffeine, diet drinks or alcohol. UUI may be associated with dysuria, indicating the presence of infection or inflammation of the bladder or urethra (Abrams et al. 2009; Hunskar et al. 2004; Wijma et al. 2003).

Overactive Bladder (OAB) has been defined as “urgency with or without urge incontinence usually with frequency and nocturia in the absence of an underlying metabolic or pathological condition”(Abrams et al. 2009, p334).

2.2.3 Mixed urinary incontinence

Mixed urinary incontinence is “the combination of involuntary leakage associated with urgency and also with exertion, effort, sneezing or coughing” (Abrams et al. 2009, p334).

To assess the prevalence of UI in population studies using questionnaires the presence of UI relies on self-report. Early recommended definitions of UI required objectively demonstrable loss of urine (Bates P 1979), however these definitions are not practical for large epidemiological studies. The ICS has defined UI as any involuntary loss of urine. This definition is suitable for large epidemiological studies (Abrams et al. 2009; Hunskar et al. 2004; Lasserre et al. 2009), and will be used for the studies in this thesis. When interpreting the epidemiological literature it is important to note the definition used as this may influence interpretation of the findings of the studies. Definitions that have been used in earlier studies are summarised in Table 2.1.

Table 2.1 Different definitions for UI in different studies

Author (year)	Definition
Abrams et al. (2003) Kocak et al. (2005) Hunikaar et al. (2004) Hannestad et al. (2000) Lasserre et al. (2009)	“Any involuntary leakage of urine”(new) ICS
Dolan et al. (2003) Steg et al. (1992) Eliasson et al. (2001) Minassian et al. (2003) Abrams et al. (1999)	ICS defined “UI as a social or hygienic problem and is objectively demonstrable”
Roberts et al. (1998)	“In the last year, have you had slow leakage or dribbling throughout the day?”
Eliasson et al. (2004)	“Have you ever experienced urinary leakage?”
Chiarelli et al. (1999) Rekers et al. (1992) López et al. (2009)	“Loss of urine in the past 12 months or previous year”
Rizk et al. (1999) Saleh et al. (2005)	“Any involuntary leakage of urine or accidental loss of control of urination in inappropriate times or places regardless of its severity, frequency or social or hygienic consequences in the last 12 months”
Peyrat et al. (2002)	“Do you currently have involuntary leakage of urine?”
Adaji et al. (2010)	“When do you leak urine?”
Scarpa et al. (2006)	“Complain of an involuntary leakage on effort or exertion, or sneezing or coughing”
Fultz et al. (2000)	“Have you had involuntary leakage or lost any urine at all, other than a few drops right after urination?” (past 6months)
Vinker et al. (2001)	“Any urinary incontinence, past or present”
Zhu et al. (2010)	“Involuntary leakage associated with urgency and also exertion, effort, and sneezing or coughing.”
Murray (2002)	“Do you have UI diagnosed by a health professional?”
Markland et al. (2009)	“Over the past 12 months, how often do you have difficulty holding your urine until you can get to a toilet?”
Hsieh et al. (2008b)	“Have you had the experience of involuntary urine loss during daily activities?”

2.3 Epidemiology of UI

Epidemiology studies the prevalence and incidence of diseases, to enable researchers to determine the magnitude and distribution of any health problem and for projecting the need for health and medical services (Abrams et al. 1999). Prevalence is defined as the number of people affected within a defined group of respondents and at a defined time point. For the cross-sectional surveys presented in this thesis, the prevalence of UI was defined as the proportion of the number of incontinent respondents to the number of all respondents in the survey.

When there is little or no information about the incidence and/or prevalence of a condition in a population descriptive studies are indicated (Portney and Watkins 2000). In general, descriptive studies provide the foundation for more precise studies with comparison groups or longitudinal data (Grimes and Schulz 2002). In Oman the prevalence of UI is unknown indicating the need for descriptive epidemiology. The studies presented in this thesis were undertaken to address that need. In addition to simply descriptive epidemiology data were collected to examine the risk factors applicable to that population. Lifestyle and culture vary between urban and rural areas in Oman that may influence.

Significantly between Muscat and other regions in Oman. Different factors may affect the prevalence in Muscat and the different regions for example in Muscat many women participate in physical activities such as walking, swimming, and attending gym, whereas in other regions women are more sedentary. In Muscat the majority of women are in the work force compared with the other regions where many are performing mainly home duties, therefore the collecting time for Muscat was changed according to their time and was after working hours. In Oman it is proposed that women are circumcised (Elchalal et al. 1999) but the types of

circumcision vary between regions. Average number of children in Oman is seven, which is almost the same among all regions, (Census, 2003).

2.4 Universal distributions of prevalence of UI studies

The reported prevalence of urinary incontinence among women varies considerably (Hunskaar et al. 2000). A review of worldwide data reported the overall median prevalence of UI among women was 27.6% with a range of 4.8% to 58.4% across countries (Minassian et al. 2003). Aspects of study design that may contribute to the variability in prevalence reported include the methods of sampling, the inclusion and exclusion criteria, and methods of data collection (questionnaire, interview, audit of medical records). Examination of tables from review papers (Hunskaar et al. 2005; Minassian et al. 2003) highlighted the differences between studies in terms of the country, sample size, response rates and definitions of UI. The definitions used in different studies on urinary incontinence published since 1992 are summarised in Table 2.1. Some studies include women of all ages and health status; some are restricted to community dwelling women whereas others include institutionalised women. Another source of variation is the inclusion or exclusion of pregnant or early post-partum women as the incidence of UI increases during pregnancy and following childbirth (Marshall et al. 1996). However, different methodology cannot account for all differences in prevalence regional and cultural differences in the sample are also considered to be important (Abrams et al. 2005). In a large study of European women over 18 years (n= 29,500) living in four countries, using the same sampling strategies and questionnaires in all countries, Hunskaar and colleagues (2004) reported that the overall prevalence of UI was 35% however the prevalence varied considerably between countries, with 23% in Spain, 44% in France, 42% in UK and 41% in Germany. This study design was robust and the lower prevalence in Spanish

women compared to other countries was difficult to understand or explain. The authors postulated that cultural and racial differences between countries may have contributed to the unexpected disparity. They postulated that possibly Spanish women were more embarrassed about having UI and under reported the condition (Hunskaar et al. 2004).

In the United States of America (USA), the prevalence of stress incontinence differs between different racial groups Hispanic, White, Black and Asian American women (36%, 30%, 25% and 19% respectively) (Thom 1998).

Differences in prevalence are not always easy to explain, ethnicity and cultural background might influence the prevalence of UI. Willingness to admit to a problem with UI must influence the accuracy of self-reported prevalence data and this willingness is likely to differ between cultures, however there are no studies directly comparing the cultural acceptance of suffering from UI.

The majority of the previous epidemiological studies of UI have been conducted in women living in developed nations, such as the previously mentioned large study (Hunskaar et al. 2004). As there is now an abundance of crude prevalence data for these women, the ICS recommends further epidemiological studies in the developed countries should be analytical in nature and make use of validated tools. Longitudinal studies in these groups are desirable to better understand predictors and cofactors. In contrast, in countries such as Oman, where prevalence is not known, the ICS strongly encourages descriptive epidemiology and recommends studies should be modified to the cultural background, economic and social environment of the population of interest (Abrams et al. 2005). Epidemiological studies of UI from different countries have been summarised in Table 2.2.

Table 2.2 Summary of prevalence, recruitment, age-groups and time frame of UI

Authors (publication year)	Country	Recruitment	Prevalence and the time frame of UI	Age groups
Chiarelli and Brown (1999)**	Australia	Random from insurance database (Medicare)	12.8% young 36.1% mid age 35% older	18-23 45-50 70-75
Botlero (2009)	Australia	Database from electoral roll in southern Australia.	41.7%	24-80
Rizk et al. (1999)**	UAE	Random from GP visits and community	20.3%	45
Saleh et al. (2005)**	Qatar	Random from GP visits and community	20.6%	45
Peyrat et al. (2002)	France	Working in a teaching hospital were assessed during their annual visit to the institution staff physician, self reported questionnaire	27.5%	20-62
Hunskaar et al. (2004)*	France	Drawn iteratively from households participating in national postal surveys	44%	18+
Lasserre et al. (2009)	France		26.8%	8+
Holtedahl and Hunskaar (1998)	France	During medical visit to GP a random sample of 698 woman in three North-Norwegian municipalities were invited by mail to two gynaecological examination one year apart in the office of their general practitioner in 1994-1995”	47%	50-74
Hunskaar et al. (2004)*	Spain	Drawn iteratively from households participating in national postal surveys	23%	18+
Avellanet et al. (2003)	Spain	All health centre (collection day were chosen randomly)	56%	15+
Vinker et al. (2001)	Israel	Random from visits and general practitioner (GP) practises	36%	30-75

Hunskaar et al. (2004)*	United Kingdom	Drawn iteratively from households participating in national postal surveys	42%	18+
Dolan et al. (1999)*	Northern Ireland	“All were registered with GPs and were randomly identified from a centralized computerized age-sex register of family practice”	33.5%	35-74
Aslan (2009)*	Turkey	Five largest residential home among the total nine all residents Selected from household cards from 3 national health centres (urban, semi- urban and rural)	43.5%	60+
Kocak et al. (2005)	Turkey	Female working nurses from large hospital data were collected via health centre visits it was done by interview	23.9%	18+
Yagmur and Ulukoka (2010)	Turkey		21.5%	Not specified
Roberts et al.(1998)**	USA	Random selected cohort	49%	50+
Fultz and Herzog (2000)	USA	Randomly digit dialing (interview)	24%	40+
Markland et al. (2009)**	USA	A community base study, collected data from home Assessment using questionnaire about UI	37%	65+
Hunskaar et al. (2004)*	Germany	Drawn iteratively from households participating in national postal surveys	40%	18+
Hannestad et al. (2000)*	Norway	Community-dwelling all aged 20 and above who are residing in county were invited to participate	25%	20+
Scarpa et al. (2006)	Brazil	“Third trimester of pregnancy attending the antenatal clinic of the University of Campinas (UNICAMP), Sao Paulo”	50%	Not specified

Adaji et al. (2010)	Nigeria	From antenatal clinic at Abu teaching Hospital Zaria Nigeria (pregnant women)	21.1%	15-42
Aggazzotti (2000)	Italy	14 Institutions are either 2 residential homes or 9 nursing homes and 3 mixed institution	59.8%	65+
Hsieh et al. (2008b)*	Taiwan	Multi stage random from National Institute of Family Planning of the Department of Health	21.7% with marriage 24.9% alcohol 24.5% drug allergy 40.3% diabetes 30.1% hypertension	20-59
Lapitan et al. (2001)	Asia Pacific	23 Centres in 11 Countries	53.1% 16.4% Thailand 12.4% Philippines 11.9% Taiwan 11.8% India 13.1% Pakistan 8.8% South Korea 7.6% Hong Kong 6.4% Malaysia 4.7% Indonesia 3.6% Singapore 3.6% China	20-59
Kyu-Sung et al. (2008)	Korea	“National survey was conducted as a part of the Korean national health interview”	24.4%	19+

*Leakage at any time

**Leakage 12 months

***Leakage 6 month time

2.5 Severity

Severity of UI ranges from occasionally leaking a few drops of urine to daily loss of large amounts of urine. In most epidemiological studies the severity of the UI condition is estimated from information about the amount and the frequency of urine loss. The Incontinence Severity Index (ISI) was developed and validated by Sandvik (2000) to provide a more accurate measure of severity of UI, (Fall et al. 1985; Hunskaar et al. 1999; Rekers et al. 1992). The ISI is calculated as the product of ordinal category variables based on the frequency and volume of urine leakage.

Frequency has four levels (0, 1, 2, 3), according to the number of episodes of leakage per month for the last 12 months (0, 1-4, 5-24, ≥ 25). Volume of leakage has two levels, a few drops (1) or more than a few drops (2). Naturally women with zero leakage score 0 according to this system. Women who have leakage are divided into three categories; mild (1-2), moderate (3-4) and severe (6-8) (Sandvik et al. 2000).

2.6 Risk factors related to urinary incontinence

Documented risk factors for UI in women include lower urinary tract infection (LUTI), pregnancy/childbirth, (caesarean & vaginal) parity, menopause, age, smoking, coughing/sneezing, obesity, exercises, coffee, constipation, diabetes, some drugs (diuretics), and ethnicity differences (Avellanet et al. 2003; Chiarelli and Brown 1999; Eason et al. 2004; Elchalal et al. 1999; Hacker and Moore 1992; Marshall et al. 1996; Sapsford et al. 1998). The significance of individual risk factors differs between age groups, hormonal status, racial and cultural groups and there are connections between risk factors. For example, in older women, parity is not associated with risk of UI (relative risk (RR) = 1) (Hunskaar et al. 2005). Whereas in young women parity is strongly associated with risk such that a young woman with 3 children has 5 times the risk of UI than women who have no child or less than three children (Hunskaar et al. 2005).

2.6.1 Lower urinary tract symptoms

Urinary tract infection is one of the causes of transient UI while it developed in response to acute condition. Many studies have indicated that LUTS is a risk factor of UI (Dolan et al. 1999; Irwin et al. 2006; Manonai et al. 2004; Wennberg et al. 2009). Lower urinary tract symptoms can cause blood in the urine, a burning sensation while passing urine, difficulty initiating urine flow and also difficulty flow stopping the urine, frequency and nocturia, (Hunskaar 2006). When the transient

cause is sufficiently controlled and treated, the urinary incontinence usually resolves (Abrams et al. 2009).

2.6.2 Pregnancy/Childbirth/ Parity

Urinary incontinence throughout pregnancy is extremely common and affects 31-60%, usually it occurs in third trimester. Among women who are affected with UI in the beginning of pregnancy some may become continent after delivery, but may develop UI later in life (Abrams et al. 2009; Burgio et al. 2003; Hunskar et al. 2000; Viktrup et al. 2006).

Childbirth and multiparity are the greatest risk factors reported by many studies (Chiarelli and Brown 1999). The causes of UI following child birth may be due to pelvic floor laxity as a consequence of weakness and stretching of the muscle and the connecting tissue while delivering or damage to the pudendal nerve (Hunskar, 2000 #13; Laycock 1987; Marshall et al. 1996). First vaginal delivery, episiotomies and forceps extraction are known to be risk factors for UI in young and mid-aged women (Foldspang et al. 1999; Rekers et al. 1992; Viktrup et al. 2006). Rortveit (2006) reported that being aged greater than 25 years at the first delivery was associated with increased risk of UI 12 years after delivery (Diez-Itza et al. 2010). However, it was reported by Marshall et al (1996) that incontinence is more likely to occur in parous rather than in nulliparous women at all ages. Moreover, subsequent vaginal deliveries did not increase the risk significantly (Morkved et al. 2003).

2.6.3 Menopause

Female UI is understood to be associated with a woman's hormonal state and fluctuations. A low oestrogen level in post-menopausal women is considered one potential cause of UI (Hvidman et al. 2003). This suggestion originates in part from surveillance of oestrogen and progesterone receptors in the urinary tract and a

moderate increase in UI associated with ovulation merits attention (Hvidman et al. 2003).

Urinary symptoms may also occur during the change from the pre-menopausal, perimenopausal to the post-menopausal state. The atrophic changes (such as body fat, skin and muscle) and the drop in body oestrogen levels brought on by menopause may contribute to an increase weakness of pelvic floor muscle and urethral closure pressure that may lead to UI (Hunskaar 1998; Laycock and Holmes 2003). Rekers (1992) compared the prevalence of UI in pre-menopausal and post-menopausal women and found no difference between the groups (25% versus 26%). However, there was a difference in frequency of UI with post menopausal women having daily incontinence with higher frequency than premenopausal (7% versus 3%).

2.6.4 Age

Urinary incontinence should not be considered a normal effect of aging even though there are changes in bladder and pelvic structures that occur with age (Abrams et al. 1999). Age is widely recognised as a risk factor, but the relationship between age and UI is not straightforward. There is a consistent increase in the prevalence of UI until the 5th decade but a decrease in prevalence during the 6th decade and into the 7th decade (Hannestad et al. 2000; Hunskaar et al. 2005; Minassian et al. 2003).

Although the decline is consistently observed, the reasons remain unclear. It may be due to hormonal or lifestyle changes associated with ageing. Normally aging affects the lower urinary tract, and reduces the strength of detrusor contractions.

2.7 Lifestyle Factors

2.7.1 Smoking

Women who smoke seem to be at an increased risk of developing UI (Bump and Norton 1998). This may be because they cough more regularly (Bump and McClish 1992) or because the anti-oestrogenic hormonal effects of smoking may have direct and indirect effects on the bladder and urethral functions (Bump and McClish 1992). Incontinent smokers have a tendency to be younger than incontinent non-smokers (Bump and Norton 1998). Some studies have found that smoking has an association with UI for those who are heavy smokers smoking more than 20 cigarettes per day. There is some evidence that the association is not maintained in past smokers (Arya et al. 2000; Hannestad et al. 2003).

2.7.2 Coughing/sneezing

There appears to an increased incidence of UI in women that cough and sneeze this may due to increases in the intra abdominal pressure (Chiarelli and Brown 1999).

2.7.3 Exercise and Work

Women participating in high impact exercises, such high jump, and body pump weight lifting, and others are likely to develop SUI due to increased in downward force on pelvic floor muscles. (Abrams et al. 1999; Danforth et al. 2007; Kikuchi et al. 2007).

2.7.4 Caffeine intake

Caffeine tends to irritate the bladder so its consumption may be associated with higher risk for UI. It was found that caffeine intake has higher significant of detrusor instability (Arya et al. 2000; Hannestad et al. 2003).

2.7.5 Obesity

Obesity has been identified as an independent risk factor for UI in women.

Increasing weight will increase the intra-abdominal pressure and may load and strain the pelvic tissues, these results in pelvic floor muscles weakness (Hunnskaar et al. 2000; Parazzini et al. 2003). Weight reduction is one possible way of treating and reducing UI (Peyrat et al. 2002).

2.8 Other risk factors

2.8.1 Constipation

Constipation is one of the risk factors for UI. Chiarelli and Brown (1999) found a significant association between UI and constipation. Chronic straining for stool may result in pelvic floor muscle weakness that increases the risk of stress urinary incontinence (Chiarelli and Brown 1999).

2.8.2 Diabetes

An association between diabetes and UI has been reported (Hsieh et al. 2008a) but the association may only exist with insulin-requiring (IRDM) not with non-insulin-requiring diabetes (NIRDM) (Lewis et al. 2005). It was reported that approximately 50% of women that have had diabetes for five years and above having more risk of severe UI and twice risk of very severe (Abrams et al. 2009).

2.8.3 Medications/ Diuretics

Certain drugs can cause or contribute to overflow, stress and urge urinary incontinence (Arya et al. 2000). These drugs consist of anticholinergics, antidepressants, antipsychotics, sedative-hypnotics, antihistamines, nervous system depressants, narcotics, alcohol, calcium channel blockers, adrenergic agonists, beta adrenergic blockers, alpha adrenergic antagonists, diuretics, caffeine (Diokno et

al. 1991; Fantl et al. 1990). The mechanism of action of the above drugs in can cause decreased bladder contractions and cause retention of urine (Weiss 1998).

2.9 Proposed risk factor

2.9.1 Circumcision

Female circumcision has been practice since the 5th century BC. It started in Egypt and was also performed by the Romans. In Western society there is documented evidence of the procedure in 1822 (Businge 2007; Elchalal et al. 1999; Meniru et al. 2000). Female circumcision or female genital mutilation (FGM) is the cutting, or partial or total removal, of external female genitalia. It is a procedure which is practiced in many countries; 28 counties in Africa, Asian counties around the Indian Ocean and East Mediterranean, the Middle East, North and South America and Australia (Elchalal et al. 1999; Feldman-Jacobs and Clifton 2010; Isa et al. 1999; World Health Organization 2008). When and how circumcision is performed differs between countries and cultures (World Health Organization 2008). It is performed on new-born girls one day old or those up to 10 years old and in some areas they practice it in adolescence, in adults before marriage or during the first pregnancy. It was estimated by the World Health Organisation (WHO) in 2000 that between 100 million and 140 million girls and women have undergone some form of FGM; at least 3 million girls in Africa alone are expected to be at risk every year (Feldman-Jacobs and Clifton 2010; World Health Organization 2008). It has been proposed that circumcision may cause UI as a late medical complication (Elchalal et al. 1999; Isa et al. 1999).

2.10 Quality of life

Urinary incontinence affects both women and men throughout the world. It has major social and hygiene consequences for those affected. The impact of UI on QoL seems

to vary depending on the type, duration and severity of incontinence. Urinary incontinence may be more distressing to younger than older women (Hunnskaar 1998; Sakondhavat et al. 2007). It affects different women in diverse ways and has variable influences on their physical, psychological, social, domestic and interpersonal lifestyles. These effects may be modified by other factors including age, race and culture, personal goals and experience, interpersonal relationships, general physical and mental health and life expectancy (Keller et al. 1998; Rizk et al. 1999). People with UI often suffer from a poor QoL including loss of self esteem, sleep deprivation, symptoms of depression or anxiety, embarrassment, financial distress and may cope by resigning themselves to restricted activities. Incontinent persons also struggle with ordinary activities such as working, shopping or travelling in a car.

There is conflicting evidence about whether the type of UI increases psychological distress, but several studies indicate that women with urge incontinence have a higher mental distress and social isolation levels. This may be due to difficulties in self management because of lack of control resultant from the lack of ability to control urge (Grimby et al. 1993).

Many women affected with UI do not seek treatment. Across populations, median levels of care seeking of only 23% have been reported (Minassian et al. 2003). It appears, that many women suffer in silence with UI, possibly because they are unaware there are effective treatments available, or because they are too embarrassed to report or seek treatment for UI (Adaji et al. 2010; Rizk et al. 1999; Saleh et al. 2005).

Several studies have found women with SUI avoid of sexual activity due to coital urinary leakage (Bø et al. 2000; Rizk et al. 1999; Saleh et al. 2005). These difficulties have been reported to affect between 2 and 50% of affected women and appear to

cross multiple ethnic and cultural groups (Lukacz et al. 2007; Montserrat and Montserrat 2008; Moran et al. 1999; Shaw 2002). Most likely because of embarrassment, coital urinary leakage represents a frequently unrecognised cause of physical and psychological distress in women with UI (Molander et al. 2002).

Studies conducted in the Muslim countries, reported reduced QoL for Muslim women whom are affected by UI as they are unable to perform their five times daily prayers which requires their clothing not to be even minimally soiled (Rizk et al. 1999; Saleh et al. 2005). Consequently, affected Muslim women may need to change their clothes several times each day. Of Emirates women who suffer from UI, 90% reported it interfered with praying (Rizk et al. 1999).

2.11 Significance

The prevalence of UI in Oman is unknown. Anecdotal evidence and a number of lifestyles characteristics of Omani women suggest the prevalence may be high. With Omani women having a high number of children, high prevalence of diabetes, hypertension and obesity this may lead to high prevalence of UI (Al-Moosa et al. 2006; Al Riyami and Afifi 2002; Al Riyami et al. 2004). Availability of treatment for Omani women with UI is very limited and restricted to large cities. Establishing the prevalence of UI in Oman will inform the development of health education and treatment programmes for local women. Although all affected Omani women are likely to benefit from such interventions, younger women may be more inclined to seek treatment.

Chapter 3 Methodology

3.1 Introduction

Urinary incontinence has been identified as a public health problem internationally, that affects the QoL of women living with it. While there is comprehensive information available about the prevalence and risk factors for UI in developed nations, little is known about the epidemiology of UI in developing countries such as Oman. To address this gap, the need for epidemiology using methods that are specific to the cultural, economic and social background of the population of interest has been raised (Abrams et al. 1999).

3.2 Aims

The aims of this thesis were to investigate the prevalence, subtypes, risk factors, severity, levels of bother, care seeking for UI in Omani women and to determine how much of a negative influence UI had on their daily life. To achieve these aims the study was conducted in three parts.

3.3 Objectives

3.3.1 Part A

The objective of Part A was to develop a valid and reliable questionnaire that could be used to determine the prevalence of UI and its subgroups plus acquire data on the potential risk factors for UI; the impact of UI on ADL; and the care-seeking behaviours of affected Omani women.

3.3.1.1 Methodology

To achieve the aims of this thesis, a questionnaire suitable to be administered to Arabic speaking or English speaking women in Oman was required to determine whether they have urinary incontinence. Essential characteristics of the

questionnaire were that it was culturally specific and sensitive, and included validated questions and definitions that would allow cross-cultural and cross-national comparisons as recommended by Abrams (2005). Following a comprehensive search of the literature, it was decided that no questionnaire entirely suitable to collect data from a representative sample of the population of Omani women was available. Consequently, questionnaire development was required. This process commenced by defining the population of interest, that is, community dwelling Omani women aged ≥ 18 years. Our study was open to all Omani women, aged ≥ 18 years, who spoke Arabic and/or English, and were able to answer the study questions. Non-Muslim or non-Omani women were excluded. To enable inclusion of a representative sample, the questionnaire needed to be suitable for administration as an interview rather than self-completion to cater for the substantial proportion of women likely to be illiterate in both English and Arabic.

Items to be included were based on the overall aims of the study, as previously stated, to determine the prevalence of UI and the three subtypes of UI; plus the risk factors, severity, effect on activities of daily life (ADL), levels of bother, care seeking for UI in Omani women and to determine how much of a negative influence UI had on their daily life. In addition demographic items required to describe the sample were incorporated. Questions were predominantly closed ended to facilitate coding and uniformity of responses. Individual question formats included grid, branching, and frequency and time measures (Portney and Watkins 2000).

Validity of the questionnaire was addressed in a number of ways, as recommended by the International Epidemiology Association (IEA) Questionnaire group (<http://www.ieaweb.org/>, 2010). Content validity was dealt with by careful item selection in the draft stage of development plus repeated review by experts in the

area (Portney and Watkins 2000). Criterion validity could not be established for all variables but where possible, questions that had previously established criterion validity were used, for example, to determine the severity of UI, questions developed and validated by Sandvik (2000) were used. In addition to validating the questionnaire as equivalent for use in English or Arabic, forward and backward translation is recognised to contribute to validity by helping to identify and resolve any ambiguity in the questions (<http://www.ieaweb.org/>, 2010). We developed a data dictionary that incorporated internationally recognized definitions from the EPICONT, Australian Institute of Health and Welfare (AIHW) data dictionaries (<Http://www.AIHW.gov.au> (Hannestad et al. 2000; Sandvik et al. 2000) available in Appendix 9.

The process of questionnaire development and evaluation is further described in Chapter 4. The questionnaire was developed to include demographic, risk factors and UI information. Where possible, items from the numerous questionnaires already developed to examine the recognized risk factors (health, lifestyle, gynaecological and obstetric history) and prevalence of UI in women were included. Most questions from the EPICONT questionnaire were incorporated into the questionnaire as this group of questions enables classification of UI in accordance with ICS definitions as well as categorizing the severity of symptoms (Hannestad et al. 2000; Sandvik et al. 2000).

Face validity was evaluated by experts who reviewed the questionnaire and provided feedback. To ensure face validity, the completed draft of the questionnaire was circulated to experts in the field, for critical evaluation and to seek suggestions for revision. Internationally recognized experts in the field Professor Steinar Hunskaar (Department of Obstetrics and Gynaecology, University of Bergen Norway) and Dr

Jo Laycock, recently retired Urotherapy Manager at Bradford Royal Infirmary, agreed to review the tool. In addition, Dr Maryam Mathew Zachariah (Gynaecologist at Sultan Qaboos University Hospital, Oman), reviewed the questionnaire to provide additional culturally sensitive insight.

The questionnaire was designed to be administered as a structured interview in Arabic and/or English. Interview rather than self-completion was the method of delivery to cater for the substantial proportion of women likely to be illiterate in either language.

3.3.1.2 Procedure

The questionnaire developed in Part A was tested with 15 Muslim women to review the items and confirm the utility of interview-based administration in either Arabic or English (Appendices 7 and 8). The data from these administrations was used to calculate reliability. This study was approved by the Human Research Ethics Committee at Curtin University (Appendix 2) and all participants provided written informed consent.

Data were collected by a bilingual physiotherapist and recorded in English.

Volunteers were interviewed twice, one week apart, once in English and once in Arabic. Order of language was randomised by tossing a coin. Duration of the interviews was timed. At the completion of the second interview, the physiotherapist discussed the survey questions with the volunteers to determine where questions were unclear or misleading in either or both languages.

Duplicate data were checked for consistency using percentage agreement. The responses in each language are compared and discussed in a more detailed questionnaire paper Chapter 4 (Part A) in the results. Questions were revised to address any inconsistencies. Reliability and utility of the questionnaire was tested in

15 Muslim women aged ≥ 18 years, 10 in Perth and 5 in Seeb. Non-Muslim women were excluded.

3.3.2 Part B

To test sampling methods, data collection and data management in a pilot study and to generate data regarding the prevalence, risk factors and impact on life style and activities of Omani women.

The Sultanate of Oman has a population 2,340,815 living in eight regions. Muscat is the capital and urban region. The socio-demographic characteristics of urban (Muscat) and rural (other regions) populations in Oman differ in age, sex and education. Overall, Muscat has a population of 632,073; it has a younger, better educated population with a slightly smaller average family size (www.Omancensus.net), (Al Riyami et al. 2004; Al Riyami A ; The Sultanate of Oman Ministry of Education 2009).

The main languages used in Oman are Arabic and English. Other languages such as Swahili and Balushi are used, but much less frequently; mostly in Muscat and Jabali, a city in Dhofar. Twenty-six percent of Omani women are illiterate and only 16% have completed secondary school or higher (Al Riyami et al. 2004; Al Riyami A 2004). In Oman, mail is generally collected by the man of the household who may or not convey mail such as a survey to female members of the household. Furthermore, a substantial number of prospective respondents would be unable to respond without assistance due to restrictions in literacy. Postal recruitment or survey by questionnaire is unlikely to be representative in Oman. Door to door recruitment and interview-based surveys are well accepted in Omani culture. In this chapter the research methodology used for the three parts of the thesis is outlined. The process

used to develop the questionnaire, the sampling methods, the procedures for data collection, data analysis and ethical considerations regarding the thesis are described.

3.3.2.1 Methodology

The field testing was done in Seeb (Muscat region), this region was selected as it has the highest population density, and a diverse socioeconomic distribution. It was also convenient for the researcher in the field who collected the data, as she lived in the target area. The most important objective of this testing was to test questionnaire, sampling and recruitment methods for the larger study, however, a useful by-product of Part B was the generation of the first data from Oman regarding the prevalence and risk factors of UI. This approach enabled corrections and changes to the questionnaire to be done prior to starting study (Part C).

3.3.2.2 Area covered

Seeb (Muscat, Oman)

3.3.2.3 Subjects

120 women aged ≥ 18 years residing in the Muscat region of Oman in the Wilayat of Seeb.

3.3.2.4 Inclusion criteria

Omani women, Muslims residing in Wilayah Seeb

Only one woman was interviewed in each household.

3.3.2.5 Exclusion criteria

Non-Omani, Non-Muslims and living outside of Wilayah Seeb.

Table 3.1 Socio-demographic characteristics of Muscat (urban), and other regions (rural) of Oman*.

	Urban (%)	Rural (%)
Age		
20-29	40.5	41.2
30-39	24.3	20.6
40-49	14.5	10.9
50-59	10.7	13.9
≥ 60	10.0	13.3
Sex		
Male	48.8	50.3
Female	51.2	49.7
Education level		
Illiterate	24.8	36.1
Less than secondary	37.5	41.8
Secondary or above	37.7	22.1
Average family size	7.3	8.0

*Data are from the 2000 national health survey

Table 3.2 Localities of Wilayah Seeb, Muscat, Oman where subjects were recruited; 10 subjects in each area

Mabellah south	Al Khoudh (old)
Mabellah north	A Khoudh (new)
Mawaleh north	Al Hail north
Mawaleh south	Al Hail south
Wadi Awami	Sharadi
Jifnain	Seeb

Seeb is the largest Wilayah in the Sultanate of Oman with a population of 223,449. It has 18 Wilayahs (www.Omancensus.net). Among them the Wilayahs in table 3.2 were randomly selected for the field test. Twelve Wilayahs (cluster) were randomly selected as starting points from the 2003 Oman Census list of households. The starting household and every second subsequent household in a clockwise direction was visited until data had been collected from 10 women in each Wilayah (cluster).

3.3.2.6 Procedure

The study was approved by the Human Research Ethics Committee at Curtin University and by the Wali of the Seeb Wilayat (Appendices 2 & 5). The subjects were recruited door to door. The purpose of the survey was explained to the woman/women of the household and oral consent was obtained.

The questionnaires were administered by the researcher. Questionnaire administration procedures were standardized. Volunteers were interviewed in English or Arabic according to their preference and the data were recorded in English by the physiotherapist. The number of households visited where questionnaires were not completed was recorded and the reasons noted, (e.g. no one home, refused to fill the questionnaire, etc). Only one woman was interviewed in each household. For security reasons, the researcher was always accompanied by another woman. For the census, each Wilayah was divided into numbered “blocks” of 60 houses. The starting point for each cluster was the first house from the selected census block. Every second subsequent household in a clockwise direction was visited until the number of subjects required for that cluster was recruited.

At the completion of data collection, from the perspective of the physiotherapist collecting the data the process went smoothly, the time taken to collect the data was suitable for her and the subjects. Confidentiality was maintained, as questionnaires

were referenced by number, region and Wilayah only. No identifying personal information about the subject was obtained.

3.3.2.7 Data Analysis

The statistical package Statistics Package for the Social Science (SPSS)/PC (V15) was used for data analysis. The sample was portrayed using descriptive statistics and compared with the census data to examine the effectiveness of the sampling strategy, using comparisons of proportion and means comparison tests as appropriate.

Willingness of volunteers to participate was assessed using the number of households visited and where no data were collected, reasons for non-participation were documented. Prevalence was described using proportions and percentages. Bivariate logistic regression analysis was also used to examine potential risk factors.

Information from these analyses enabled power calculations for the subsequent epidemiological study.

3.3.2.8 Ethical Issues

Ethical approval was obtained prior to the commencement of the study from:

Wali (Mayor) of Wilayat Seeb, Muscat (Appendix 5). People in Seeb were notified that the study would be taking place, and that they should expect to be visited by a female who worked at the Sultan Qaboos University Hospital.

The Human Research Ethics Committee of the Curtin University of Technology (HR 41/2007), (Appendix 1.)

3.3.3 Part C:

To determine the prevalence and risk factors of UI among Omani women using a population based survey.

3.3.3.1 Methodology

3.3.3.1.1 Area covered

All regions of Oman

3.3.3.1.2 Subjects

Sample of 800 Omani women aged ≥ 18 years

3.3.3.1.3 Inclusion criteria

Omani women residing in Oman in all regions

3.3.3.1.4 Exclusion criteria

Women who were not Omani, not Muslim, aged less than 18 years or were unable to respond to the questionnaire for any reason, were excluded.

3.3.3.1.5 Sampling

A multistage sampling approach modelled on the approach used by Burnham et al (2006) was used. With this approach sampling stages are stratified for population distribution. A similar approach has previously been successfully applied in a National Health Survey in Oman (Al Riyami A 2004).

In total, 37 starting points were randomly selected the 2003 Oman Census list of regions and sub-regions (Wilayah). Stages of sampling were region/Wilayah/ block/house.

Within each Wilayah one census block was randomly selected to determine the starting point for data collection. Each block has 60 houses. Census blocks were developed for the 2003 Oman census. The starting point for each cluster was the first house from the selected census block. Every second subsequent household in clockwise direction was visited until the number of subjects required for that cluster has been recruited.

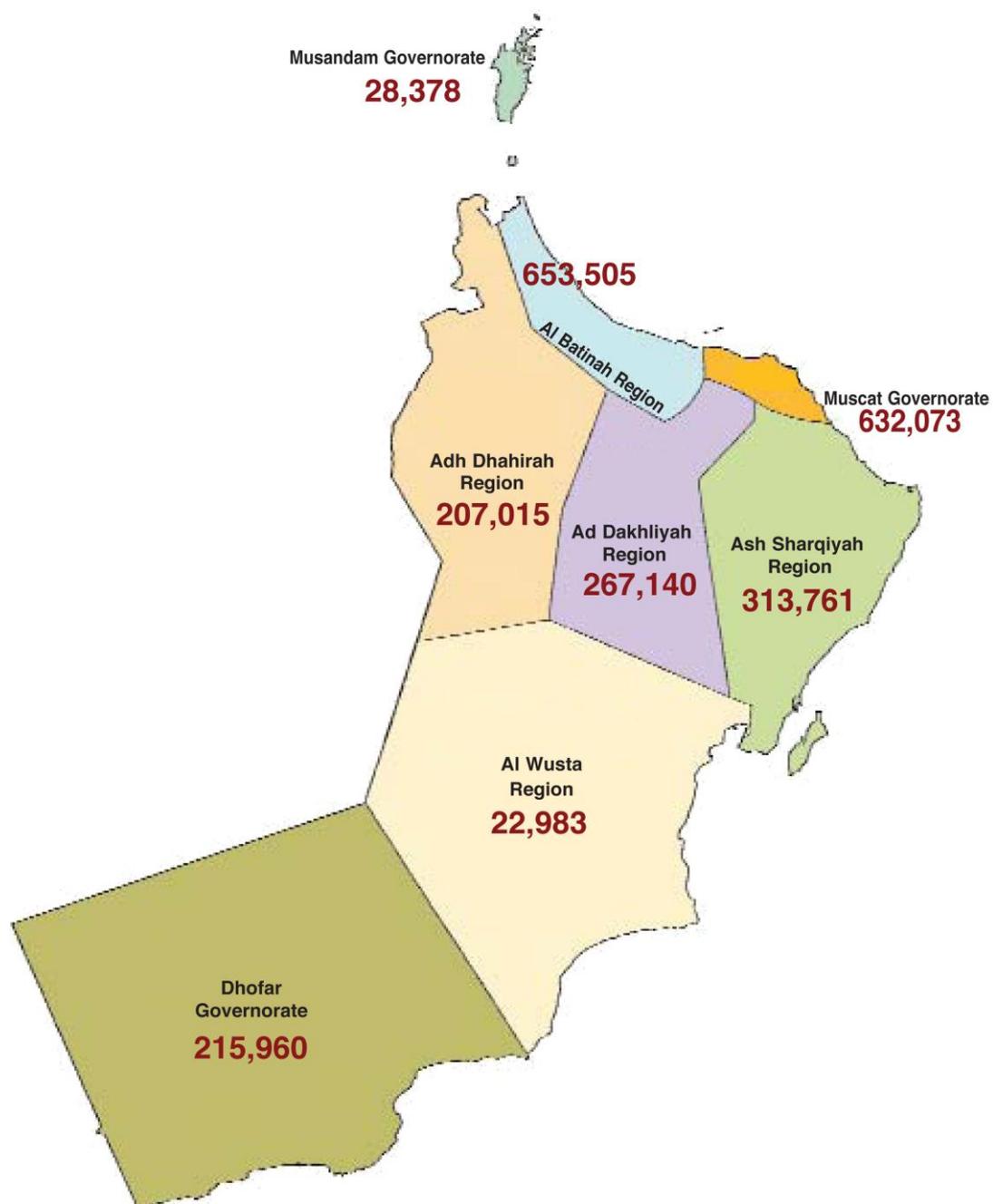


Figure 3.1 Omani population

This figure demonstrates the eight regions of Oman and the distribution of the population.

Table 3.3 Distribution of clusters and samples according to regions and Wilayah

Regions (clusters)	Number of wilayah	Total Omani female population	Number of subjects to be interviewed	Number of clusters	Number of clusters x subjects per cluster
Muscat	6	182,893	166	6	5 x 28 1 x 26
AdDakhaliya	8	11,699	107	5	4 x 21 1 x 23
Ad Dhahira	5	73,352	67	3	2 x 22 1 x 23
Al Batina	12	282,242	257	12	11 x 21 1 x 26
Al Wusta	4	7,826	7	1	1 x 7
Ash Sharqiya	10	132,923	120	6	6 x 20
Musandam	4	9,500	9	1	1 x 9
Dhofar	10	73,583	67	3	2 x 22 1 x 23
Total	59	880,108	800	37	800

The table above shows the numbers of Omani women in eight regions of Oman and 59 Wilayah. Among 41 Wilayahs 19 were randomly selected and defined as clusters. All the Wilayah in Muscat (urban) and Batinah (rural) region were sampled according to the population density. Subjects were allocated in each cluster according the sample size of each region. Each cluster included a minimum of seven and maximum of 28 subjects. Only one woman was interviewed in each household.

3.3.3.1.6 Data Analysis

Data analysis was conducted using Predictive Analytic Software (PASW) (v18), formally SPSS. Prevalence was described using proportions and percentages. Bivariate logistic regression analysis was used to examine potential risk factors. Preliminary power calculations for the study were based on previously reported prevalence data (Minassian et al. 2003) and assumed an overall prevalence of 26% in Omani women, a power of 80% and p-value of 0.05. Allowing a margin of error of

3% and 95% confidence interval, a sample 800 subjects was sufficient to achieve the objectives of the study.

3.3.3.1.7 *Ethical Issues*

Ethical approval was obtained prior to the commencement of the study from the Human Research Ethics Committee of Curtin University (HR 66/2007; Appendix 2). To comply with survey protocols in Oman, written approval from the Ministry of National Economy of Oman was required (Appendix 6).

Hard copies of the original data were photocopied and stored securely in Oman prior to transport of the original data to Perth. All data were subsequently archived securely at the School of Physiotherapy, Curtin University where they will be stored for 5 years with access restricted to the researcher and supervisors. All electronic information has been stored on password protected hard disks, with back up disks securely stored in the School of Physiotherapy. No information was stored or published that could identify any subject.

There were special considerations with door-to-door data collection in the different regions visited. Culturally sensitive practice was employed in each different region, while the culture was generally consistent between regions there were some local considerations. The door-to-door recruitment process worked well. People were hospitable and welcoming, inviting the researcher in and offering coffee, to which offense would be incurred by declining. Although the time for collecting the data for each subject was not more than 15 to 20 min accepting hospitality as was appropriate made visit times longer.

Travelling to different regions was both time consuming and expensive, driving long distances, flying into the regions of Dhofar and Musandam and crossing the sea to the other side of Ash Sharquiya added challenges to data collection. These

geographical challenges, combined with a local event, meant that on one occasion data collection had to be discontinued prior to collection of all data from that cluster in order to be on time for transport out of the region.

Regional differences such as local work schedules meant that the optimal time for data collection varied. In areas such as Mawaleh and Al hail most people go to work early in the morning. In those regions it was difficult to know what time to visit homes and therefore later in the day was preferable. Most of those families lived on their own without extended family so if you missed a woman in that house you would need to come back. In regions where most of the women don't work (Muhut, Sharqiya), accessibility was easier. However, timing of visits remained an issue in these regions where a strict daily schedule of housework, visiting, napping, prayers and events such as funerals applied. Despite the timing difficulties almost all women were hospitable and showed us a warm welcome.

Overall, the method of sampling and data collection used were appropriate and extremely effective with complete data obtained from 99% of the target sample.

3.4 Summary

Chapter three describes the methodology used in this study. It explains the research setting and the procedure of how the data were collected and analysed. Finally the chapter explains how the ethical considerations were applied in this study. The following chapter discusses the results of the study.

Chapter 4 Results

The general aim of this doctoral research was to investigate the prevalence of urinary incontinence in Omani women. The project incorporated three main parts.

In Part A, a culturally appropriate questionnaire to determine the prevalence of UI and its major subtypes, risk factors, severity, associated bother, and care seeking among Muslim Omani women was developed and tested.

In Part B a large pilot study was conducted to test the sampling, data collection and data management processes to be evaluated and fine-tuned prior to the national study. In this study 120 Omani women aged ≥ 18 years were recruited from randomly selected households within the Seeb Wilayah (district) of Muscat, the capital of Oman. Data were collected door-to-door using the questionnaire developed in Part A and used to determine the prevalence of UI and associated risk factors in this group of urban Omani women.

In Part C of this research the methods developed and tested in Parts A and B were implemented nationally to investigate the prevalence of UI among Omani women and to determine the risk factors associated with UI, and the influence of UI on their daily lives. A population based sample of 800 urban and rural women were invited to participate, of which 792 women agreed to participate. Results of each of these parts of the doctoral research are presented as separate “submission ready” manuscripts. In this format a synopsis of the methods and a discussion is included for each manuscript within this results chapter, although there is further discussion of the body of work as a whole in Chapter 5 of the thesis.

4.1 Results of Part A: The development of a questionnaire to study the epidemiology of urinary incontinence among Muslim women in Oman.

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4.1.1 Abstract:

Objective: The aim of this study was to develop a valid and reliable questionnaire to determine the prevalence of urinary incontinence (UI), risk factors, severity, care seeking, bothersome and its subtypes in Omani women.

Methods: The questionnaire was designed to be administered to Omani women as a structured interview in either English or Arabic. Items incorporated include demographic characteristics; gynaecological and obstetric history; UI and the subtypes stress UI, urge UI and mixed UI; severity of UI and the impact it has on activities of daily living; as well as other health and lifestyle issues previously identified as risk factors for UI. Consistency of responses to the questionnaire was tested with 15 Muslim women by administering the questionnaire twice, once in English and once in Arabic one week apart.

Results: There was the highest agreement was within the range (75% to 100%) vast majority of questions in both languages were 100% agreement. The lowest agreement was from 45% to 62%.

Conclusion: We have developed a questionnaire suitable to administer as an interview to Muslim women in English or Arabic to determine whether they have UI.

Key words: questionnaire, female urinary incontinence, epidemiology, Oman and Gulf countries.

4.1.2 Introduction

Urinary incontinence (UI) is prevalent among women world-wide. Prevalence differs between countries, ethnicities, and cultures (Minassian et al. 2003). While some of this variability is undoubtedly due to differences in the methodology employed to collect data, regional and cultural differences are also considered to be important (Abrams et al. 2005; Hunskar et al. 2000). In view of the diverse methods used in different studies, the International Continence Society (ICS) recommends using standard definitions for future studies to facilitate comparisons (Abrams et al. 2005). The majority of studies to date have been conducted in white women living in developed nations. As there is now an abundance of crude prevalence data for these women, the ICS recommends that further epidemiological studies in the developed countries should be analytical in nature (Abrams et al. 2005). Longitudinal studies in these groups are desirable to better understand predictors, and covariates. In contrast, in countries such as Oman, where prevalence is unknown, the ICS strongly encourages descriptive epidemiology and recommends that studies should be "tailored to the cultural, economic and social environment of the population of interest" (Abrams et al. 2005).

Urinary incontinence (UI) can cause embarrassment, and has social and hygiene consequences for any affected women. Affected Muslim women may need to change their clothes several times each day in order to meet the requirements of cleanliness for prayer. Affected women from both United Arab Emirates (UAE) (90%) and

Qatar (64%) have reported that UI hindered their routine for prayer, among other things (Rizk et al. 1999; Saleh et al. 2005).

Although a number of questionnaires have been developed to assess the prevalence and risk factors of UI and the impact it has on the daily living of those affected, these instruments cannot simply be utilized across nations due to lack of cultural equivalence (Abrams et al. 2005; Hunskar et al. 2004). To our knowledge, no comprehensive questionnaire encompassing prevalence and risk factors, as well as other factors specific to Islamic culture, has been developed for use in Oman.

Two studies of the prevalence of UI in the Gulf countries from UAE (Rizk et al. 1999) and Qatar (Saleh et al. 2005) have been reported. Both of these studies aimed to determine the prevalence of UI, its impact on activities of daily living (ADL) and the care seeking behaviours of affected women. These studies did not use the definitions for UI recommended by the ICS or differentiate between the three predominant forms of UI (stress UI, urge UI, and mixed UI); nor did they gather data on many of the potential risk factors for UI.

A number of large descriptive epidemiology studies have used a questionnaire developed for the Epidemiology of Incontinence in the County of Nord –Trondela (EPICONT) study (Hannestad et al. 2000). The EPICONT questionnaire can be used to determine the presence or absence of UI, the type of symptoms; stress UI (SUI), urge (UUI), and mixed UI (MUI), the severity of UI and how bothersome it is, using an approach consistent with the ICS definitions (Abrams et al. 2003). This short questionnaire, suitable for self-completion, has been used in a wide variety of countries and western cultures; however, the questionnaire does not cover issues of relevance for other cultures such as Arabic or Islamic cultures.

There are numerous risk factors for UI that have been identified consistently in studies of women from various nations and cultures (Hunskaar et al. 2000). Parity, menopause and ageing are among those most commonly reported (Abrams et al. 2003; Hunskaar et al. 2000). To enable comparison of risk factors between Omani women and women from other cultures it was considered desirable to measure a comparable suite of factors. In addition, it is well known that female circumcision can lead to medical complications and it has been proposed that UI may be one of the resulting conditions (Elchalal et al. 1999; Isa et al. 1999). As there is anecdotal evidence that circumcision is still practiced in Oman and this variable has not been widely analysed previously as a risk factor for UI it was included in our questionnaire.

The purpose of this study was to develop a valid and reliable questionnaire to determine the prevalence of UI and its subgroups; data on the potential risk factors of UI; the impact of UI on ADL; and the care-seeking behaviours of affected Omani women. Objective data on these conditions is critical to inform and justify the development of health education and treatment programs in Oman.

4.1.3 Methods

The aim of this study was to generate a questionnaire suitable to be administered as an interview to Arabic speaking or English speaking women in Oman to determine whether they have urinary incontinence. The questionnaire needed to be culturally specific and sensitive, and include validated questions and definitions that would allow cross-cultural and cross-national comparisons. The questionnaire needed to be suitable for administration as an interview rather than self-completion to cater for the substantial proportion of women likely to be illiterate in both English and Arabic. Approval for the study was obtained from the Human Research Ethics Curtin

University of Technology (HR 41/2007, Appendix 1). Written informed consent was obtained from the women who participated in the study (Appendix 3).

4.1.3.1 Design of questionnaire

Following an extensive review of the literature with a focus on studies of prevalence and risk factors related to UI and published surveys; we prepared a list of items for inclusion in the questionnaire. The following topics were selected:

1. Demographic characteristics
2. Gynaecological and obstetric history (potential risk factors)
3. Urinary incontinence and the subtypes SUI, UUI, MUI.
4. Severity of UI
5. Other health and lifestyle issues previously identified as risk factors for UI in other cultures such as: age, parity, constipation, chronic cough, obesity, allergy (sneezing), diabetes, lower urinary tract symptoms (LUTS), diuretics, frequency, nocturia and smoking.
6. Whether affected women found UI bothersome.
7. The impact of UI on ADL, specifically
 - a. Prayer
 - b. House work
 - c. Sport
 - d. Sexual activities.
 - e. Care seeking, from family, doctors or other health professions

The individual items in the questionnaire were developed to address these topics.

Where appropriate, questions from previously developed and validated questionnaires were used. Almost all questions from the EPICONT questionnaire were incorporated into the questionnaire as this group of questions enables

classification of UI in accordance with ICS definitions as well as categorizing the severity of symptoms (Hannestad et al. 2000; Sandvik et al. 2000). Some questions, related to specific socio-cultural issues such as prayers and changing clothes, were based on questionnaires used by Rizk et al. (1999) and Saleh et al. (2005). Where necessary, new questions were developed. For new questions, data definitions from professional organisations such as the Menopause Society (<http://www.menopause.org.au>), the American College of Gastroenterology (www.acg.gi.org), the World Health Organization, (www.who.int/bmi/index), the Omani Censuses 2003 (www.Omancensus.net) and existing data dictionaries such as the Australian Institute of Health and Welfare (<http://www.AIHW.gov.au>) were used. A data dictionary specifying each item and its definition was developed (Appendix 9).

4.1.3.2 Designing the questionnaire

We compiled the questionnaire in English in the first instance with a view to translating into Arabic prior to reliability testing. The wording of the questionnaire was simple, clear and easy to articulate in an interview. Although translation into Arabic was not literal, the need for translation was also considered in developing the questions in English.

Questions were predominantly closed ended to facilitate coding and uniformity of responses. The simplest were dichotomous, for example: Do you understand what urinary incontinence is? (1-yes; 2-no). Other questions offered a number of alternatives from which to select an answer, for example: What is your marital status? 1-married, 2- divorced, 3- widowed, 4- never married. Individual question formats included grid, branching, and frequency and time measures (Portney and Watkins 2000).

To ensure face validity, the completed draft of the questionnaire was circulated several times to experts in the field, Professor Steinar Hunskaar, Department of Obstetrics and Gynaecology, University of Bergen, Norway and Dr Josephine Laycock, retired Urotherapy Manager at Bradford Royal Infirmary, for critical evaluation and to seek suggestions for revision. In addition, Dr Maryam Mathew Zachariah (Gynaecologist at Sultan Qaboos University, Oman), reviewed the questionnaire to provide additional culturally sensitive insight. Revised versions of questionnaire were reviewed two to four times by these reviewers. Next, the English version of the questionnaire was reviewed by five lay people (four Muslim) in Australia for feedback regarding the clarity of the questions, whether there were any ambiguities and whether the wording of specific items was appropriately sensitive. In accordance with their suggestions further minor corrections were made.

The resultant questionnaire included 47 questions (Appendix 7), seven related to demographic status, nine to obstetric and gynaecological history (incorporating 13 items), eight to the presence, type and severity of UI, five to the impact of UI, one about whether being affected was bothersome, two to care-seeking and 15 potential risk factors (nine health issues and six lifestyle factors).

At this stage the questionnaire was translated from English to Arabic (Appendix 8). Bilingual physiotherapist's working at Sultan Qaboos University Hospital (SQUH) and Diwan Clinic of the Royal Court in Oman did the translation. Two bilingual physiotherapists working at SQUH performed the initial translation independently. Their translations were reviewed, each by another physiotherapist. These four physiotherapists as a group compared and combined the two translated versions of the Arabic questionnaire and agreed that the final version was equivalent to the original English version. The resultant Arabic version of the questionnaire was pilot

tested with four Omani women to ensure there were no ambiguities or insensitive questions.

4.1.4 Reliability testing

The questionnaire was tested in Arabic and English with 15 Muslim women fluent in both languages, 10 in Perth, Western Australia and five in Muscat, Oman.

Volunteers were recruited by personal contact and word of mouth. They provided written consent prior to the first interview. Interviews were conducted by two bilingual physiotherapists, one in Perth and another in Muscat. Data were recorded by the interviewers in English. Volunteers were interviewed twice, approximately one week apart, once in English and once in Arabic. The order of language administration was randomised according to the toss of a coin prior to the first interview. At the completion of the second interview, the researcher discussed the survey questions with the volunteers to determine whether any questions were unclear or misleading. All questions were clear to the participants however, one interviewer found the formatting of one question confusing so formatting was revised. Duration of the interviews was timed.

Statistics: Data analysis was conducted using Predictive Analytic Software (PASW, v18), (formally known as Statistical Package for Social Science, (SPSS)). Data were checked for consistency using percentage of agreement. Kappa statistics were not considered appropriate for this study as the data were not from independent “raters” and there was no expectation that agreement demonstrated would be by chance alone.

4.1.5 Results

Eight of the 15 participants had UI. The continent women did not answer the questions about UI, bother and care seeking. Therefore the number of respondents

was lower for some questions. Both the English and Arabic questionnaires contained 47 questions each. Questions related to five main topics: demographic data; obstetric and gynaecological history; urinary incontinence knowledge and status; bother and care seeking; and risk factors.

Answers to the seven demographic questions were identical (100% agreement) regardless of the language of administration. Similarly, agreement was 100% for all but one of the nine obstetrics and gynaecology questions, including the question regarding circumcision. This question related to regular menstruation and one participant changed her response between administrations of the questionnaire (93% agreement).

Overall there were 12 questions related to urinary incontinence knowledge and status. Three participants changed their response to the question regarding understanding what UI is (80% agreement). This was consistent with UI being explained at the time of the first interview. For the seven questions related to UI status there was $\geq 93\%$ agreement. Of the two questions used to calculate the UI severity index (Sandvik et al. 1993) there was a 100% agreement for the first and 75% agreement for the second. However, these changes did not result in a change in the degree of severity calculated; hence overall there was 100% agreement for severity. Agreement was 93% and 87% respectively for the ordinal questions related to frequency and nocturia.

In the section on bother and care seeking there was 100% agreement for questions about wetting and changing clothing. In response to the question “Does urinary leakage bother you?” the response was variable (62% agreement). Related to the question on bother were branching questions focussing on four activities of daily living that UI may affect (praying, sporting activity, house work and sexual activity).

There were five ordinal levels of impact for each activity. Responses to these questions were inconsistent at the lower and higher levels of bother. Moreover the format of these questions was reported to be confusing when recording responses.

There were two dichotomous care-seeking questions each with a follow-up branch. The agreement on these questions was $\geq 88\%$.

Of the eight questions about other health issues, seven (diabetes, LUTS, chronic cough, allergy with sneezing, diuretics, frequency, and nocturia) were dichotomous in nature and agreement was $\geq 93\%$. The remaining question from the health issues related to constipation (how many times do you empty your bowels) with five ordinal levels of response. For this question agreement was poor (53%).

The questionnaire included two lifestyle topics smoking and coffee drinking.

Agreement was 100% for all seven questions and branches related to these topics.

All interviews were completed within 15 minutes. No negative feedback was reported by any of the respondents.

4.1.6 Discussion and Conclusion

The importance of developing culturally specific and sensitive questionnaires using standardized definitions for epidemiological studies of UI has been stressed by the ICS (Abrams et al. 2003). In accordance with this recommendation we have developed a questionnaire for Muslim women in Oman, suitable for administration as a structured interview. Self-complete questionnaires are not suitable to collect data from a cross-section of the female population in Oman as 26.5% of women are illiterate, (<http://www.indexmundi.com/oman/literacy.html>). Consequently the reliability testing of the questionnaire was interview-based. The structure and content

of the questionnaire is simple and may be suitable as a questionnaire for self-completion; however we have not formally tested this method of administration.

In general, the level of agreement between the first and second random administrations was excellent indicating that the questionnaire is reliable and that there is semantic equivalence between administration in English or Arabic.

It is reasonable to expect the response to demographic questions to be the same from week to week. Similarly in the obstetrics and gynecology questions it is extremely unlikely that concordance in a woman's response to questions related to how many children she has and details regarding their delivery a chance agreement.

Questions regarding the prevalence and subtype of UI were taken from the EPICONT questionnaire; agreement between languages was excellent so there was no need to revise those questions. The 20% lack of agreement between administrations for the question on understanding UI was likely consistent with UI being explained at the first interview therefore there was no need to revise that question.

The two questions on severity of UI were taken from the questionnaire developed by Sandvik et al. (1993). Although there was not perfect agreement in the responses to one of these questions when data from both questions was combined to form the severity index, there was 100% concordance in the index.

In the tested version of the questionnaire there was a major question regarding whether UI was bothersome, with four branching questions regarding the level of bother during praying, sporting activity, house work and sexual activity. Poor agreement for these questions was addressed by collapsing the response levels from four to three. In addition these questions were reformatted into five separate

questions to alleviate the difficulty experienced recording the answers. The care seeking questions had a good level of agreement.

For the health issues, only the question about constipation resulted in inconsistent responses. These related to the number of bowel actions per week, and occurred between options “three times per week”, and “more than three times per week”. Therefore, this question was revised to read “Do you empty your bowels less than three times a week?” so the response was dichotomous

Care taken regarding the content and definitions used in this questionnaire will enable comparison with data from studies using the EPICONT questionnaire and other studies using the ICS definitions. Given the similarity in culture and language within the Gulf countries our questionnaire should be suitable for use in most countries in the region. The simplicity of the questionnaire is likely suitable for self completion but we have not tested the reliability of its use in that format.

Two previous studies conducted in the Gulf region employed locally designed questionnaires (Rizk et al. 1999; Saleh et al. 2005) the definition of UI used in these questionnaires was similar to the ICS definition although limited to a time frame of the past 12 months (Rizk et al. 1999; Saleh et al. 2005). These studies did not consider differences between the types of UI such as SUI, UUI and MUI, and no measure of severity of UI was reported. In a UAE study the questionnaire used was validated by testing 50 randomly selected female workers at Al-Ain Hospital (Rizk et al. 1999). The questionnaire was used in the community and a hospital outpatient department. It is unknown whether the survey was conducted in Arabic and/or English. The questionnaire used in a Qatari study was initially developed in English and later translated into Arabic (Saleh et al. 2005). It was tested with 75 women who visited a Primary Health Care (PHC) clinic in Qatar, but the authors did not specify

whether the interview was conducted in both languages or if only one language was used. Both studies focused only on quality of life (QoL) and care-seeking behaviours and did not measure other factors of interest.

An advantage of our questionnaire is that it is comprehensive in content yet it takes only 15 minutes to complete. We have incorporated additional questions, for example a question regarding LUTS, suggested by HajeBrahimi et al. (2004) and El-Azab and Mascha (2009) in their studies using the ICIQ-SF. Rizk (1999) and Saleh (2005) included prayer questions for Muslims. Similarly, we have included these questions in our questionnaire. In addition we have included a question on circumcision as one of the potential risk factors for UI. Questions included are appropriate to the Omani and neighbouring cultures. Moreover we have demonstrated that data collected are equivalent regardless of whether the questionnaire is administered in Arabic or English, in those who speak both languages.

A limitation of our study was the sample size, particularly for questions that were only pertinent to those with UI ($n = 8$). However, levels of agreement were high and the majority of questions were not vulnerable to chance agreement. The questionnaire has not been validated for self-completion.

We conclude that our 47-item questionnaire is suitable to administer as a 15-minute interview in Arabic and/or English to enquire comprehensively about any UI problem among Muslim and Omani women. Further, the results will permit comparison with other international studies using questionnaires that conform with ICS recommendations.

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4.2 Results of Part B: The prevalence, risk factors, severity, quality of life and care-seeking of urinary incontinence among Omani women in Seeb

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4.2.1 Abstract

Background and aims: The aim of this study was to investigate the prevalence of urinary incontinence (UI) in Omani women and to determine the risk factors associated with UI in the study population.

Methodology: 120 women aged ≥ 18 years were randomly selected from households within the Muscat region of Oman. Data were collected 'door-to-door' using a valid and reliable questionnaire developed for the study. The collected data were analysed using (SPSS) version 15; descriptive statistics and logistic regression analysis were used for this study.

Results: Among the 118 women who agreed to participate in the study, the prevalence of UI was 52.5%. Among the affected women 28% had stress UI, 12% urge UI, and 12.5% mixed UI and symptoms were severe in 13%. UI was considered bothersome by 79%, and 72% reported it affected their prayers nonetheless, only 25.8% consulted a health professional. Sneezing related to allergy, obesity, lower

urinary tract symptoms, and chronic cough were significantly associated with UI with odds ratio (95% confidence interval) of 7.1 (2.2 to 22.4), 2.2 (1.05 to 4.7), 2.3 (1.02 to 5.2), and 3.8 (1.005 to 14.4) respectively. However, when all these variables were considered together in stepwise logistic regression analysis sneezing was the only variable independently associated with UI.

Conclusion: The prevalence of UI was high among Omani women in the locality of Seeb in Muscat. The risk factors associated with UI can be prevented or treated by increasing the level of awareness among health professionals and the community. Consequently, this might significantly help the health professional in the management of UI symptoms; therefore, reducing the burden of this condition.

Key Words: Epidemiology, prevalence, urinary incontinence, risk factor, Omani women.

4.2.2 Introduction

Urinary incontinence (UI) is common throughout the world (Minassian et al. 2003). Epidemiological studies indicate the prevalence of UI varies between different populations (Aggazzotti et al. 2000; Chiarelli 2007; Hunskaar 1998; Stroup et al. 2000; Thom 1998). Urinary incontinence affects both men and women but is more prevalent in women. It has major social and hygiene consequences and a negative impact on women's quality of life (QoL) and activities of daily living (ADL) for those who are affected. (Chiarelli and Brown 1999; Hägglund et al. 2001; Minassian et al. 2003). For Muslim women who need to pray five times daily and cannot do so if their clothing is even minimally soiled it has unique implications. Affected Muslim women may need to change their clothes several times each day. Of Emirates women who suffer from UI, 90% reported it interfered with praying (Rizk et al. 1999).

A review of worldwide data reported that the overall median prevalence of UI among women was 27.6%, however the range was large: 4.8 to 58.4% (Minassian et al. 2003). Factors contributing to the wide range in prevalence reported include the definitions of UI used, methods of sampling and data collection, and regional and cultural differences (Abrams et al. 2005; Hunskaar et al. 2004). Differences in prevalence are not always easy to explain, ethnicity and cultural background might influence the prevalence of UI. Willingness to admit to a problem with UI must influence the accuracy of prevalence data and this willingness is likely to differ between cultures, however there are not studies directly comparing the cultural acceptance of suffering from UI.

A variety of risk factors for UI have been identified. They include age, pregnancy, childbirth, parity, obesity, lower urinary tract infection (LUTI), diabetes, drugs, constipation, menopause and coffee consumption (Abrams et al. 2005; Avellanet et al. 2003; Chiarelli and Brown 1999; Danforth et al. 2006; de Tayrac et al. 2004; Eason et al. 2004; Hacker and Moore 1992; Marshall et al. 1996; Sapsford et al. 1998). The importance of individual risk factors on UI appears to differ between age groups, hormonal status, and racial and cultural backgrounds (Chiarelli and Brown 1999; Lewis et al. 2005; Marshall et al. 1996; Peyrat et al. 2002; Rizk et al. 1999; Rortveit et al. 2001; Zvetanka et al. 1999) although it should be acknowledged that some of these apparent differences may also relate to differences in study design.

Many affected women with UI do not seek treatment. Across nations, median levels of care seeking of only 23% have been reported (Minassian et al. 2003). It appears, that many women suffer in silence, perhaps because they are unaware there are effective treatments available or because they are too embarrassed to report or seek treatment for UI (Adaji et al. 2010; Rizk et al. 1999; Saleh et al. 2005).

The prevalence of UI has not been previously been studied within the Omani population, and there is a limited data on the risk factors for UI among women in the Gulf region and none specific to Omani women. Establishing the prevalence of UI in Oman is important to determine the need for treatment and consequently the resources required to provide appropriate interventions for the affected women.

Aims: The aims of this study were to investigate the prevalence, severity and risk factors of UI in Omani women in the suburb Seeb located in Muscat the capital city of Oman. Secondary aims were to establish whether UI bothered those women affected; what impact it had on their activities of daily living, particularly on their routine of prayer; and whether and where they would seek care for it.

4.2.3 Methods

4.2.3.1 Subjects and recruitment

This study was a cross-sectional population based survey. The study sample of 120 women aged ≥ 18 years was recruited from women residing in the locality of Seeb within the Muscat region of Oman. Women who were not Omani or Muslim were excluded. Muscat is the capital region of Oman. It is divided into six localities (wilayah). The locality of Seeb has a population of 223,449 of which 95,318 are female. This region was selected as it has a high population density and a diverse socioeconomic distribution. A cluster sampling approach was used. Twelve starting points within Seeb were randomly selected from the 2003 Oman Census list of households. The starting household and every second subsequent household in a clockwise direction were visited until 10 women in each cluster had been invited to participate. The study was approved by the Human Research Ethics (HR 41/2007) at Curtin University of Technology, and permission was granted by the Wali (Mayor) of Seeb in Oman. Householders were shown identification and a letter verifying

permission for the study had been granted by the local authorities (Appendix 5). The purpose of the survey was explained to the woman/women of the household and verbal consent obtained. Only one woman was interviewed in each household.

4.2.3.2 Questionnaire and data collection

The languages used in Oman are predominantly Arabic and English. The Omani census reported that 26.5% of population were illiterate (<http://www.Omancensus.net>). Al Riyami et al (2004) reported that only 16% of Omani women have completed secondary school and many are unable to write or read. For this reason, data were collected by a female investigator at the home of the respondents. One female researcher, always accompanied by another woman recruited door-to-door. Structured interviews using a validated questionnaire designed for the study (Chapter Four) were conducted with women willing to participate. Interviews were conducted in English or Arabic according to the preference of the volunteer. The questionnaire included demographic facts and questions related to knowledge about UI, prevalence and severity of UI, impact of UI, and risk factors and care seeking for UI. In addition, height and weight were measured using portable equipment. The variables measured are listed in Table 4.2.1.

Table 4.2.1 Differences between continent and incontinent women

Demographic/ Clinical data	Continenence n=56	Incontinence n=62	OR (95% CI)	P-value
Age (only for age known)(n=85)	38.7±11.3	39.0±11.3		0.85
Menopause (%)	13.6	15.3		1.0
Parity (number of children)	5.0±3.6	5.1±3.0		0.83
Number episiotomy	1.2±1.8	0.9±1.6		0.39
Circumcision (%)	35.6	64.4	2.1 (0.9-4.6)	0.06
Obesity (%)	33.9	63.5	2.2 (1.0-4.7) *	0.03
Diabetes (%)	60.0	40.0	1.4 (0.5-3.8)	0.62
Frequency (%)	66.1	33.9	1.6 (0.7-3.8)	0.22
Nocturia (%)	54.3	45.7	1.8 (0.5-2.4)	0.70
Diuretics (%)	59.3	40.7	1.1 (0.6-2.1)	0.19
Daily coffee consumption (cup/day)	1.2±1.5	1.4±1.8		0.54
Coffee (%)	64.5	35.5	0.1 (0.30-0.90)	0.43
Lower urinary tract symptoms (LUTS) (%)	33.3	66.7	2.3 (1.0-5.2) *	0.04
Constipation (%)	44.8	55.2	1.5 (0.4-2.6)	0.83
Chronic cough (%)	21.4	78.6	3.8(1.0-14.4) *	0.03
Allergy (sneezing) (%)	15.4	84.6	7.1(2.2-22.4) *	0.001
Smoking	0	0	0	0

* Significant

4.2.3.3 Definition of terms

The ICS definitions of UI were used in the survey (Abrams et al. 2003). UI was defined as "any involuntary leakage of urine". The sub-classifications of UI used in this study were stress urinary incontinence (SUI), which is the complaint of involuntary leakage on effort, exertion, coughing, sneezing or laughing. When the complaint of involuntary leakage was accompanied or immediately preceded by urgency it was defined as urge urinary incontinence (UUI), and if symptoms of both SUI and UUI were present the condition was defined as mixed urinary incontinence (MUI) (Abrams et al. 2003).

Severity of UI was classified according to the index developed and validated by Sandvik et al (1993). This index is calculated as the product of ordinal category variables based on the frequency and volume of urine leakage. Frequency has four levels (0, 1, 2, 3), according to the number of episodes of leakage per month for the last 12 months (0, 1-4, 5-24, ≥ 25). Volume of leakage has two levels, a few drops (1) or more than a few drops (2). Naturally women with zero leakage score 0 according to this system. Using this severity index, women who have leakage are divided into three categories; slight (1-2), moderate (3-4) and severe (6-8), according the amount and frequency of leakage (Sandvik et al. 2000).

Health issues that may be risk factors for UI were defined according to published definitions from credible sources such as relevant professional associations (eg American College of Gastroenterology (www.acg.gi.org) for the definition of constipation). Women with any burning sensation while passing urine were defined as having lower urinary tract symptoms (Hacker and Moore 1992). Patient's body mass index (BMI) was calculated as weight/height (kg.m⁻²), women with BMI ≥ 30 were defined as obese (World Health Organisation 2000).

4.2.4 Statistics

Data were analysed using the Statistics Package for the Social Science (SPSS®) software version 15 for Windows. Descriptive statistics were used to summarize the data. Characteristics of the continent and incontinent women were compared using the Chi square test for proportions and the unpaired t-test for continuous variables. Univariate and forward stepwise (p to enter < 0.05 and p to remove >0.01) logistic regression analyses were used to determine associations between the risk factors and UI. Associations between type of UI, severity and levels of bother were tested using the Chi square test. The significance level was set at $p < 0.05$.

4.2.5 Results

One hundred and twenty women were invited to participate in this study. Although all were willing to participate, two, who were not Omani nationals were excluded. Therefore there were 118 (98.3%) participants. They were aged 18 to 69 years however 28% of the study sample did not know exactly how old they were and 29% percent were illiterate. Sixty-two percent of the women were not aware what the term UI referred to until it was explained to them. Almost one third (28.8%) of the sample were post menopausal and 44% had a BMI ≥ 30 and were classified as obese.

The prevalence of UI among the study population was 52.5% (62), of which 53.2% (33) had stress UI, 22.6% (14) had urge UI and 24.2% (15) had mixed UI. Severity of UI was slight in 26 (42%) women, moderate in 28 (45.0%) women and severe in 8 (13%) women.

Among the studied risk factors, allergy accompanied with sneezing, chronic cough, obesity, and LUTS were significantly associated with the presence of UI (Table 4.2.1). If all of these significant variables were included in stepwise multiple

regression analysis, allergy causing sneezing, was the only significant predictor of urinary incontinence in our study.

Of the 62 (52.5%) affected women, 49 (79%) were bothered by UI and 26 (42%) reported it was a major bother. Eighty-four percent (52) changed their clothes at least once per day and of those 23 changed three or more times per day. Only 22 reported using incontinence pads. Urinary incontinence had a negative impact on prayers, in 72% (45) of affected women. Of those, 42% (26) described that UI extremely affected their prayers. There was a negative effect on sport in 9 (14.5%), housework in 14 (22.6%) and sexual activity in 8 (13%).

Severe UI was uncommon among the women with SUI (3%) but more prevalent among those with UUI or MUI (21.4% and 26.7% respectively). Slight UI was common among women with SUI and UUI (54.5% and 42.9% respectively) but much less prevalent among women with MUI (13.3%) (Fisher's Exact Test=11.4; $p=0.01$; (Figure 4.2.1).

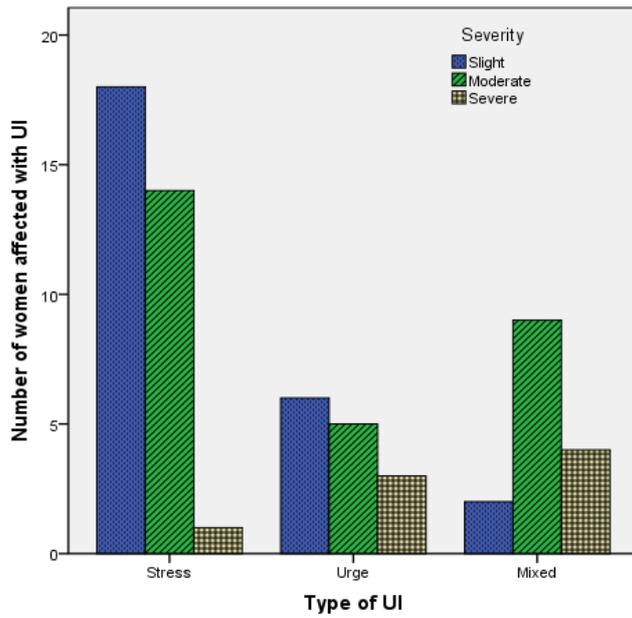


Figure 4.2.1 Distribution of the three levels of severity within the sub-types of UI (Fisher’s Exact Test=11.4; p=0.01).

Women with SUI and MUI were most likely to find their UI a major bother (45.5% and 66.7% respectively) whereas only 7.1% of women with UUI found it a major bother (Fisher’s Exact Test=18.7; p=0.002; Figure 4.2.2).

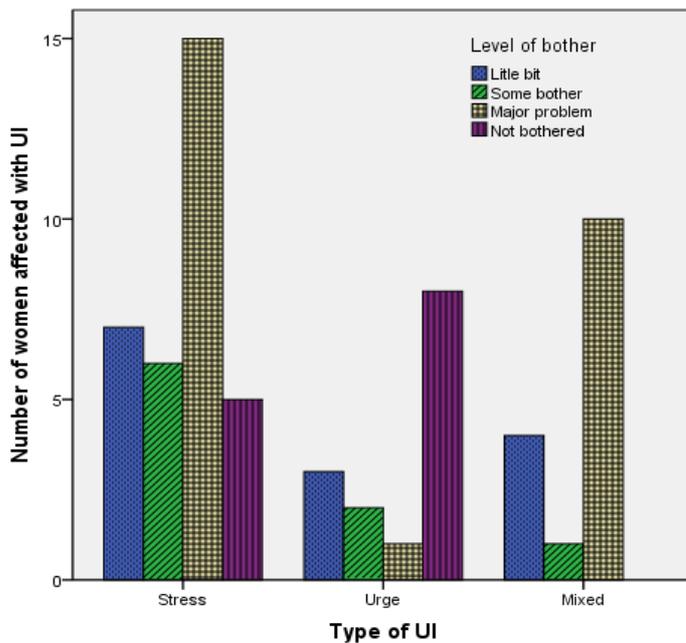


Figure 4.2.2 Distribution of the four levels of bother within the sub-types of UI (Fisher’s Exact Test = 18.7; p=0.002)

There was no significant relationship between the four levels of bother reported and the severity of symptoms (Fisher's Exact Test = 9.8; $p=0.1$; Figure 4.2.3).

There was no significant association between age and the severity of UI (Fisher's Exact Test = 7.1; $p=0.5$) or between age and level of bother (Fisher's Exact Test = 12.5; $p=0.3$). Whether or not women sought treatment for their UI was not associated with the type of UI ($p=0.5$), the severity of UI ($p=0.3$) or the level of bother ($p=0.1$).

Of the 62 affected women 43 (69.4%) did not discuss their symptoms with their family, and 46 (74.2%) did not consult a medical practitioner or seek treatment from any other health professionals such as physiotherapists. With respect to their reasons for not discussing UI, 18 (41.9%) said that they thought that it was normal to have

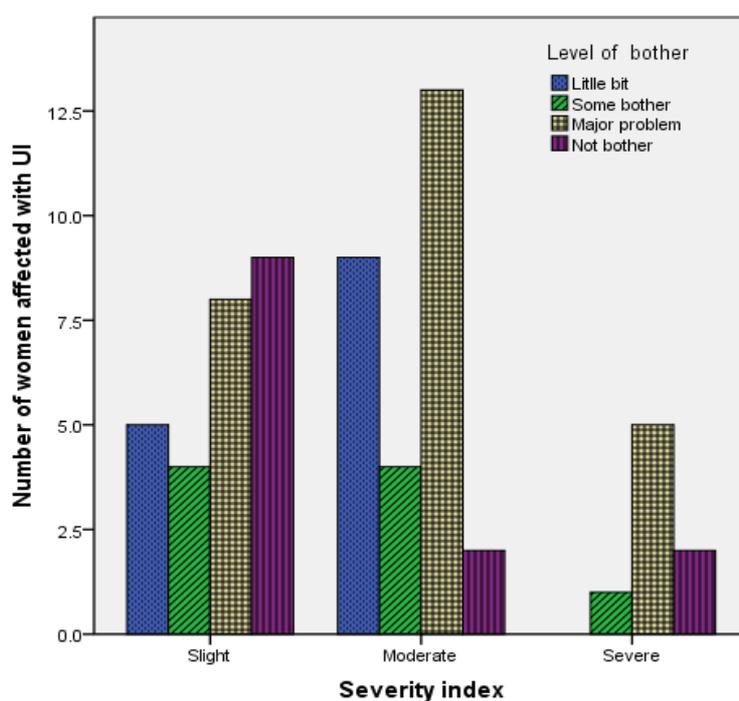


Figure 4.2.3 Distribution of the four levels of bother within the three levels of severity (Fisher's Exact Test = 9.8; $p=0.1$)

these symptoms, 13 (30.2%) thought that it was not a big problem and 12 (27.9%) felt embarrassment in talking about the symptoms.

4.2.6 Discussion

This is the first study examining the prevalence of UI in women living in urban Oman. The overall prevalence of UI in these women was high. This is in contrast with previous studies also conducted in Gulf countries (Rizk et al. 1999; Saleh et al. 2005) where prevalence ranged from 20.3% to 20.6%. A likely explanation for the lower prevalence reported in the earlier studies is their use of a time constrained definition of UI, that is questions specified “any involuntary leakage of urine or accidental loss of control of urination in inappropriate place or at inappropriate time regardless of its severity, frequency or social or hygienic consequences in the past 12 months”. Studies from other regions and countries have also used a similar time constrained definition of UI and reported lower prevalence rates ranging from 12.8% to 36% (Chiarelli and Brown 1999; Rizk et al. 1999; Saleh et al. 2005; Vinker et al. 2001).

For the present study, the broader definition recommended by the ICS at the time this study protocol was developed (Abrams et al. 2003) was used. This definition has been used in a number of large prevalence studies in Europe. Hunskaar et al (2004) reported that prevalence was similarly high in France (44%), the United Kingdom (42%), and in Germany (41%) however the prevalence was considerably lower in Spain (23%) (Hunskaar et al. 2004), and Norway (25%) (Hannestad et al. 2000). As the same definition of UI was used for all these studies the authors postulated that cultural and ethnic differences between countries may have contributed to the unexpected disparity. It is possible that women from some cultures may be more

embarrassed about having UI or alternatively they may consider it as an inevitable consequence of ageing and be less inclined to report it (Hunskaar et al. 2004).

Methods of sampling, inclusion and exclusion criteria, and methods used for collecting data such as self reported questionnaire, interview or audit of medical records, might also contribute to variation in the prevalence of UI in the studied populations. In Oman the door-to-door method of recruitment and data collection rather than postal surveys was necessary to ensure a representative sample in view of the high prevalence of illiteracy in Omani women. This approach also resulted in an extremely high response rate (98%) and complete data for each participant, which both add to the strength of the study. Similar high response rates have also been reported for studies conducted in Turkey (98.8%), Qatar (79.8%) and UAE (89%) (Kocak et al. 2005; Rizk et al. 1999; Saleh et al. 2005) where data were collected by face-to-face interview, although the data for these studies was collected in hospitals as well as the community. A major limitation of door-to-door recruitment and interview is that it requires considerable resources to collect the data and in some countries unannounced visits to people's homes would not be viewed favourably. Another limitation of face-to-face interview is that the data are more vulnerable to social desirability bias whereby participants choose responses they think are more socially acceptable rather than the responses that are accurate to them (Kocak et al. 2005). Postal surveys are a more convenient and economical way to collect data where appropriate, however they do tend to have lower response rates (Chiarelli and Brown 1999; Hannestad et al. 2000; Hunskaar et al. 2004).

The prevalence of stress UI was high in comparison with other types of UI. A higher prevalence of stress UI than any of the other subtypes of UI has been reported in a number of other studies and countries including Norway (Hannestad et al. 2000),

Germany, Spain United Kingdom and France (Hunskaar et al. 2004) and among white and Hispanic but not black women in the United States of America (Thom 1998). Reasons for these differences are largely speculative, however, physiological and structural differences between black and white women have been reported (Hunskaar et al. 2003).

In our sample of community dwelling women, the severity was predominantly moderate (45.2%) or slight (42%) with only eight women (12%) reporting severe UI. Similarly, in a community dwelling sample of women in Norway aged >20 years, Sandvik et al (1993), using the same definition of severity, found that almost half of their sample had slight UI (46%) with 27% moderate, and 27% severe. In contrast, when data were collected from women attending general practice or a hospital clinic for management of UI, those with severe UI accounted for more than 60% of the sample and less than 10% had slight symptoms (Sandvik et al. 2000). These data suggest that women may be less likely to seek treatment for slight UI, and would be consistent with them considering slight UI to be normal or untreatable. Among the Omani women we surveyed, whether or not women sought treatment for their UI was not associated with the type of UI, the severity of UI, or the level of bother. This may be a reflection of a lack of knowledge about or access to effective treatments.

Unlike a number of other studies that have reported a higher prevalence of severe UI in midlife/middle age groups (Hannestad et al. 2000; Sandvik et al. 1993), we did not find a significant relationship between age and the severity of UI. Although this may be attributed to cultural or methodological differences, the most likely explanation is the comparatively small sample size in our study.

In the present study, mixed UI was the most bothersome type of UI. Other studies have also found that MUI was the most bothersome (Hannestad et al. 2000;

Lewicky-Gaupp et al. 2009). Lewicky-Gaupp et al (2009) reported that urge and mixed UI had a greater negative impact on women than SUI. In contrast, among the Omani women in our study stress UI was the next most common form of UI women found to be a major bother. This may be due to the impact of UI on prayer, an extremely important consideration for Muslim women. Any Muslim woman will not be able to pray without changing if she has leaked even a drop of urine, making it a major bother, whereas a non-Muslim woman may feel comfortable to ignore a drop or two of urine. The impact of UI on prayer would also explain the lack of association between severity of UI and the level of bother.

It has also been reported that the bother associated with UI differs between ethnic groups. In one study that included different ethnic groups from Michigan in the USA the level of bother was greater among black women than white women and black women with urge UI found it most bothersome (Lewicky-Gaupp et al. 2009).

Like our study, other studies have reported that risk factors such as obesity, lower urinary tract symptoms, chronic cough, and allergy with sneezing were significantly associated with UI (Chiarelli and Brown 1999; Lewis et al. 2005; O'Connell et al. 2002; Zvetanka et al. 1999). It is of interest that 3 of the 4 significant risk factors are associated with increasing intra-abdominal pressure that would load the pelvic floor. This would suggest that examination of the pelvic floor for signs of dysfunction and implementation of a pelvic floor training program would be beneficial for a large proportion of these women (Bø 2003; Shamliyan et al. 2008; Yoo 2011). Moreover all of these risk factors are amenable to treatment either with changes to lifestyle, medical management or a combination of both.

The cross-sectional data from our study cannot be interpreted to indicate causal relationships. However, there are data from other studies that do provide evidence

that the relationship between obesity and UI is causal (Danforth et al. 2006; Minassian et al. 2008). Studies of obese women with UI have shown that surgical and non-surgical weight loss is associated with reduction in the frequency or resolution of UI (Brown et al. 2006; Bump and McClish 1992; Subak et al. 2002). In general parity and episiotomy are associated with UI (Chiarelli and Brown 1999; Lewis et al. 2005; Marshall et al. 1996; Rortveit et al. 2001; Zvetanka et al. 1999) however; in our study this relationship was not apparent. Similarly Arya (2000) found no association between parity and UI in Icelandic women. One explanation for this difference may be the small sample size in the present study and the Arya (2000) study. Similarly, diabetes, constipation, use of diuretic medications and coffee consumption, were significantly associated with UI in a number of earlier studies (Chiarelli and Brown 1999; Lewis et al. 2005; Marshall et al. 1996; Rortveit et al. 2001; Zvetanka et al. 1999) however these associations were not apparent in the present study, again maybe due the modest sample size. In our study the sample size was small and data were collected in an urban community only, whereas some previous studies have had very large samples size, different recruitment strategies, selection criteria and methods of data collection. All of these factors may contribute to differences in the findings.

Female genital cutting (FGC) or circumcision as it is commonly referred to can cause late medical complications such as UI (Elchalal et al. 1999). However, contrary to expectations, circumcised women in the current study were not at greater risk of developing UI although there was a trend in that direction. This could be a Type II error and a significant association may be detectable in a larger sample. Another explanation may be the type of FGC most often employed in this region. We didn't ascertain the type of circumcision directly from the women surveyed; however,

anecdotal evidence suggests that circumcised women in urban regions of Oman have one of the less aggressive forms of cutting described as a prick or a nick that would be classified as Type IV according to WHO criteria (WHO 2000). It is possible the level of tissue damage associated with this “procedure” may be insufficient to lead to UI.

It is known that UI can be distressing and cause or contribute to physical, and psychological morbidity in women in all ages (Chiarelli and Brown 1999; Hunskaar 2006). A large proportion of Omani women in Seeb reported UI had a negative effect on their prayer and 29% of women considered this effect to be extreme. This is similar to earlier reports from women in UAE and Qatar (Rizk et al. 1999; Saleh et al. 2005) however the extent of the effect on prayers was not reported in these studies. The effect of UI on doing the housework in Omani women was high compared to Qatari (14%) and UAE (4.9%) women who said UI did not stop their work. In the Gulf countries sport is neglected by women in all age groups with only a few women participating in sport. Among those who do exercise, walking and gym are the most common form of exercise. This may explain the relatively few women reporting that sport was affected by UI and would be one reason why other studies from the Gulf region have not reported data on exercise participation (Rizk et al. 1999; Saleh et al. 2005). In the USA, where a greater proportion of women are physically active, it has been reported that incontinent women were more likely to be physically inactive than continent women and that incontinence was a significant barrier to activity (Nygaard et al. 2005). Moreover, in a longitudinal study the incidence of in women aged 54 to 79, the incidence of UI was lower among more active women (Danforth et al. 2007). On the other hand in a Norwegian study comparing the prevalence and risk factors for UI in former elite athletes and non-

athlete controls found current level of activity was not associated with UI in either group (Bø and Sundgot-Borgen 2009).

It was reported by Saleh et al (2005) and Rizk et al (1999) that UI highly affected sexual activity (47% and 33.3% respectively). In contrast, with the present study was low, this may be due to the culture and small sample size and recruitment. It is difficult to understand why this difference has occurred, particularly as data for all of these studies was collected by interview. A proportion of the data collected in the other studies was collected in a hospital environment so possibly participants felt more comfortable talking about such personal matters to interviewers in a clinical setting.

Only 25.8% of the women in Seeb sought the advice of a health professional for their UI. This is not dissimilar to the levels of care-seeking reported in the United Arab Emirates (30.9%) or four European countries (France, Germany, Spain and United Kingdom) where 31% of women had sought treatment (O'Donnell et al. 2005).

Factors proposed to contribute to the generally low levels of care-seeking include a lack of knowledge about the condition, the level of bother, unaware there are treatments available and embarrassment about discussing the condition.

There are a number of factors that must be taken into account when interpreting the findings of this study. As the data were all self-reported they are vulnerable to recall bias, nonetheless, considerable care was taken with development and testing of the questionnaire good reliability of responses was established. Data were collected from only one urban region of Oman so generalization to the population as a whole requires caution, particularly as factors such as socioeconomic status and level of education have been found to be associated with disease burden associated with UI and levels of care-seeking (Lewicky-Gaupp et al. 2009).

4.2.7 Conclusion

To date the prevalence and impact of UI has not been investigated in any region of Oman.

Our finding provides evidence that there is a high prevalence of UI among Omani women and that the condition has a profound effect on their activities of daily living, particularly their routine of prayer. As care-seeking is low there is a need to consider health education and health promotion activities to raise awareness about the prevention and treatment of UI.

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4.3 Results of Part C: The prevalence, risk factors, severity, care seeking and impact of urinary incontinence in Omani women

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4.3.1 Abstract

Background: Urinary incontinence (UI) is prevalent among women worldwide however, prevalence and risk factors in Oman are largely unknown. Establishing the prevalence among Omani women and the impact UI has on their daily lives will inform and justify the development of health education and treatment programs.

Aim: The aim of this study was to investigate the prevalence; risk factors; associated bother and impact on daily living of UI in Omani women as well as to determine levels of care-seeking for the condition.

Methodology: In this cross-sectional study, 800 women aged ≥ 18 years were recruited using a national multi-stage cluster sampling approach. Only Muslim Omani women were recruited. Data were collected door-to-door using a questionnaire developed for this study. Data were analysed using descriptive statistics, chi square or t-tests and logistic regression analysis.

Result: 792 out of 800 women agreed to participate. This represents a 99% response rate. 42.9% were found to have Urinary Incontinence, 22.7% SUI, 3.3% UUI and 16.9% MUI. Risk factors associated with UI included lower urinary tract symptoms (LUTS) (OR 2.7; 95% CI 1.9-3.7), obesity (OR 2.2; 95% CI 1.6-3.0), sneezing

Results

associated with allergy (OR 1.7; 95% CI 1.2-2.4), nocturia (OR 1.1; 95% CI 1.3-2.3), constipation (OR 1.5; 95% CI 1.1-2.1), parity (OR 2.6; 95% CI 1.7-3.8), and coffee consumption (OR 1.4; 95% CI 1.0-1.9).

Of affected women, 66% reported UI caused difficulties performing prayers, 29.1% described this effect as extreme. 88.5% change their clothes and only 20.3% consult health professional, and 65.6% were bothered by the condition UI. Severity of UI was, slight in 74.7% (n=592), moderate in 14.3% (n=113) and severe in 11% (n=87). Circumcision, diuretics, chronic cough, menopausal status and diabetes were not significantly associated with UI.

Conclusion: There was a high prevalence of UI among Omani women in Muscat.

Five risk factors were considered significant and several risk factors were considered close to significant. Further studies are required, and to develop health education and treatment programme in Oman

Key Words: Epidemiology, prevalence, urinary incontinence (UI), Omani women, affecting activities of daily life, care seeking.

4.3.2 Introduction

Urinary incontinence (UI) is a condition that affects women of all ages throughout the world. Although there is good epidemiological evidence regarding the prevalence and consequences of UI in some parts of the world, there are many areas, including Oman where data are largely unavailable. The prevalence of UI appears to differ between countries, with a range that varies from 4.8% to 58.4% (Minassian et al. 2003). While some of this variability is undoubtedly due to differences in the methodology employed in the collection of data, regional and cultural differences are also considered to be important (Abrams et al. 2005). Accurate, region-specific data is important for the formulation of health policy, health economy decision making, provision of treatment and future clinical research (Abrams et al. 1999).

Only a few epidemiological studies related to UI have been conducted in the Middle East. A United Arab Emirates (UAE) based study found that 20.3% of the population sample was incontinent (Rizk et al. 1999), while a Qatari study reported a prevalence of 20.6% (Saleh et al. 2005). A study in Egypt reported that 28.2% of their sample were suffering from UI (El-Azab and Shaaban 2010) whilst a study in Israel demonstrated that 36% of women in their sample had previously had an episode of UI (Vinker et al. 2001).

The Sultanate of Oman is located in southwest Asia, on the southeast coast of the Arabian Peninsula. It borders the United Arab Emirates in the northwest, Saudi Arabia in the west, and Yemen in the southwest. Oman has a population of 2,340,815, one third of which is Omani female. To date, only one small study of the prevalence of UI has been conducted in Oman. This study took place in 2009 (Al Busaidi et al. 2009). In that study, 118 women from the Seeb district of Muscat the

capital city responded to the questionnaire, the results of which have been discussed in Chapter 4.2.

A number of risk factors for UI have been identified. Previous studies have reported that age, (Lewis et al. 2005; Zhu et al. 2010; Zvetanka et al. 1999) pregnancy, vaginal delivery, parity, menopause, chronic cough, sneezing, obesity, constipation and diabetes are significant risk factors for UI (Brown et al. 2006; Chiarelli and Brown 1999; Lewis et al. 2005; Marshall et al. 1996; Scarpa et al. 2006; Zvetanka et al. 1999). Anecdotal evidence suggests that many women in Oman believe that incontinence is normal after the birth of a child. Many Omani women also feel embarrassed to talk to anyone about the subject. They apparently are not aware that there are effective remedies for problems associated with UI, including medical, surgical and physiotherapy treatments.

A sample of women from Muscat, the capital city of Oman, was surveyed in 2009. The prevalence of UI was 52.5%. Although medical and surgical treatments are available in many Omani hospitals, physiotherapy assessment and treatment is available in only two urban hospitals in the whole country, Sultan Qaboos University Hospital (SQUH) and Khoula Hospital. Determining the prevalence of UI will help gauge the need for more provision of appropriate treatment services in both urban and rural regions.

4.3.3 Aims

The principal aims of this study were to investigate the prevalence and types of UI in Oman and the prevalence of UI in both urban and rural areas. In each region, the severity and risk factors of UI in Omani women was investigated. Secondary aims were to establish what effect UI had on the daily activities of women, in particular during their lengthy routine of prayer; how many women considered themselves to

be “bothered” by UI and whether they felt that it was necessary to seek treatment. The significance of the study lay in the importance of information regarding the prevalence of UI for the development of health education, treatment programs, and resource allocation to ensure equity in service delivery.

4.3.4 Methods

This study was a national population-based survey of Muslim Omani women aged ≥ 18 years.

4.3.4.1 Subjects and recruitment:

Data were collected from a population-based sample of Omani women. Women who were not Omani, not Muslim, aged less than 18 years or were unable to respond to the questionnaire for any reason, were excluded. The target sample size was 800; data were collected from 792 women.

A multi-stage cluster sampling approach was used. Oman has an area of 309,500km² which is divided into eight regions: Muscat, Ad Dakhaliya, Adh Dhahira, Al Batinah, Al Wusta Ash Sharkiya, Dhofar and Musandam. These regions are further divided into sub-regions called wilayahs (districts). There are 59 districts in all. Using this strategy, sampling stages can be stratified for population distribution. A similar approach has previously been successfully applied in a National Health Survey in Oman (Al Riyami et al. 2004).

Stages of sampling were region / wilayah / block / house. All regions were sampled, with the sample size determined according to the proportion of the population residing in the region. Where the total sample size for the region was less than 20, one wilayah was randomly selected for sampling. In two regions, due to the population density, all wilayahs were sampled. For the remainder, the number of wilayahs to be sampled was sufficient to allow each cluster to include 20 to 25

Table 4.3.1 Distribution of clusters and samples according to regions and Wilayahs

Regions (clusters)	Number of wilayah	Total Omani female population	Number of subjects to be interviewed	Number of clusters	Number of clusters x subjects per cluster
Muscat	6	182,893	166	6	5 x 28 1 x 26
Ad Dakhaliya	8	11,699	107	5	4 x 21 1 x 23
Ad Dhahira	5	73,352	67	3	2 x 22 1 x 23
Al Batina	12	282,242	257	12	11 x 21 1 x 26
Al wusta	4	7,826	7	1	1 x 7
Ash Sharqiya	10	132,923	120	6	6 x 20
Musandam	4	9,500	9	1	1 x 9
Dhofar	10	73,583	67	3	2 x 22 1 x 23
Total	59	880,108	800	37	800

subjects (Table 4.3.1). The wilayahs to be surveyed in each region were selected using random number tables. Within each wilayah one census block was randomly selected to determine the starting point for data collection. Census blocks were developed for the 2003 Oman census. For the census, each wilayah was divided into numbered “blocks” of 60 houses. The starting point for each cluster for this survey was the first house from the selected census block. Every second subsequent household in a clockwise direction was visited until the number of subjects required for that cluster had been recruited. In total, 37 starting points were selected. The target sample size in a cluster ranged from 7 to 28 women.

For this study, the Muscat region was considered to be urban as it is more developed than other regions, it has the majority of the commercial banks, private colleges and hotels and it has the highest population density of 162.2/km². Population density in other region is considerably lower (≤ 52.3). Apart from Muscat, all regions in the present study were classified to be rural (Al-Moosa et al. 2006). The socio-demographic characteristics of Muscat and other regional populations in Oman differ. Overall, Muscat has a younger, more educated population with a slightly smaller average family size (Census, 2003).

4.3.4.2 Procedure

Data were collected by two female Omani physiotherapists both fluent in both Arabic and English. The interviewers were always accompanied by another woman for reasons of security.

4.3.4.3 Definition of terms

The ICS definitions of UI were used in the survey (Abrams et al. 2003). UI was defined as any involuntary leakage of urine. The sub-classifications of UI used in this study were stress urinary incontinence (SUI), which is the complaint of involuntary leakage on effort, exertion, coughing, sneezing or laughing. When the complaint of involuntary leakage was accompanied or immediately preceded by urgency it was defined as urge urinary incontinence (UUI), and if symptoms of both SUI and UUI were present the condition was defined as mixed urinary incontinence (MUI) (Abrams et al. 2003).

In this study we used a questionnaire developed specifically for Omani women, designed to be administered as an interview in either English or Arabic. The reliability and semantic equivalence of the questionnaire used in this study had been established in an earlier study (Chapter 4.1). Items incorporated included

demographic characteristics; gynaecological and obstetric history; presence of UI and the subtypes: stress UI, urge UI and mixed UI, the severity of UI and the impact it has on activities of daily living. Other health and lifestyle issues previously identified as risk factors for UI were also included.

The severity index used in this study was developed and validated by Sandvik for the epidemiology studies. The index was calculated by multiplying “the amount of urine leakage x frequency of leakage”. raw scores were then classified as severe, moderate or slight (Sandvik et al. 1993; Sandvik et al. 2000).

4.3.5 Statistics

Data analysis was conducted using Predictive Analytic Software (PASW) v18, formally Statistical Package for Social Science (SPSS). Descriptive statistics were used to summarise the data. Characteristics of both continent and incontinent women were compared using the Chi square test for proportions and the unpaired t-test for continuous variables. Univariate and forward stepwise (p to enter < 0.05 and p to remove >0.01) logistic regression analyses were used to determine associations between the risk factors and UI. Only significant variables from the univariate analyses were included in the multivariate analysis. The results were presented as numbers, percentages and odds ratios with 95% confidence intervals (CI).

Associations between type of UI, severity and levels of “bother” were tested using the Chi square test. The significance level was set at $p < 0.05$.

4.3.6 Results

4.3.6.1 Participants

The target sample size was 800 women. Almost all women approached were willing to participate, resulting in a sample of 792 women and a response rate of 99%. Of the eight missing subjects, two were not eligible to be in the study as they were not

Omani, two refused to allow measurement of their body weight, one refused to be interviewed as she had a phobia about health professionals. In one region there were insufficient women at home on the day of data collection to complete that cluster. This was due to a wedding in a neighbouring area that a most people were attending. Participants aged from 18 to 70 years. Of the participants, 287 (36.2%) did not know their age; amongst that group, 51 (6.4%) were from urban regions and 236 (29.8%) from rural regions. Overall, 148 (18.7%) were postmenopausal; only 40.4% of unknown age were post-menopausal, 28 (3.5%) from urban regions and 120 (15.2%) from rural. Two hundred and eighty-eight (35.7%) of the sample had BMI ≥ 30 and were classified as obese. Two hundred and nine (31.4%) women from the study sample were illiterate, 42 (5.5%) urban and 207 (26.1%) rural women. The remainder of the demographic results are in Table 4.3.2 below.

Table 4.3.2 Demographic characteristics of the sample

Demographic/ Clinical data	Continenence n=452	Incontinence n=340	Total n=792
Age known	279 (55.2%)	226 (44.8%)	505 (63.8%)
20-29	122 (15.4%)	62 (7.8%)	184 (23.2%)
30-39	112 (14.1%)	110 (13.9%)	222 (28.0%)
40-49	35 (4.4%)	38 (4.8%)	73 (9.2%)
50-59	9 (1.1%)	13 (1.6%)	22 (2.8%)
60-70	1 (0.1%)	3 (0.4%)	4 (0.5%)
Age unknown	173 (61.7%)	114 (39.5%)	287 (36.2%)
Understand What UI is?			
Yes	245 (30.9%)	204 (25.8%)	449 (56.7%)
No	207 (26.1%)	136 (17.2%)	343 (43.3%)
Reside in Urban area	100 (12.6%)	65 (8.2%)	165 (20.8%)
Marital status			
Never married	76 (9.6%)	25 (3.2%)	101 (12.8%)
Married	316 (39.9%)	274 (34.6%)	590 (74.5%)
Divorced	21 (2.7%)	14 (1.8%)	35 (4.4%)
Widowed	39 (4.9%)	27 (3.4%)	66 (8.3%)
Educational level			
Primary	73 (9.3%)	64 (8.1%)	138 (17.4%)
Intermediate	53 (6.7%)	58 (7.3%)	111 (14.0%)
Secondary	142 (17.9%)	96 (12.1%)	238 (30.1%)
University/ Diploma	39 (4.9%)	18 (2.3%)	57 (7.2%)
BMI	29 (3.7%)		
<18.5	137 (17.3%)	4 (0.5%)	33 (4.2%)
18.5-24.99	139 (17.6%)	67 (8.5%)	204 (25.8%)
25-29.99	147 (18.6%)	133 (16.8%)	272 (34.3%)
≥ 30		136 (17.2%)	283 (35.7%)
Stage of menopause			
Pre menopause	312 (39.4%)	231 (29.2%)	543 (68.6%)
Peri menopause	49 (6.2%)	52 (6.6%)	101 (12.8%)
Post menopause	91 (61.5%)	57 (38.5%)	148 (18.7%)
Obstetric history			
Parity	4.9 ± 0.5	5.7 ± 5.3	5.2±4.0
Normal	4.1 ± 3.7	4.6 ± 4.2	4.3±4.1
Normal(Episiotomy)	0.3 ± 0.2	0.3 ± 0.2	0.6±1.3
Caesarean	0.5 ± 0.4	0.8 ± 0.6	0.6±1.0
Miscarriage	0.6 ± 0.5	0.7 ± 0.6	0.2±0.7

Table 4.3.3 Clinical characteristics of the sample

Clinical characteristics n=792	Continenence n=452	Incontinence n=340	OR (95% CI)	P-value
Age (years, only known age, (n=505)	31.6 ± 8.17	34.7 ± 8.96		0.001
Post menopause (n=148)	91 (11.5%)	57 (7.2%)	0.79 (0.55 to 1.15)	0.22
Parity (number of children)	4.9 ± 4.18	5.78 ± 3.81		0.002
Parity				
No children	113 (74.3%)	39 (25.7%)	0.38 (0.26 to 0.57)	0.001
Children	339 (53.0%)	301 (47.0%)		
Parity only with children				
≤3	196 (65.8%)	102 (4.2%)	0.56 (0.41 to 0.75)	0.001
>3	256 (51.8%)	238 (48.2%)		
Number episiotomy	0.4 ± 1.19	0.8 ± 1.53		0.003
Circumcision (n=677)	378 (47.7%)	299 (37.8%)	1.42 (0.94 to 2.15)	0.08
Obesity 555	286 (36.1%)	269 (34.0%)	2.19 (1.59 to 3.04)	0.001
Diabetes (n=83)	47 (5.9%)	36 (4.5%)	1.02 (0.64 to 1.61)	0.93
Frequency (n=186)	95 (12.0%)	91 (11.5%)	1.07 (0.75 to 1.53)	0.06
Nocturia (n=405)	205 (25.9%)	200 (25.3%)	1.44 (1.06 to 1.95)	0.001
Diuretics (n=119)	63 (8.0%)	56 (7.1%)	1.21 (0.82 to 1.80)	0.32
Daily coffee consumption (cup/ day)	1.7 ± 2.58	2.12 ± 3.16		0.13
Coffee drinkers (n=574)	314 (39.6%)	260 (32.8%)	1.42 (1.03 to 1.96)	0.02
LUTS (n=222)	88 (11.1%)	134 (16.9%)	2.34 (1.68 to 3.24)	0.001
Constipation (n=194)	95 (12.0%)	99 (12.5%)	1.36 (0.97 to 1.92)	0.009
Chronic cough (n=72)	31 (3.9%)	41 (5.2%)	1.44 (0.86 to 2.41)	0.01
Allergy (sneezing) (n=174)	80 (10.1%)	94 (11.9%)	1.77 (1.26 to 2.49)	0.001
Miscarriage (n=309)	164 (23.7%)	145 (21.0%)	0.89 (0.66 to 1.21)	0.48
Number of miscarriage	0.66 ± 1.12	0.69 ± 1.05		0.72

4.3.6.2 Prevalence

There was a high prevalence of UI in the study sample; 340 (42.9%) women had UI, 180 (22.6 %) had SUI, 26 3.2% UII and 134 (17.2%) MUI. The prevalence of UI was comparable in urban (39%) and rural (44%) women. Forty-three percent (n=343) of women did not understand the term UI until it was explained. The prevalence of UI differed between regions (Table 4.3.4). With a higher prevalence in rural regions than urban regions.

Table 4.3.4 Prevalence of UI in each region of Oman

Regions	Continenence n=452	Incontinence n=340	Prevalence of UI in each region
Urban			
Muscat	100	65	39.4%
Rural			
Batina	154	104	40.3%
Dakhaliya	57	49	46.2%
Dhahira	36	28	43.8%
Sharqiya	65	53	44.9%
Dhofar	31	34	52.3%
Wosta	3	4	57.1%
Musandam	6	3	33.3%
Total	452	340	42.9%

4.3.6.3 Severity

Severity of UI was considered “slight” in 74.7% (n=592), “moderate” in 14.3% (n=113) and “severe” in 11% (n=87) of affected women. The majority of women with MUI (32.8%, 38.8%) and UUI (46.2%, 34.6%) had “moderate” or “severe” symptoms, whereas “slight” symptoms were more common among women with SUI (53%), ($\chi^2 = 35.6$; $p=0.001$).

The majority of those affected by MUI reported that the MUI was severe. In contrast, the levels of severity most commonly reported by those who had SUI and UUI were “slight” and moderate respectively (Figure: 4.3.1.).

4.3.6.4 Bother

Forty-four percent of women with UUI considered it a “major bother” and 32.1% with MUI considered it a “major bother”, whereas only 11.2% of women with SUI reported “major bother” ($\chi^2 = 21.5$; $p= 0.001$) (Figure 4.3.2).

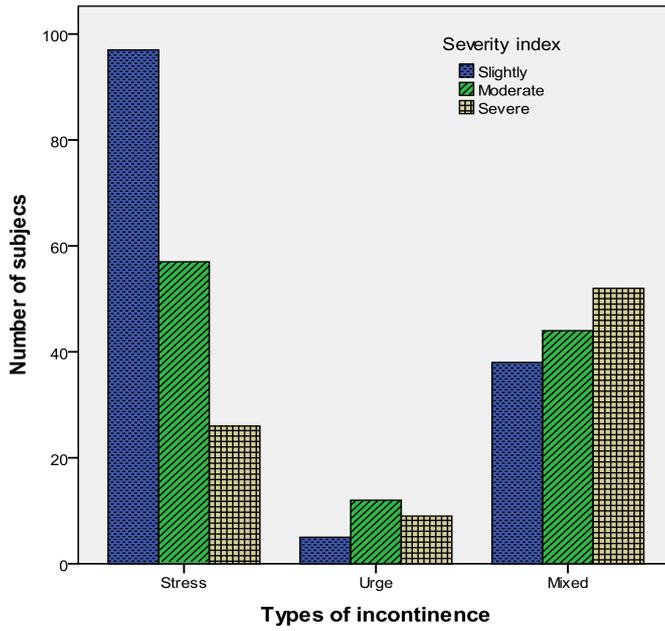


Figure 4.3.1 Distribution of severity of UI with three sub-types of UI ($\chi^2 = 35.6$; $p=0.001$)

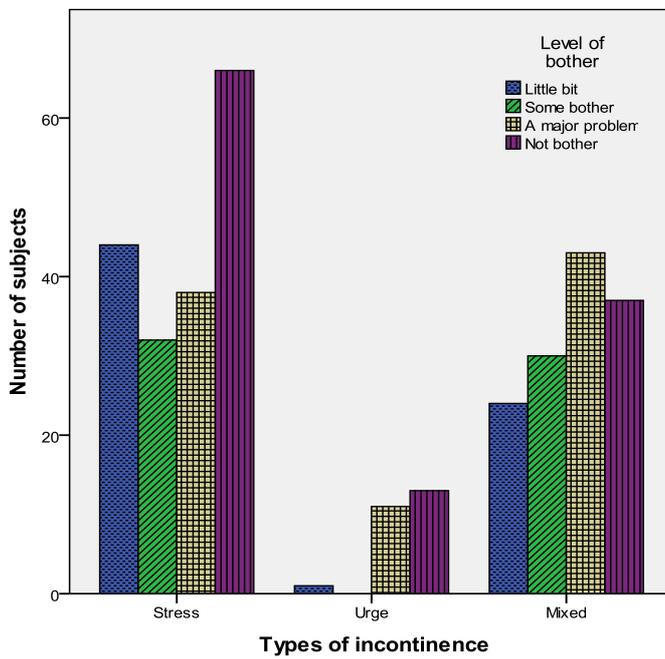


Figure 4.3.2 Distribution of types of UI with four levels of bother ($\chi^2 = 21.5$; $p=0.001$)

There was no significant association between age and severity of UI, or age and “bother” ($\chi^2 = 13$; $p = 0.1$), $\chi^2 12.4$; $p = 0.052$ respectively). The majority of women with “slight” UI considered themselves to have “no bother” (42%) or “little bother” (25%), whereas amongst women with severe UI, the majority complained of “some bother” (21%) and the majority considered it a ‘major problem’ (40%) ($\chi^2 19.8$; $p = 0.003$) (Figure 4.3.3).

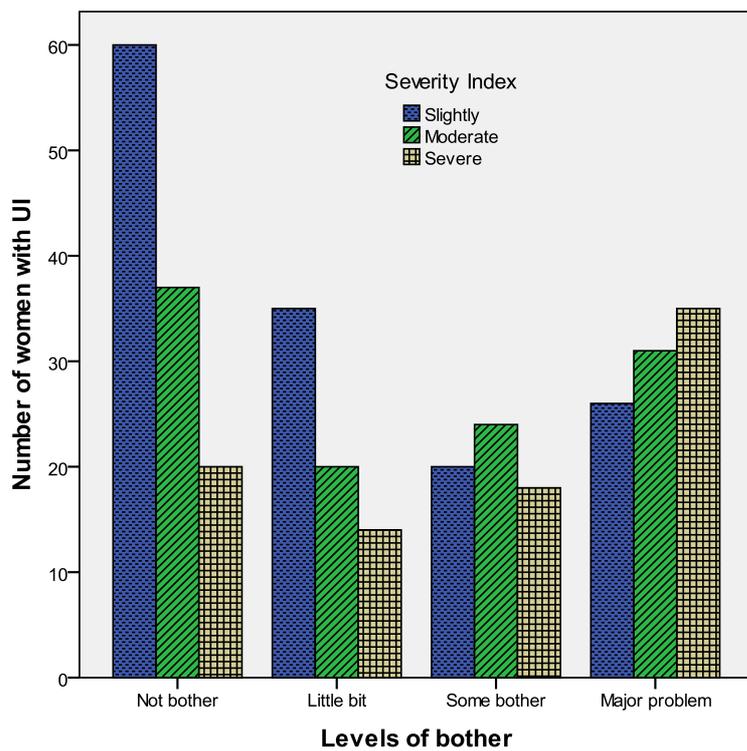


Figure 4.3.3 Distribution of the three levels of severity against four levels of bother ($\chi^2 19.8$; $p = 0.003$)

4.3.6.5 Geographic regions

Stress UI was the most common type of UI reported by women in both urban and rural regions. UUI was uncommon in both urban and rural regions. MUI was more common in rural than urban women. (χ^2 7.1; $p=0.03$) (Figure 4.3.4): There were no significant differences between women in urban or rural areas regarding levels of severity, bother or consultation with a health professional.

4.3.6.6 Risk factors

Ten of 17 risk factors considered were significantly associated with UI in univariate analyses (Table 4.3.5).

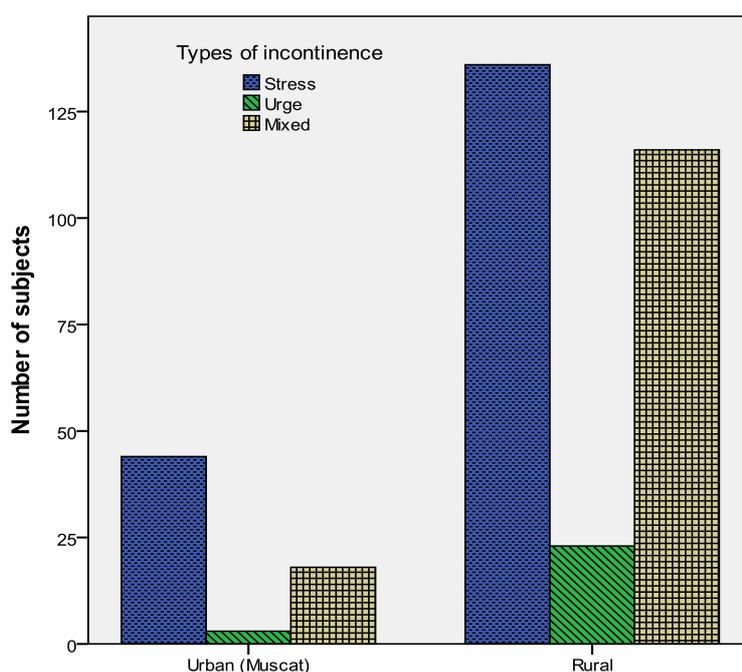


Fig 4.3.4 Distribution of UI type in urban and rural areas. (χ^2 7.1; $p=0.03$)

Table 4.3.5 Association between potential risk factors and urinary incontinence (n=792)

Risk factors	Continent (452)	Incontinent (N=340)	p-value
Age			
Known (n=505)	279 (55.2%)	226 (44.8%)	0.001
Unknown (n=287)	173 (60.3%)	114 (39.7 %)	
Cough			
Yes	1 (43.1%)	41 (56.9%)	0.01
No	421 (58.5%)	299 (41.5%)	
Allergy cause sneezing			
Yes	80 (46.0%)	94 (54.0%)	0.001
No	372 (60.2%)	246 (39.2%)	
Lower urinary tract symptoms			
Yes	88 (39.6%)	134 (60.4%)	0.001
No	364 (63.9%)	206 (36.1%)	
Constipation			
Yes	95 (49.0%)	99 (51.0%)	0.01
No	357 (59.7%)	241 (40.3%)	
Diabetes			
Yes	47 (56.6%)	36(43.4%)	1.0
No	405 (57.1%)	304 (42.9%)	
Oral medication for diabetes			
Yes	29 (47.5%)	32 (52.5%)	0.67
No	423 (57.9%)	308 (42.1%)	
Insulin			
Yes	10 (50%)	10 (50%)	0.80
No	442 (57.3%)	330 (42.7%)	
Diuretics			
Yes	63 (52.9%)	56 (47.1%)	0.38
No	389 (57.8%)	284 (42.2%)	
Coffee			
Yes	314 (54.7%)	260 (45.3%)	0.03
No	138 (68.3%)	80 (36.7%)	
Post –menopause			
Yes	96 (65.5%)	57 (38.5%)	0.16
No	361 (56.1%)	283 (43.9%)	

Parity				
No children	113 (74.3%)	39 (25.7%)	0.001	
Children	339 (53.0%)	301 (47.0%)		
Parity only with children				
Below 3	196 (65.8%)	102 (4.2%)	0.001	
Above 3	256 (51.8%)	238 (48.2%)		
Nocturia				
Yes	205 (50.6%)	200 (49.4%)	0.001	
No	247 (63.8%)	140 (36.2%)		
Frequency				
Yes	113 (74.3%)	39 (25.7%)	0.60	
No	339 (53.0%)	301 (47.0%)		
Miscarriage (only married)				
Yes	164 (53.1%)	143 (46.9%)	0.48	
No	288 (59.6%)	195 (40.4%)		
Overweight & obesity				
Yes	286 (51.5%)	269 (48.9%)	0.001	
No	166 (70.0%)	71 (30.0%)		

Eight of these risk factors were included in a stepwise multiple regression analysis. The two variables excluded were age and parity where groups were defined as no children versus any number of children. Age was excluded because of the large proportion of women who did not know their age. The following six factors were significantly independently associated with UI: allergy accompanied with sneezing, parity, LUTS, obesity, nocturia, and constipation (Table 4.3.6).

Table 4.3.6 Association between risk factors and UI using forward stepwise logistic regression

Risk Factor	OR (95%CI)	P
Allergy	1.6 (1.1 to 2.3)	0.005
Parity ≤ 3 or > 3	0.4 (0.2 to 0.6)	0.001
LUTS	2.6 (1.7 to 3.4)	0.001
Obesity	2.0 (1.4 to 2.8)	0.001
Constipation	1.4 (1.0 to 2.0)	0.02
Nocturia	1.4 (1.0 to 1.9)	0.02

4.3.6.7 Effects on activities of daily living

Being affected by UI had a negative impact on many aspects of life amongst the surveyed women. Ninety percent (n=307) reported they wet their clothes, and 88.5% (N=301) said they needed to change their clothes because of wetting. Of the women who changed their clothes, 42% (n=146) changed once a day, 20.3% (n=69) changed twice a day and 25.3% (n=86) changed their clothes three times or more per day.

Demonstrating a major problem in that respect for the women surveyed. Having to change clothing even once would have impact on their Quality of Life (χ^2 48.7; p=0.001).

Women with severe UI (40%) and women with moderate UI (28%) are more likely to change their clothes three times or more than women reporting “slight” UI (13%) (χ^2 38.8; p=0.001).

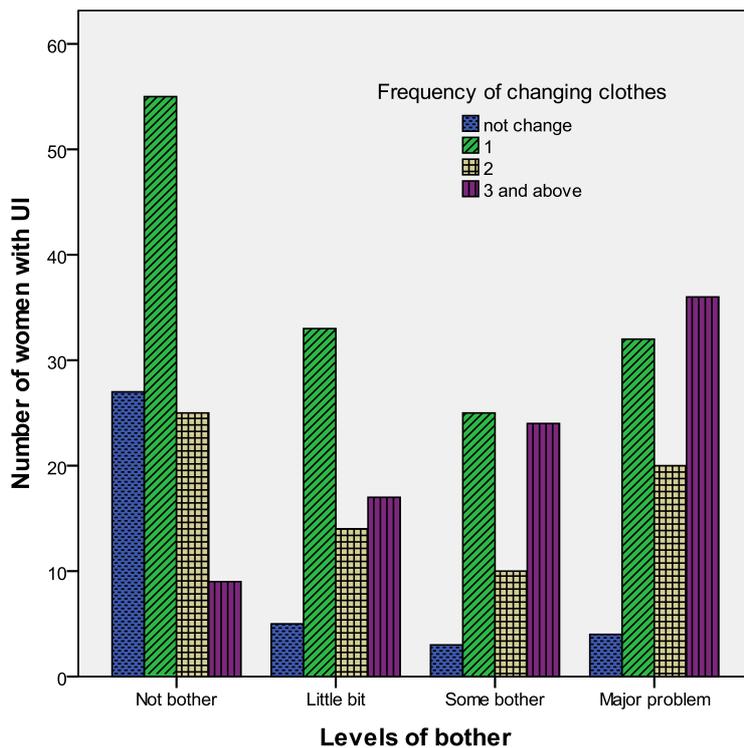


Figure 4.3.5 Impact of changing clothes relative to level of bother (χ^2 49.7; $p=0.001$)

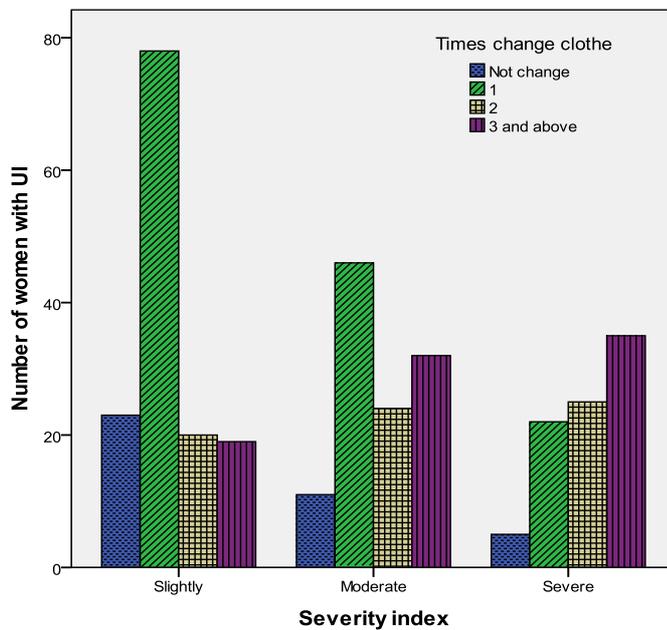


Figure 4.3.6 Number of times clothes were changed relative to severity index (χ^2 =38.8; $p=0.001$)

Twenty-four percent of affected women with UI wear pads to deal with the problem. Urinary incontinence affected the prayer time of 66% (n=224) of affected women. Of that percentage, 29.1% (n=99) considered the effects during prayer to be “extreme”. Of those who were affected with UI, 27% (n=94) said the condition affected their ability to do housework. Of those, 10% (n=34) considered the effects to be “extreme”. Of the affected women, 10.6% (n=36) reported that UI affected the playing of sports/exercise. Of those, 4.4% (n=15) considered the effects to be “extreme”. With regard to sexual activity, 13% (n=44) reported that UI affected their sexual activity. Of that percentage, 6.2% (n=21) considered the effects to be “extreme”. Sixty five percent of those who were incontinent were “bothered”, with 27.1% (n=92) of that group claiming “major bother”.

4.3.6.8 Care seeking

Of the women affected by UI, only 20.3% (n=69) consulted a health professional and 18.2% (n=60) discussed the condition with their families. The reasons given for not consulting a health professional and discussion with family members were as follows: 52.3% (n=179) reported that they did not know that UI could be considered a problem for which they should seek help, 17.5% (n=60) reported that they were embarrassed about the condition, and 12.5% (n=9) did not consider UI to be a significant problem.

The majority of women who suffered with MUI (53.6%), consulted health professionals. Whereas fewer women with SUI (33.3%), or (UUI 13,8%). sought treatment (χ^2 14.0; p=0.001). Thirty percent of those with severe UI, 21% with moderate UI and 13.6% of those who experienced slight UI had consulted a health professional. With regard to bother, 32.6% of the women who felt major bother consulted a health professional, while health care advice was sought by 22.6%,

17.4%, and 11.1% of women reporting some, little, and no bother respectively. (χ^2 9.3; $p=0.002$)

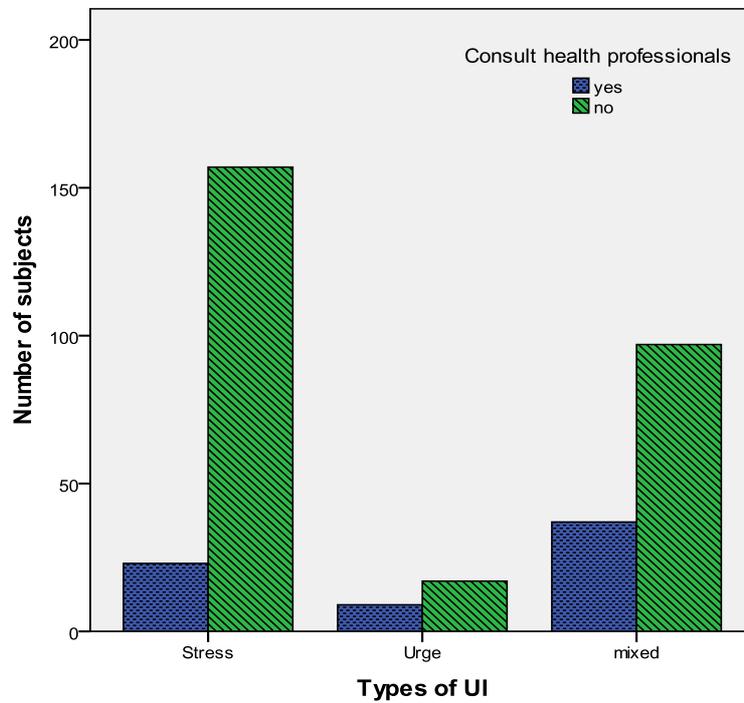


Figure 4.3.7 Distribution of women seeking care for different types of UI (χ^2 14.0; $p=0.001$)

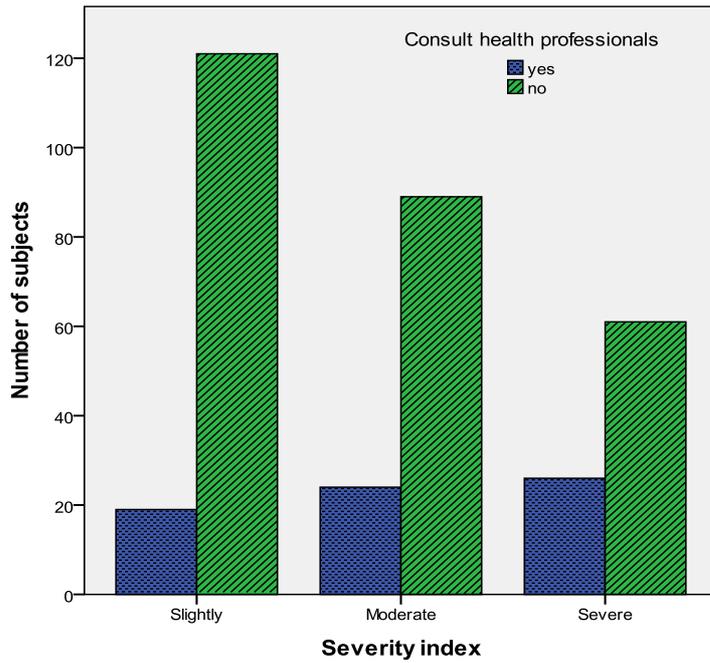


Figure 4.3.8 Distribution of women who consult health professionals according to the severity of UI (χ^2 9.2; $p=0,001$)

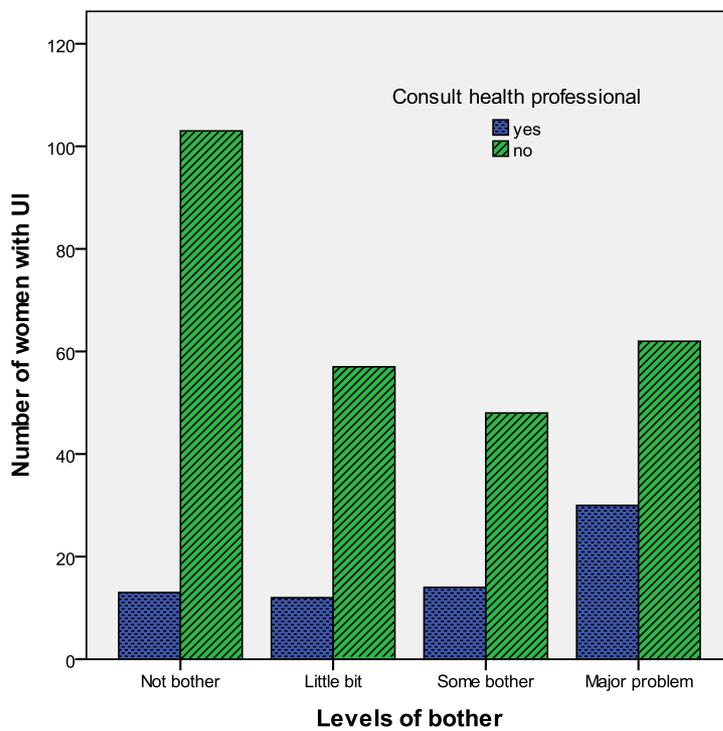


Figure 4.3.9 Numbers of affected women who consult a health profession according to the level of bother (χ^2 15.2; $p=0,002$)

4.3.7 Discussion

There was a wide variation in the population sampling and response rate in the various studies. In Oman, the door-to-door method of recruitment and data collection rather than postal surveys, was considered necessary. This method would ensure a representative sample in view of the high prevalence of illiteracy in Omani women. The door-to-door approach resulted in an extremely high response rate (99%) and complete data was collected for each participant, both of which add considerably to the validity of the study. For our study we developed and validated the questionnaire, so the data we collected was culturally specific. This added to the veracity of the data. Similar high response rates have also been reported for studies conducted in Turkey (98.8%), Qatar (79.8%) and UAE (89%), (Kocak et al. 2005; Rizk et al. 1999; Saleh et al. 2005), where similar face-to-face methods of interview were used to collect data, although the data for these studies was collected in hospitals as well as the community. Kocak et al (2005) used the ICIQ-SF questionnaire that was translated into the Turkish language and validated, however this approach would be unlikely to result in the same level of cultural specificity. Rizk et al (1999) (UAE) and Saleh et al (2005) combined participants recruited from the community and hospitals and Kocak et al (2005) recruited from health centres (Kocak et al. 2005; Rizk et al. 1999; Saleh et al. 2005). A major limitation of door-to-door recruitment and interview is that it requires considerable resources to collect the data required, and in some countries unannounced visits to residential homes would not be viewed favourably. Although there are higher response rates, data collected by face-face interviews are more vulnerable to social popularity bias (Kocak et al. 2005). Postal surveys are a more convenient and economical way to collect data where appropriate; however they do tend to have lower response rates. (Chiarelli and Brown 1999; Hannestad et al. 2000; Hunskaar et al. 2004).

4.3.7.1 Prevalence

Overall reported the median prevalence of worldwide data of UI among women was 27.6%, (range: 4.8 to 58.4%) across countries (Minassian et al. 2003). The prevalence of UI in this study was high compared with four other Middle East countries within the range (20.3% to 36%) (El-Azab and Shaaban 2010; Rizk et al. 1999; Saleh et al. 2005; Vinker et al. 2001). A possible explanation for the lower prevalence reported in the previous studies is their use of a time constrained definition of UI, for example “within the previous twelve months”. Other studies have used a similar time-constrained definition of UI and reported lower prevalence (Chiarelli and Brown 1999). There are yet further studies that reported low UI prevalence in comparison with present findings with a reported range of 20% to 36%. These surveys were conducted in Asia, Europe, Australia and the Middle East (Chiarelli and Brown 1999; Hunskaar et al. 2004; Lapitan et al. 2001; Rizk et al. 1999; Saleh et al. 2005). Peyrat et al (2002) and Lasserre at al (2009) reported that the rate of UI prevalence in French women was 27.5% and 26.8% respectively. The lowest prevalence was reported from the Middle East 20.6% from Qatar (Saleh et al. 2005) and 20.3% from United Arab Emirates (Rizk et al. 1999). The reason for the differences in percentages could be the sample size for the Gulf studies; most used restricted age groups. Relatively few used an open age group such as 18 years and over.

The high rate of prevalence of UI in our study was similarly to other countries around the world (Avellanet et al. 2003; Botlero et al. 2009; Cam et al. 2009; Danforth et al. 2006; Hunskaar et al. 2004; Shamlıyan et al. 2008). However, although the prevalence rate was similar to the present study, different methodology was used. Methods of sampling, inclusion and exclusion criteria, and methods used

for collecting data such as self-reported questionnaires, interviews or audits of medical records, might also contribute to variations in the prevalence of UI in the studied populations. As an example, a report by Cam et al (2009) that 62.2% of the Turkish population had UI, seems to illustrate very high prevalence compared to other studies. The method used for this particular report was recruitment in hospital using urodynamic testing and a questionnaire. It was also a very small sample. For these reasons generalisation of the results to the population as a whole is inappropriate. In Oman, the door-to-door method of recruitment and data collection rather than postal surveys was necessary to ensure a representative sample in view of the high prevalence of illiteracy in Omani women.

The prevalence of UI in women appears to vary by race or ethnicity: Caucasian women who are affected have been surveyed at 66%, African Americans 49%, Chinese 50.2%, Hispanic 41.5% and Japanese 52.9%, although some of these apparent differences may reflect differences in study design (Sampsel et al. 2002). The reasons proposed for these differences are largely speculative; however, physiological and structural differences between black and caucasian women have been reported (Abrams et al. 2009).

The prevalence of UI by type in the present study shows that stress urinary incontinence was at a high level compared with other types of UI. We also found similar results in women from urban and rural regions, and this is on a par with the EPICONT studies (Hannestad et al. 2000). In Hunskaar et al (2004) only France shows a low prevalence of SUI compared to other countries. Different results between studies could be attributed to cultural backgrounds variation. Even within Europe, lifestyles vary between countries and this could contribute to the variations in prevalence of UI.

4.3.7.2 Severity

In the present study, we found the severity of UI was predominantly slight (74.7%) with only 14.3% moderate and 11% severe. Likewise, in a study of 1820 community dwelling Norwegian women aged over 20 years, Sandvik et al (Sandvik et al. 1993) using the same criteria, found almost half of their sample had slight UI (46%), 27% had moderate UI and 27% had severe UI (Sandvik et al. 1993). In contrast, among women recruited in hospital or general practice environments where women were being treated for incontinence the prevalence of severe incontinence is considerably greater (69% and 63% respectively) while less than 10% had slight effects (Sandvik et al. 2000). These results suggest that relatively few women consult health professionals for treatment of slight UI, and could be coherent with those women assuming slight UI to be normal. Our findings and those of Sandvik et al (Sandvik et al. 2000) among subjects recruited in the community were similar (Sandvik et al. 1993). Rizk et al reported that 27.1% of the incontinent woman had severe UI and 72.95% had mild UI however the criteria they used to classify UI were unclear. Moreover, their sample included women recruited in the community and health care centres, making direct comparison between their study and ours difficult.

With regard to severity according to UI subtype, our findings were similar to previous studies where severe incontinence was more common in women who had MUI compared with other types of UI (Bump et al. 2003; Hannestad et al. 2000). An association between severity and age has also been noted in studies using the same severity index. Interestingly severe UI was most common in the midlife age groups (Hannestad et al. 2000; Sandvik et al. 2000). In the context of this index, moderate and severe UI were positively associated with the impact of UI (Sandvik et al. 1993; Sandvik et al. 2000)

4.3.7.3 Bother

Our data also suggested urge and mixed incontinence bothered more women than SUI. “Major bother” was demonstrated mostly in UUI and MUI. This result was similar to other studies that also found that MUI was considered the most bothersome (Hannestad et al. 2000; Lewicky-Gaupp et al. 2009). It has been reported that the level of bother differs between different ethnic groups (Lewicky-Gaupp et al. 2009). For example, in African American women, 55% of the affected women were bothered and 14% were bothered in a major way (Ruff et al. 2002). Data from the same study also showed that African American women were more bothered by UI than white or Hispanic women (Lewicky-Gaupp et al. 2009).

In the present study the bother aspect was considered higher. Urinary incontinence can be considered a problem in Islamic culture, even when severity index levels are slight. Praying is a priority activity in any Muslim country. Followers of the Islamic culture are required to change even minimally soiled clothes before each prayer session. A Muslim woman, or indeed a man, will not be able to perform their prayers with full concentration if there is even a very small amount of leakage. In contrast, in other cultures a drop or two of occasional leakage may not be considered a problem.

The prevalence of the impact of UI on activities of daily life for Omani women is on a par with the limited data available from other Gulf region countries where 64% to 90% of women have reported UI has an effect on their ability to pray (El-Azab and Shaaban 2010; Rizk et al. 1999; Saleh et al. 2005). None of the earlier studies attempted to gauge the magnitude of the effect. Our data showed that this effect was extreme in 29.1% of women.

In the present study, the high prevalence of UI involved changing wet clothing; this is on a par with the UAE (48.1%) and Qatari (41.3%) women (Rizk et al. 1999; Saleh et al. 2005). Urinary incontinence affecting their house work in Omani women was high compared to Qatari women (20%) and UAE women claimed to be the least affected (4.9%).

As in most Gulf countries, sport or exercise is not considered a high priority amongst Omani women of any age group and few women participate in sport. Of those who do, walking and gym visits are their main activities. In the present study, 10.6% of Omani women doing sporting activities were affected by UI. To our knowledge no other studies in the Gulf countries have investigated effects of UI on sport or exercise.

It was reported in many studies that sexual activity can be affected by UI with a range between 2% and 50% in epidemiology and clinical samples (Bø et al. 2000; Lukacz et al. 2007; Montserrat and Montserrat 2008; Moran et al. 1999; Rizk et al. 1999; Saleh et al. 2005; Shaw 2002). It was reported by Saleh et al and Rizk et al in the Gulf countries that UI highly affected sexual activity (47%, 33.3% respectively) in contrast to the present study where 13% reported UI had an effect on their sexual activity. This may be a reflection of collecting the data by interview at the subject's home rather than hospital interviews or postal questionnaires. A more anonymous approach may make these questions easier to answer than face-to-face interviews.

4.3.7.4 Risk factors

It was reported in many studies that age was one of the risk factors with significant connection to UI (Botlero et al. 2009; Chiarelli and Brown 1999; Lasserre et al. 2009; Lewis et al. 2005; Peyrat et al. 2002; Rizk et al. 1999; Zvetanka et al. 1999). Although in our study only 505 out of 792 women knew their age, age was analysed

and it showed similar results to the other studies as a risk factor of UI. In contrast with the study in Seeb where age was not significant a significant factor although this may be due to the small sample size in Seeb particularly after exclusion of the women that didn't know their age. Many studies used restricted age groups such as between 45 and 65 years, whereas in our study the age group was open; the only restriction was they had to be adult women over 18 years.

It is generally accepted that parity and episiotomy are predictors of UI as this has been demonstrated in numerous rigorous studies (Chiarelli and Brown 1999; Lasserre et al. 2009; Lewis et al. 2005; Marshall et al. 1996; Rortveit et al. 2001; Zvetanka et al. 1999). Similarly, in the present study there was an association between parity, episiotomy and UI. This is consistent with the potential for tissue damage to occur during vaginal delivery with or without episiotomy.

The number of post menopausal cases affected by UI was low in the present study. This result was similar to the Seeb study (4.2) despite the larger sample size; this may be due to only 3% of the Omani population being of age 65 and above (www.Omancensus.net) and the effect that might have on the power to detect a relationship.

Diabetes, diuretics and coffee were significantly associated with UI in many studies (Chiarelli and Brown 1999; Lasserre et al. 2009; Lewis et al. 2005; Marshall et al. 1996; Rortveit et al. 2001; Zvetanka et al. 1999). This contrasts with the present study where diabetes and diuretics were not associated with UI. All data for this study was self report and it is possible the some women, particularly some from remote areas who were illiterate may not have been able to answer some questions about disease and medications accurately. Interestingly coffee drinking was a significant predictor of UI.

In many studies it was reported that risk factors such as obesity, LUTS, constipation, chronic cough and allergies with sneezing were significantly associated with UI (Chiarelli and Brown 1999; Lasserre et al. 2009; Lewis et al. 2005; O'Connell et al. 2002; Zvetanka et al. 1999). We found all of those factors plus nocturia were independently associated with UI in Omani women. It is of interest that four out of the six significant risk factors are associated with increasing intra abdominal pressure that would load the pelvic floor.

It was proposed that female circumcision could be one of the causes of late medical complications such as UI (Elchalal et al. 1999). However, women who were circumcised were not at significantly greater risk of urinary incontinence than uncircumcised women in Oman (OR 1.42; 95% CI 0.94 to 2.15; p=0.08). The majority of circumcised women in our survey had a Type IV circumcision that involves a pricking, piercing or incising the genital area without actual excision of the external genitalia (World Health Organization 2008). This may explain why the risk associated with the procedure was not significant in our analysis. In societies where more aggressive procedures are routinely undertaken the effects are likely to be quite different.

4.3.7.5 Care seeking

Care seeking in the Middle East countries varies greatly. In Egypt only 4% and in the UAE 30.9% of the affected women sought medical treatment. The present study is within a similar range (4% to 30.9%) (El-Azab and Shaaban 2010; Gasquet et al. 2006; Rekers et al. 1992; Rizk et al. 1999). Amongst African American women, only 13% had sought treatment (Ruff et al. 2002); the main reason given for women not seeking treatment or advice was embarrassment; 67.2% in Egypt, 40.6% in Qatar and 78% in UAE (El-Azab and Shaaban 2010; Lasserre et al. 2009; Rizk et al. 1999;

Saleh et al. 2005); this contrasts with the present study in that more women did not know that UI is considered a problem for which they should seek help. Many Omani women considered UI to be a normal condition following childbirth or a natural condition for older women. Of the Omani women affected by UI, 17.5% stated they were embarrassed about the condition. Gasquet et al (2006) reported that in general, French women were embarrassed and their QoL was affected by SUI and women who were severely affected with UI sought treatment (Gasquet et al. 2006). Hägglund et al (2007) (2007) found that a significant number of women were embarrassed and did not seek professional help fearing that to do so would be a sign of weakness; they also tended to feel that UI was a very personal and private issue (Hägglund and Wadensten 2007).

In our findings, women with UUI and MUI were the groups most likely to report their symptoms to the health professionals rather than women with SUI symptoms. These findings are similar to the findings from Hannestsad et al (2002) (2002). Although both findings are similar, they reported the women who had visited the doctor during previous 12 months. Our study differed in that we did not state a time frame in our study (Hannestad et al. 2002). Our study proved that the majority of women were more likely to consult a health professional with severe UI and major symptoms. This issue has been reported by the previous studies (Hannestad et al. 2002; Rekers et al. 1992).

The depth and scope of the present study regarding the prevalence of UI has not been investigated in regions of Oman, other than the (Seeb) Muscat region. Recruitment door-to-door and face-to-face interviews were most suitable for our study; the response rate was higher as shown in the result. Moreover, a substantial proportion

of potential respondents would be unable to respond without assistance due to limitations in literacy as shown in Table 1.

4.3.8 Conclusion

There is a high prevalence of urinary incontinence among Omani women. It is essential to note that the risk factors we indentified can all be improved with the correct treatment. At the present time, the treatment for urinary incontinence in Oman is limited. The findings in our study suggest there is a need for greater availability of treatment. The data we have collected will be an important aid to planning future health care for Omani women.

The difference for the women of Oman will be between a life adversely affected by the health issue of incontinence, as compared with a much better quality of life where continence is considered the right of all women.

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Chapter 5 Discussion

5.1 Introduction

The current chapter will discuss my study results and compare those results with the conclusions of other international studies that have dealt with the same subject.

This chapter will outline the strengths and limitations that had an influence on my study results and will include recommendations that I feel will be culturally appropriate to Omani women. I also feel that many aspects of my study could be applied to women worldwide.

This study has three main themes as shown below, and I will discuss each of these themes individually.

- A. To develop an appropriate *urinary incontinence questionnaire* to be administered in interview format to Muslim Omani women in both Arabic and English languages. The questionnaire was initially tested for suitability on a group of bilingual women who reside in the city of Perth, Western Australia.
- B. To field test *sampling and survey methods* in 120 women from the Wilayat Seeb region of Muscat, the capital of the Sultanate of Oman.
- C. To determine the prevalence and risk factors of Urinary Incontinence (UI) in Omani women. This will be determined using a population-based survey.

The ultimate aim of this study was to determine the prevalence and risk factors of UI in Omani women. Two preliminary studies were required to develop the methodology that would enable the prevalence study.

The first requirement was to develop and test a questionnaire in both English and Arabic languages that was valid and reliable to be administered as an interview. The second requirement was to field test the questionnaire.

A number of important aspects of the methodology, including sampling, recruitment, questionnaire administration, data management, and overall feasibility were incorporated into the field test.

5.2 Part A: Development and testing of the Urinary Incontinence Questionnaire

As with all research, the findings of epidemiological research are constrained by the quality of the data. This is particularly the case for self-reported data where the quality of all aspects of the questionnaires becomes critical. The need for high quality questionnaires and the importance of expending resources on their development has been highlighted by the international epidemiology association (IEA) in a consensus report (<http://www.ieaweb.org/>, 2010). Their observations are consistent with and complementary to recommendations from ICS that epidemiological data related to UI should be collected using standardised definitions (Abrams et al. 2009). For these reasons, a great deal of time, effort and attention was paid to the development and testing of the questionnaire used for the study presented in this thesis. The considerable effort involved in this process was considered essential to the veracity of the findings of the national survey (Part C).

Oman is a country of multiple languages; the two most commonly used are Arabic and English. Therefore, in order to collect data from a representative sample of the population, it was essential to have a questionnaire that could be administered in both languages. Incorporating a rigorous to-and-fro translation process into the questionnaire development procedures achieved this. Further evaluation of the

linguistic and semantic equivalence of the questionnaire was incorporated into the reliability testing process by recruiting bilingual women to participate in the reliability study.

Administering the questionnaire once in English, followed by once in Arabic when gathering the data for reliability testing permitted not only assessment of whether the responses were reliable but also whether the questions elicited equivalent responses regardless of the language of administration.

The reliability questionnaire was developed to incorporate various other questions considered important to professional Omani women who work as experts in the field of women's health. The questionnaire was developed by adjusting items from the various questionnaires already developed to examine the recognised risk factors including health, lifestyle, gynaecological and obstetric histories, and the prevalence of UI among Omani women. It was also to include demographic data. The questionnaire contained relevant aspects of the cultural, economic and social environment of the population of interest as it was strongly encouraged and recommended by ICS to use descriptive epidemiology studies (Abrams et al. 2005).

To guarantee content validity, the completed draft of the questionnaire was distributed to globally recognised experts well known in the field of UI; Professor Steinar Hunskaar (Department of Obstetrics and Gynaecology, University of Bergen Norway) and Dr Maryam Mathew Zachariah (Gynaecologist at Sultan Qaboos University, Oman). Dr Zachariah's expertise was invaluable for culturally-sensitive insights. The experts took part to determine that the epidemiology questions on the prevalence of UI and its subgroups, data on the probable risk factors for UI, the impact of UI on ADL and the care-seeking behaviours, were correctly covered. The responses from both experts were considered when compiling the final version of the

questionnaire. The scientific advice and comments given from the experts were very much taken into account to ensure that the content validity on our questionnaire would be highly accepted as an interview-based format to determine, amongst other factors, the prevalence of UI and its subgroups, data on the feasible risk factors for UI, the impact of UI on ADL, and the aspect of care-seeking.

As mentioned, the reliability testing of the questionnaire was interview-based. The structure and content of the questionnaire was simple, direct and clear, and was suitable as a questionnaire for self-completion. We have not tested this method of administration formally. The benefit of the present questionnaire was the opportunity to collect an extensive amount of data at one time. We also felt it would save time and prove economical for the researcher. This questionnaire is suitable for use in descriptive and analytical epidemiological study design, particularly in cross-sectional (Malmsten et al. 2010; Maniao et al. 2010). However two previous studies conducted in the Gulf region employed locally designed questionnaires (Rizk et al. 1999; Saleh et al. 2005), and the definition of UI used in these questionnaires was similar to the ICS definition, although the time frame used for prevalence of UI was restricted to the previous twelve months only (Rizk et al. 1999; Saleh et al. 2005). The present study was not limited by time as defined in the ICS.

The UAE study's questionnaire was validated by testing 50 randomly selected female workers at Al-Ain Hospital at a two week interval (Rizk et al. 1999).

The questionnaire used in the Qatari study was initially developed in English and translated into Arabic at a later date (Saleh et al. 2005). It was tested on 75 women who visited a PHC clinic in Qatar. However, researchers did not specify whether the interview was conducted in both languages or if only one language was used. In the present study, the questionnaire reliability testing was done among 15 Arabic-

English bilingual Muslim women in the Perth community at a one week interval, with the interview conducted in first in Arabic and then subsequently in English.

The current study included questions relating to prayer for Muslims, similar to Rizk (1999) and Saleh (2005). Additionally we have included a question on female circumcision as one of the potential risk factors for UI. Generally, questions included are appropriate to the Omani and neighbouring cultures. Moreover, we have demonstrated that data collected is equivalent, regardless of whether the questionnaire is administered in Arabic or English, in those who speak both languages. An advantage of our questionnaire is that it is comprehensive in content yet it takes only 15 minutes to complete.

The previous studies mentioned did not consider differences between UI types such as SUI, UUI and MUI, and did not measure the severity of UI that was reported. The Qatar and UAE studies focused on prevalence, quality of life, and care-seeking behaviors. However, our current study has incorporated additional questions, such as a question regarding LUTS as suggested by Hajebrahimi and El- Azab and Mascha in their studies using the ICIQ-S (El-Azab and Mascha 2009; Hajebrahimi et al. 2004).

A limitation of the questionnaire development study was the sample size, particularly for questions that were only relevant to those with UI ($n = 8$). However, levels of agreement were high and the majority of questions were not vulnerable to chance agreement.

5.3 Part B: Field testing the methodology

To our knowledge, this field test was the first to examine the prevalence of UI in Omani women. There were several objectives of the field test, but given the lack of

existing information on the prevalence of UI among Omani women, the results of the study in terms of prevalence, risk factors and impact on lifestyle was of prime interest and will be discussed first. Nonetheless, the information gathered by field testing, the proposed methods of sampling, and administration of the questionnaire was an invaluable step in ensuring the data from the national survey was of high quality and will be discussed later in this section.

5.3.1 Level of participation in the Seeb study

In Seeb, Oman, a door-to-door recruitment method was used for data collection. The questionnaire was piloted on 120 women in Seeb. This approach resulted in a significantly high response rate (98%) and complete data for each participant, both of which adds to the strength of the study. Similar high response rates have been reported for studies conducted in Turkey (98.8%), Qatar (79.8%), and UAE (89%) (Kocak et al. 2005; Rizk et al. 1999; Saleh et al. 2005). Similar face-to-face methods of recruitment were used for the above studies.

This study is the first of its kind to investigate the prevalence of UI in women living in urban Oman. The overall prevalence of UI in these women was high. This is in contrast with previous studies also conducted in Gulf countries (Rizk et al. 1999; Saleh et al. 2005) where prevalence ranged from 20.3% to 20.6%. The major differences between the earlier studies and the present one was that the latter made use of the ICS definition, did not have such a restrictive time frame, or restrict the age group of the women to between 45 and 65 years.

The overall prevalence of UI in the women in our study was high, which was in contrast to previous studies also conducted in Gulf countries (Rizk et al. 1999; Saleh et al. 2005) where the prevalence range of UI was from 20.3% to 20.6%. This lower prevalence could have been as a result of the use of a time constrained definition of

UI, for example in questions specified as “any involuntary leakage of urine or accidental loss of control of urination in an inappropriate place or at an inappropriate time regardless of its severity, frequency or social or hygienic consequences in the past 12 months” (Rizk et al. 1999; Saleh et al. 2005). Studies from other countries have also used a similar time constrained definition of UI and reported a prevalence range 12.8% to 36% (Chiarelli and Brown 1999) (Rizk et al. 1999; Saleh et al. 2005; Vinker et al. 2001).

The pilot study results obtained led to the following study to determine prevalence and risk factors of UI among Omani women using a population based survey. The details of the field test study are mentioned in Chapter 4B.

Currently in a global context, only the Gulf studies used the face to face interview approach in the community and in hospitals (Rizk et al. 1999; Saleh et al. 2005). In contrast, other studies used postal surveys only. Both methods showed high response rates. However, the present study has the highest response rate among all of the studies, which is significant in that we believe this was due to our door-to-door recruitment method where we collected the data in person, rather than in a more remote way. Face to face interviews have high quality responses, and minimise sample bias which could occur in postal surveys, as well as in telephone interviews. Taking this into account, door-to-door interviewing was the best method to suit Omani women, as many are illiterate, especially those in older generations (Al Riyami 2004).

5.4 Part C: To determine the prevalence and risk factors of Urinary Incontinence (UI) in Omani women.

This will be determined using a population-based survey.

5.4.1 Level of participation in the study

Door to door recruitment resulted in an extremely high response rate in the Omani cohort study as a whole (prevalence, risk factors, severity, care seeking and impact of UI), with a response rate of 99%. When compared with findings in other studies within the Gulf region such in the UAE study and Qatar study, reported response rates have been of 89% and 79.8% respectively (Rizk et al. 1999; Saleh et al. 2005). The two Gulf countries used community based and hospital based recruitment, while the present study used only community based door-to-door recruitment. In addition, response rates among various developed countries were as follows; Northern Ireland (65.6%), Sweden (77%), Canada (81.9%), USA (65.1%), Norway (74%), Israel (84%), and in the four European countries study of France, UK, Spain and Germany response rate was averaged at 60%. (Dolan et al. 1999; Hannestad et al. 2000; Hunskaar et al. 2004; López et al. 2009 ; Thom et al. 2006; Vinker et al. 2001; Zvetanka et al. 1999).

The current study's data was collected by the researcher, who is a qualified physiotherapist, an Omani citizen, and can speak both Arabic and English. The researcher was accompanied at all times by another Omani woman. This was considered necessary for validation of the study, as well as for Islamic-cultural and security reasons.

5.4.2 Prevalence of UI among Omani women

The present study applied the broader definition recommended by the ICS. This definition has been used in a large number of studies in Europe (Abrams et al. 2003).

The prevalence of UI was high among Omani women. However, in the same study there was found to be differences in prevalence between Wilayat Seeb Omani women and those from the Muscat region (urban). Nevertheless, all other regions (rural) have a higher prevalence than the Muscat region in the current study. This is similar to the regional prevalence reported in France (44%), UK(42%), and Germany(41%) (Hunskaar et al. 2004). On the other hand, the prevalence was considerably lower in Spain (23%) and in Norway (25%) compared to other European countries and the present study (Hannestad et al. 2000). The difference between the pilot study and the study in the Muscat region is the subjects in the pilot study were targeted only in one of the sub-regions of Muscat. and for the Omani study the subjects were selected in all the sub-regions of Muscat.

While the same definition of UI was used for all the studies mentioned, the researchers postulated that cultural and ethnic differences between countries may have contributed to the unexpected disparity. It is possible that women from different cultural backgrounds differ greatly in their degree of embarrassment about having UI. Alternatively, many may consider it as an inevitable consequence of ageing and be less inclined to report UI (Hunskaar et al. 2004).

In addition, prevalence of UI varies by race or ethnicity in women, with the percentages given as follows: Caucasian (66%), African-American (49%), Chinese (50.2%), Hispanic (41.5%), and Japanese (52.9%), although some difference in prevalence in the sample size appeared in all ethnicity groups (Sampselle et al. 2002). Physiological and structural differences between African-American and caucasian women have been reported (Hunskaar et al. 2003). However, the prevalence of SUI was high in comparison with other types of UI. A higher prevalence of SUI compared to other subtypes of UI has been reported in a number

of other studies in countries such as Norway (Hannestad et al. 2000), Germany, Spain, and the UK, as well as in the present study. France has shown low prevalence of SUI compared to the other studies (Hunnskaar et al. 2004), as well as among Caucasian and Hispanic, but not African-American women in the USA (Thom et al. 2006). Disparity of the results could be due to differences in the sample sizes, and the age groups, cultural backgrounds, and ethnicity between studies (Thom et al. 2006). Methods of sampling, inclusion and exclusion criteria, and methods used for collecting data such as a self-reported questionnaire, interview or audit of medical records, might also contribute to variation in the prevalence of UI in the studied populations.

5.5 Severity

The present piloted study reported that severity of UI was slightly predominant in Omani women of Seeb. In addition, in the cohort study among Omani women, the Sandvick severity index was implemented using the same definition of severity (Sandvik et al. 2000). Sandvik and colleagues found that almost half of their sample (46%) had slight UI increases: 27% were considered “moderate” increases and 27% were considered “severe” (Sandvik et al. 1993). Other studies that were carried out in different settings such as hospitals, general practices, and the community reported severity on three distinct levels. “Slight” UI was more commonly reported within the community compared to the hospital and general practice participants, many of whom reported levels of UI as “severe” UI (Sandvik et al. 1993). In contrast with the present study severity in the community was moderate.

A further difference between these studies is the method of sampling; our study recruited a community based sample, whereas Sandvik (1993) included hospital, general practice and community samples. In conclusion, our findings were more

consistent with findings from European studies where severe incontinence was more prevalent in “urge” and “mixed” UI sufferers (Hannestad et al. 2000).

5.6 Risk factors associated with UI

5.6.1 Age

The disorder due to UI tends to fluctuate between age groups. Bladder capacity reduces with ageing, while bladder contraction, involuntary or overactive bladder (OAB), becomes more common. The contractility of the bladder is damaged with ageing and can be considered normal within the physiological changes to the urinary tract due to ageing (Hannestad et al. 2000; Minassian et al. 2003). Normal pressure transmission in the urethra and sphincter muscle is maintained by oestrogen, therefore intra vaginal oestrogen is often a recommended treatment for OAB symptom among post-menopausal women (National Collaborating Centre for Women's and Children's Health 2006).

According to previous studies, age was associated with UI subtypes, and there is a persistent ill-held belief that UI is a normal consequence due to ageing (Brown et al. 2006; Chiarelli and Brown 1999; Lewis et al. 2005; Peyrat et al. 2002; Rizk et al. 1999; Zvetanka et al. 1999). The results of the present study were similar to the previous studies, in spite of age of participants not being recorded for many women. In fact, 36.2% (287 out of 792) of Omani women genuinely did not know their age, and our study included only women who were aware of their age. It is the case in Oman that many women do not know their actual age, although it is estimated that 3% of the female population in Oman are 65 years and older. (Census, 2003).

5.6.2 Menopause

A low oestrogen level in post-menopausal women is considered one potential cause of UI. Urinary symptoms are an integral part of the change from the pre- to post-

menopausal. The atrophic changes (such as body fat, skin and muscle) and the drop in body oestrogen levels brought on by menopause may contribute to an increased risk of UI.

However, the literature is conflicting in describing the role of menopause and oestrogen loss as major contributors to UI (Abrams et al. 2003). The suggestion originates in part from the surveillance of oestrogen and progesterone receptors in the urinary tract in women. A moderate UI increase associated with ovulation also merits attention (Hvidman et al. 2003). According to this study, findings of association between post-menopause and UI were not illustrated, even though there were almost 19% (n=148) of women who were considered post-menopausal who participated in the present study.

In view of the inconsistency in prevalence and risk factors for UI, studies of heterogeneous groups need to be very large in order to generate accurate estimates of risk in sub-groups such as pre-menopausal, compared with post-menopausal women. A study done by Rekers (1992) described the role of menopause and oestrogen loss as significant contributors to UI; they postulate no significant difference in prevalence of UI among the two groups (25% versus 26%) (Rekers et al. 1992). Nevertheless, the study found differences in the frequency rate of incontinence, demonstrating that postmenopausal women had more severe incontinence. Postmenopausal women were expected to have UI more frequently by 7%, in contrast to premenopausal women at 3%. They were more likely to have urgency and nocturia (Rekers et al. 1992).

5.6.3 Lower urinary tract symptoms

Lower urinary tract symptoms can be caused by urinary tract infection (UTI) and can cause blood in the urine, a “burning” sensation while passing urine, difficulties in

initiating urine flow as well as stopping urine flow (Hunskaar et al. 2000). Many studies have indicated LUTS as a risk factor of UI (Wennberg et al. 2009) (Irwin et al. 2006; Manonai et al. 2004). The current study was in agreement with the previous studies, and there were significant associations between UI and LUTS; this significance could be due to the fact that our questionnaire was not limited to a short period of time, during which women may be infected by UTI.

5.6.4 Gynaecological/ Obstetric

Women often report the onset of UI immediately following hysterectomy (Hunskaar et al. 2000). Post-hysterectomy symptoms may be caused by damage to the nerve attached to the bladder following the procedure; this could also cause SUI (Altman et al. 2007). In systematic review, Brown and colleagues found that from 45 studies, 12 studies met their inclusion criteria of eight cross-sectional, two prospective cohort studies, one case-control and one randomised controlled trial. It was ascertained from those 12 studies that the odds of developing UI after hysterectomy is about 40% higher than amongst women who did not have a hysterectomy. Therefore previous studies such as this appear to have shown a strong correlation between hysterectomy and the incidence of UI (Brown et al. 2000{Altman, 2007 #991).

5.6.5 Pregnancy and childbirth

Pregnant women are often more prone to UI. Urinary incontinence right through pregnancy is so common that it is said to affect more than 50% of pregnant women. UI starting at some stage in pregnancy roughly doubles the possibility of UI at 3 months postpartum, whether delivery is vaginal or by caesarean section (Eason et al. 2004; Marshall et al. 1996). It was reported by Hunskaar that in three different studies the prevalence rate of UI in pregnant women was common, with a range of 31%, 46% and 60% respectively (Hunskaar et al. 2000). There is evidence that

pregnant women who are incontinent may suffer from UI at a later time in their lives (Abrams et al. 2005). Particularly in view of the high fertility rate in Oman (Census, 2003), we regret that we did not ascertain whether any of the women in the study were pregnant at the time of data collection.

5.6.6 Parity

According to the Islamic and Arabic cultures, large and extended families are the norm (Kent 2008). Based on their faith, any child given by Allah (God) is considered as a gift from Allah. This is may be a point of conflict and argument, as the government of Oman encourages and advises people to have smaller families.

This in turn may contribute to a decrease in the level of UI among Omani women.

The findings of the present study support the association between UI and parity and that childbearing may increase the prevalence or incidence of UI. The average Omani family size is 5-6 children (Al Riyami et al. 2005). This finding was similar to the present study, and it is obvious therefore that Omani women are in a position of a very high risk of UI. The literature has supported that vaginal deliveries can be one of the significant risk factors for UI, particularly for SUI and MUI in the multiparous, and that there is a very strong association between UI and childbirth (Eason et al. 2004; Goldberg et al. 2003; Parazzini et al. 2003; Rortveit et al. 2001). In addition, injury to the tissues of the pelvic floor can occur as a result of perineal trauma during the different processes of delivery (episiotomy, forceps, and vacuum). Other factors may cause pelvic floor damage during the delivery, such as lengthy duration of labour and a larger than average birth weight (Eason et al. 2004; Rortveit et al. 2001).

The present study supported the previous studies in that there was an association between parity and UI. These studies reported that parity is linked with UI (Chiarelli

and Brown 1999; Lewis et al. 2005; Marshall et al. 1996; Rortveit et al. 2001; Zvetanka et al. 1999). However, a study done by Arya and colleagues (2000) in Icelandic women interestingly reported that they found no association between parity and UI among the study sample. Similarly, the field study among the Omani women in Seeb reported that parity was not associated with UI. However, this may be due to the small sample size in Seeb.

5.6.7 Obesity

Obesity increases intra-abdominal pressure which forces the urine into the urethra and static pressure in the bladder increases. Therefore, as in pregnancy, obesity places more strain on various bodily organs and can damage the pelvic floor and neurophysiology mechanism (Abrams et al. 2005; Luber 2004; Viktrup et al. 2006). The prevalence of obesity (BMI ≥ 30) in Omani women is 19% (Al-Lawati et al. 2002 ; Al-Moosa et al. 2006). In the present study, prevalence of obesity was high (70.1%) and obese women were more likely to have UI. In other studies it was reported that risk factors such as obesity were significantly associated with UI (Chiarelli and Brown 1999; Lasserre et al. 2009; Lewis et al. 2005; O'Connell et al. 2002; Sampelle et al. 2002; Zvetanka et al. 1999). The same result was observed in the present study which showed that all of the above risk factors were significantly associated with UI in the studied population. In some studies, it was found that weight reduction could reduce symptoms of, or even eliminate, UI which is a significant factor to take into account. Weight loss is associated with a reduction in obesity and this may reduce intra-abdominal pressure which causes an overload on pelvic floor muscles.

5.6.8 Constipation

Constipation may be one of the risk factors for UI similar to childbirth as it causes chronic straining and this may develop pelvic floor muscle weakness which may cause stress urinary incontinence. Marshall (1996) found that 35% of pregnant women were suffering from constipation. In Australia there was found to be a significant association between UI and conditions which increase pressure on the pelvic floor, such as constipation (Chiarelli and Brown 1999).

5.6.9 Smoking

Women who smoke seem to be at an increased risk of developing UI. The damage caused by smoking has several explanations; smoking aggravates coughing in people with chronic obstruction pulmonary disease (COPD), which can lead to intra-abdominal pressure and can put more stress on the pelvic floor muscle. It was found that smoking appears to be associated with UI as incontinent smokers have a tendency to be younger than incontinent non-smokers, and there is also a considerable relationship between cigarette smoking and incontinence in women (Bump and McClish 1992). It has been proposed that tobacco smoke has an anti-oestrogenic hormonal effect which in turn may have direct and indirect effects on the bladder and urethral functions (Bump and McClish 1992). Adding to the plausibility of this mechanism are the observations from some studies that smoking has an association between present smokers with UI and those who are heavy smokers (i.e. those who smoke more than 20 cigarettes per day), but no significant association amongst past smokers (Arya et al. 2000; Hannestad et al. 2003). In Oman it is not culturally acceptable for women to smoke, therefore very few women are likely to smoke and those that do would be highly unlikely to admit to it. Despite this, smoking was included in the version of the questionnaire used in the field test pilot study. However, as no women in that study admitted to smoking the questions on

smoking were removed from the questionnaire prior to data collection for the population based study.

5.6.10 Coughing/sneezing

Women with chronic chest conditions such as COPD, or suffer from hay-fever or allergies often report that they strain on their pelvic floor muscles regularly, which may lead to the condition of UI.

Coughing/sneezing can lead to pressure transmission defects that override the benefits of stronger urethral sphincters (Bump and McClish 1994; Samuelsson et al. 2000). There are numerous studies that confirm the relationship between coughing/sneezing and urinary incontinence (Chiarelli and Brown 1999). The present study supports the previous studies in that coughing and sneezing caused by allergy is believed to significantly contribute to UI. In the piloted study, sneezing was the only significant cause on the step wise regression. In addition, the above risk factors such as parity, obesity, constipation, chronic cough and, allergy with sneezing increase intra-abdominal pressure which may cause SUI, which in most cases, can be successfully treated (Chiarelli and Brown 1999; National Collaborating Centre for Women's and Children's Health 2006). The same result was observed in the present study which showed that all of the above risk factors were significantly associated with UI in the studied population, with the exception of smoking which was not included in the present study. It is of interest that 6 of the 9 significant risk factors are associated with increasing intra abdominal pressure that would load the pelvic floor.

5.6.11 Exercise

As in other Gulf countries, sport is still neglected by women; in all age groups, very few women do sport/exercise. Of those who exercise, walking and visiting a gym is

the most common form of exercise. In the present study, sport contributed to UI by 14.5%. The UAE and Qatar studies did not include exercise (Rizk et al. 1999; Saleh et al. 2005), but if sport/exercise participation increases in countries such as Oman, it could become a more significant factor.

Women participating in high impact exercises, such high jump, body pump (weight lifting), and others are likely to develop SUI due to an increase in downward force on the pelvic floor muscles (Abrams et al. 2009; Bø 2004; Danforth et al. 2007; De Lancey 1990; Kikuchi et al. 2007). Moreover, most of the risk factors such as pregnancy, delivery (caesarean & vaginal), parity, obesity, constipation, smoking, coughing, and sneezing, all increase intra abdominal pressure on the bladder and put more stress on pelvic floor muscles which in turn can cause pelvic floor muscle weakness; this may well lead to SUI.

5.6.12 Diabetes

Medical conditions, such as diabetes mellitus, have been associated with a 53% increase UI in middle-aged women. Diabetes mellitus occurs in 15%-20% of elderly people of weaker than average constitution (Fonda et al. 2005; Sampsel et al. 2002). The prevalence of diabetes in Oman is high; it is one of the top ten countries in the world for diabetes (Wild et al. 2004). Pre-hypertension associated with cardiovascular risk profiles was also high in the Omani population, and amongst Omani women it stands at 54.6% who are affected (Ganguly et al. 2008). Diabetes and diuretics were shown to be significantly associated with UI in many studies. Those studies were conducted in hospitals (Lewis et al. 2005). Although Oman has a high prevalence (11.6%) of diabetes, no significant association between diabetes and UI was shown in the present study (Al-Moosa et al. 2006).

5.6.13 Medications/ Diuretics

Certain drugs can cause or contribute to overflow of urine in “stress” and “urge” urinary incontinence. These drugs consist of anticholinergics, antidepressants, antipsychotics, sedative-hypnotics, antihistamines, nervous system depressants, narcotics, alcohol, calcium channel blockers, alphasadrenergic agonists, beta adrenergic blockers, alpha adrenergic antagonists, diuretics and caffeine (Fantl et al. 1990) (Diokno et al. 1991). The mechanism of the action of the above drugs in causing incontinence is that they cause decreased bladder contractions with retention, sphincter relaxation with urinary leakage, contractions stimulated by high urine flow, depressed central inhibition of micturition, diuretic effect and depressed central inhibition (Weiss 1998).

5.6.14 Caffeine intake

Caffeine is a diuretic and a bladder stimulant that can cause a sudden need to urinate, and prevent constipation (Klag et al. 2002) (Rao et al. 1998).

Caffeine tends to irritate the bladder so its consumption may be associated with higher risk for UI. However, the literature found that the mean caffeine intake of women with detrusor instability has higher significance than the controls and also that caffeine was highly correlated with detrusor instability (Arya et al. 2000; Hannestad et al. 2003). In our study most of the Omani women, when asked “How many times do you go to toilet per day”, tend to reply by way of “Whenever I go to pray”, but our question was actually “Do you pass urine during the day more than 8 times per day?” (frequency). This may be the reason it is not considered significant in the other study (Roberts et al. 1998) and similar to the present study.

5.6.15 Circumcision

Female circumcision can cause late medical complications such as UI (Elchalal et al. 1999). However, women who were circumcised were not significantly at a greater risk of urinary incontinence. Prevalence of circumcision was high, therefore the association was difficult to detect.

5.7 Bother

It was reported in some studies that women with UI were “bothered” by the condition; and it was demonstrated in other studies such as in Michigan, that African-American women were more bothered than other groups (Lewicky-Gaupp et al. 2009). Ruff et al. (1996) reported that in African American women, 55% were bothered, 14% of whom suffered “major bother”. In the present study, a similar result was found, although the degree of bother was higher. This may be due to Islamic culture, in which one would need to change their clothes before each session of prayer if there is even one drop of urine on their clothing. Omani women have shown a high prevalence of UI affecting their prayer. It was demonstrated in the present study that severe UI affects their prayers by as much as 29.1%; in contrast with the other studies in Gulf countries where the effect of severity on prayer was not considered.

Urinary incontinence also affects Omani women more whilst doing housework, as compared to Qatari (20%) and UAE women (4.9%). Moreover, women suffering from UI could feel a sense of social isolation.

5.7.1 Sexual activity

Saleh and Rizk reported that there is a relationship between sexual activity and incontinence (Rizk et al. 1999; Saleh et al. 2005). Bø (2000) also found that among women affected with UI, some complained that they also have problems with their

sexual activities, especially in the case of SUI. However, they all showed improvement with treatment that consisted of strengthening of pelvic floor muscles (Bø et al. 2000). Depending on diagnosis, the impact of incontinence on sexual relations varies. With those having bladder instability experiencing SUI (Shaw 2002) it is more common.

5.8 Care- seeking

It was demonstrated in others studies that the majority of women who experienced UI do not seek care for the problem. Care-seeking for UI among women is low. Many also feel embarrassed, and others believe UI to be normal in older women. There is a need for strategies aimed at educating the public and encouraging care-seeking for UI (Harris et al. 2007; Rizk 2009; Roberts et al. 1998).

Compared to the present study, the prevalence of care-seeking was higher in the other Gulf countries where 30.9% of UAE women and 45.8% of Qatar women affected by UI had sought treatment (Rizk et al. 1999; Saleh et al. 2005). However, in the present study, many women did not consult health professionals or discuss the condition with their families or friends. This may be due to lack of knowledge about the condition and availability of treatment in Oman. Furthermore, the differences in the prevalence of care-seeking and the particularly high prevalence in the other Gulf countries may be attributed to the recruitment area for these studies as some women may have felt more at ease to seek treatment in a hospital setting.

5.9 Treatments

It is known that UI can be distressing and cause or contribute to physical, and psychological morbidity in women of all ages (Chiarelli and Brown 1999; Hunskaar et al. 2000). In Oman, there are different methods of treating UI, including surgical, medical, and physiotherapy treatments. However, the physiotherapy treatment of UI

in Oman is very limited, which could be due in part to the shortage of professionals such as specialist physiotherapists, and resources. Physiotherapy treatment can produce much better results than general instructions given by general practitioners (Janssen et al. 2001). Physiotherapy treatment modalities vary, including approaches with or without appliance biofeedback. Pelvic floor muscle (PFM) training and electrotherapy treatment has proved to be effective treatment for female urinary incontinence (Bø 2003; Laycock and Holmes 2003).

The identified risk factors can be managed by proper treatment. To our knowledge, the physiotherapy intervention for UI in Oman is limited. The finding of this study can be used as a database to provide comprehensive planning for the treatment of UI in Oman.

5.10 Strengths of the study

The strength of the present study is that the prevalence of UI has not been investigated in Oman to date, apart from this field tested study done in the Willat Seeb, Muscat region.

Recruitment door to door and face to face interview method was most suitable for this study as a substantial proportion of potential respondents would be unable to respond without assistance due to limitations in literacy as shown in Table 1 if other methods were used. It is a strength of this study that face-to-face interviews were conducted as this yielded a very high response rate, which could not have been expected had another method, such as a postal self-reported questionnaire, been applied.

Despite potential difficulties, the researcher still managed to finish collecting the data. When going for the interview it was difficult to be sure of what would be the

best time to find the subjects at home, especially without pre-arranged appointments. Omani women's usual activities for the day include socialising over coffee in the morning and afternoon, visiting neighbours, relatives, the ill, and being in attendance at weddings and funerals. At the time of our study, the weather added to the discomfort as it was very hot during our visits.

5.11 Recommendations

The high prevalence of urinary incontinence among women in Oman proved the need to address the problem of various types of physiotherapy management of UI and the offer of more health education to the public. The evidence shows that incontinence can have a serious and demoralising effect on ADL for sufferers of UI.

To encourage and to develop the continence service which can be in partnership with ICS, and to encourage all other members such as physiotherapists, urologists, gynecologists and nurses to participate in specific health education programmes.

“Prevention is better than cure” is a valid motto in this instance. The formation of a national continence organisation is essential in order to provide the crucial point for development of comprehensive continence services. This organisation should provide the structure for affiliation between sufferers, health care professionals and the institutions, for example hospitals and health care centres.

To increase the degree of awareness in the female population and among health professionals, regarding urinary incontinence. This will help to break down the cultural barriers and behaviours, as well as giving justification to health-seeking behaviours.

Public health programmers should provide information to all women, and strategies for prevention and treatments should be implemented, especially in younger populations who can then pass the information to the next generation.

Co-operation between the health professionals such as urologists, gynaecologists and physiotherapists should be encouraged to ensure better care and positive results for our incontinent women.

To provide manpower such as physiotherapists who are able to assess and treat UI in all regions of Oman. Also, to provide short courses for the physiotherapists who are willing to work in an area of expertise that can benefit such a large number of women.

To provide antenatal and post natal exercise groups in all hospitals, as prophylaxis against the occurrence of UI.

To encourage the physiotherapy management of UI in all regions of Oman.

Clinical and epidemiological studies must be encouraged and promoted.

To conduct a study that includes male and female subjects with a large sample size is highly recommended, as no previous study of this kind has been conducted in Oman.

To conduct the use of a questionnaire and urodynamic (GOLD STANDAND) as confirmation of UI.

To conduct research regarding any aspect of female circumcision in the young population to prove that it is still in practice, and for further investigation, as it has been proposed as an example of a high risk for UI.

5.12 Limitations of this study

The study population consisted only of women in the general population of Oman and no men were included. In addition, because there were no data on pre-existing conditions for participants and a lack of epidemiological studies and of a clinically evidence based research in UI, it was a more difficult undertaking. The prevalence rates in this study may not be considered as representative of the Omani female population, neither can be generalised to the population as a whole.

5.13 Conclusions

This study provides support that there is a high prevalence of urinary incontinence among Omani women. It is essential to note that the risk factors that have been identified can all be improved through treatment. At the moment the treatment for urinary incontinence in Oman is limited. The findings of our study suggest that there is a vital need for greater availability of treatment. The data we have collected and collated will be significant in future planning of treatment and health awareness in Oman.

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References

Appendix 1 Curtin University ethics pilot study approval

memorandum

To	A/Prof Kathy Briffa, Physiotherapy
From	A/Professor Stephan Millett, Executive Officer, Human Research Ethics Committee
Subject	Protocol Approval HR 41/2007
Date	1 June 2007
Copy	A/Prof Kathy Briffa, Physiotherapy Kauthar Al Busaidi (37a Ashburton St Bentley WA Graduate Studies Officer, Division of

Curtin
University of Technology

Office of Research and Development

Human Research Ethics Committee

TELEPHONE 9266 2784
FACSIMILE 9266 3793
EMAIL hrec@curtin.edu.au

Thank you for your application submitted to the Human Research Ethics Committee (HREC) for the project titled "*The prevalence of urinary incontinence among women in Oman: A Pilot Study*". Your application has been reviewed by the HREC and is **approved**.

- You are authorised to commence your research as stated in your proposal.
- The approval number for your project is **HR 41/2007**. Please quote this number in any future correspondence.
- Approval of this project is for a period of twelve months to . To renew this approval a completed Form B (attached) must be submitted before the expiry date .
- If you are a Higher Degree by Research student, data collection must not begin before your Application for Candidacy is approved by your Divisional Graduate Studies Committee.
- The following standard statement **must** be included in the information sheet to participants:
This study has been approved by the Curtin University Human Research Ethics Committee (Approval Number HR 41/2007). The Committee is comprised of members of the public, academics, lawyers, doctors and pastoral carers. Its main role is to protect participants. If needed, verification of approval can be obtained either by writing to the Curtin University Human Research Ethics Committee, c/- Office of Research and Development, Curtin University of Technology, GPO Box U1987, Perth, 6845 or by telephoning 9266 2784 or by emailing hrec@curtin.edu.au.

Applicants should note the following:

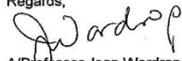
It is the policy of the HREC to conduct random audits on a percentage of approved projects. These audits may be conducted at any time after the project starts. In cases where the HREC considers that there may be a risk of adverse events, or where participants may be especially vulnerable, the HREC may request the chief investigator to provide an outcomes report, including information on follow-up of participants.

The attached **FORM B** should to be completed and returned to the Secretary, HREC, C/- Office of Research & Development:

When the project has finished, or

- If at any time during the twelve months changes/amendments occur, or
- If a serious or unexpected adverse event occurs, or
- 14 days prior to the expiry date if renewal is required.
- An application for renewal may be made with a Form B three years running, after which a new application form (Form A), providing comprehensive details, must be submitted

Regards,



A/Professor Joan Wardrop
Acting Executive Officer
Human Research Ethics Committee

Appendix 2 Curtin University main projects approval

memorandum



To	Dr Kathy Briffa, Physiotherapy
From	Miss Linda Teasdale, Ethics Officer, Human Research Ethics Committee
Subject	Protocol Extension Approval HR 66/2007
Date	11 March 2008
Copy	

Office of Research and Development

Human Research Ethics Committee

TELEPHONE 9266 2784

FACSIMILE 9266 3793

EMAIL hrec@curtin.edu.au

Thank you for keeping us informed of the progress of your research. The Human Research Ethics Committee acknowledges receipt of your Form B report, indicating modifications / changes, for the project *"The Prevalence Of Urinary Incontinence Among Omani Women"*. Your application has been **approved**.

Approval for this project remains until **03-07-2009**.

Your approval number remains **HR 66/2007**, please quote this number in any further correspondence regarding this project.

Please note: An application for renewal may be made with a Form B three years running, after which a new application form (Form A), providing comprehensive details, must be submitted.

Thank you.

A handwritten signature in cursive script, appearing to read "Linda Teasdale".

Miss Linda Teasdale
Ethics Officer
Human Research Ethics Committee

Appendix 3 Subject consent form

Subject Consent form

Title of project: The prevalence of urinary incontinence among Omani women: **Pilot study**

Principal Investigator: Kauthar Al Busaidi
Postgraduate Student, School of Physiotherapy, Curtin University of Technology

Project Supervisor: Dr Kathy Briffa
Dr Jackie Center

You are of your own accord making a decision whether or not to participate in the study, having read and understood all the information accessible. Your signature also officially states that you have had adequate opportunity to discuss this study with the investigator and all your questions have been answered to your satisfaction.

I, (the undersigned) _____

— Please PRINT

Of _____

Postal address _____ Phone _____

Consent to involvement in this study and give my authorization for any results from this study to be used any research paper, on the understanding that confidentiality will be maintained. I comprehend that I may withdraw from the study at any time without discrimination. If so, I undertake to contact the principal investigator (Tel 0410823458)

Signature _____ **Date** _____

Subject

I have explained to the subject the procedure of the study to which the subject has consented their involvement and have answered all questions. In my appraisal the subject has voluntarily and intentionally given informed consent and possesses the legal capacity to give informed consent to participate in this research study.

Principal Investigator _____ Date _____

Appendix 4 Letter requesting permission to conduct the study



التاريخ : ٢٠٠٧/١٠/٩

المحترم

الفاضل : علي بن محبوب بن حسن
مدير عام الإحصائيات الإجتماعي

المحترم

بواسطة / الدكتور أحمد بن سالم المنظري
نائب مدير عام مستشفى جامعة السلطان قابوس للشؤون الطبيه

الموضوع : طلب الموافقة على القيام ببحث علمي بالسلطنة

يسرني أن أرفع إليكم طلبي هذا لأتال مباركتكم وموافقتم على القيام ببحث علمي يتطلب زيارة لبعض المنازل بالسلطنة لتعبئة إستبيان (عن طريق مشاركة المتطوعات في البحث) وذلك من خلال إجراء مقابلات شخصية لسيدات المنازل المعنيات بالأمر . الجدير بالذكر أن هذا البحث يتمحور حول حصر حالات سلس البول لدى النساء العمائيات كما أن هذه الحالة منتشرة على مستوى العالم أيضا.

ونتيجة لهذا الحصر سيتسنى للباحثين وضع الخطط الملائمة للوقاية منها بطرق التوعية المختلفة وإن إستدعى الأمر علاج الحالات الموجودة حينذاك ولدرئها مستقبلا. وهذه الحالة الحرجة تصيب النساء بالإحباط والإكتئاب الذين يتسببان في الكثير من القلاقل للحياة الزوجية السعيدة في الكثير من الأحيان.

ولذلك نحتاج إلى موافقتكم للقيام بجمع البيانات من كل المناطق المذكوره في الطلب المرفق وذلك حسب المنطقة والتوزيع السكاني لها والمطلوب تغطية ثمانمائة من النساء العمائيات حسب عددهم في البيان الإحصائي.

وإيماننا مني بعتظيم جهودكم ودعمكم الدائم لأمثال هذه البحوث التي تعود بالنفع على مجتمعنا العزيز فإني أرجو منكم التكرم بالمباركة لهذا المشروع البحثي . وفقكم المولى الكريم إلى كل ما يحب ويرضى ، وبارك وأمد لنا في عمر بائي نهضة عماننا المجيدة صاحب الجلالة السلطان قابوس بن سعيد المعظم حفظه الله .

شاكرين لكم حسن تعاونكم
وتفضلوا بقبول فائق الإحترام والتقدير ،،،

كوثر بنت سليمان بن أحمد البوسعيدي
طالبة الدكتوراة بجامعة كيرتن للتكنولوجيا ،بيرث،إستراليا

Appendix 5 Approval letter from Governorate of Muscat

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

Sultanate of Oman
Governorate of Muscat
Wilayat Seeb
Wali Office



سلطنة عمان
محافظة مسقط
ولاية السيب
مكتب الوالي

الرقم : م/م وس / / م/م / م
التاريخ : ١٩ جمادى الأولى ١٤٢٨ هـ
الموافق : ٥ يونيو ٢٠٠٧ م

المحترم الدكتور / أحمد بن سالم المنظري
نائب مدير عام مستشفى جامعة السلطان قابوس للشؤون الطبية

السلام عليكم ورحمة الله وبركاته... وبعد!!!

بالإشارة إلى رسالتكم المؤرخة في ٢٠٠٧/٦/٤ م بشأن طلب
الفاضله / كوثر بنت سليمان بن أحمد البوسعيديه طالبة
الدكتوراه بجامعة كيرتن للتكنولوجيا بأستراليا الموافقة
على القيام ببحث علمي بولاية السيب .

نود إفادتكم بأنه ليس لدينا مانع من ذلك ، وقد قمنا
بالتعميم على شيوخ الولاية ، مرفق لكم صورة من
التعميم ، للتكرم بالإطلاع والعلم .

وتفضلوا بقبول فائق التقدير والإحترام!!!


خالد بن عبدالله العبري
نائب والي السيب



Appendix 6 Approval from Ministry of National Economy

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

Sultanate of Oman
Ministry of National Economy
Muscat



سلطنة عُمان
وزارة الاقتصاد الوطني
مسقط

التاريخ: ٢٠٠٦ / ١١ / ٢٠٠٦ م

إلى من يهمه الأمر

ليس لدى وزارة الاقتصاد الوطني متمثلة بالمديرية العامة للإحصاءات الاجتماعية أي ممانع من قيام الفاضلة: كوثر بنت سنيان بن أحمد البوسعيدي، (طالبة الدكتوراة بجامعة كيرتن للتكنولوجيا، بيرث، أستراليا) والمتطوعات انشركن معها بإجراء مقابلات شخصية للأسر المعنية في إطار القيام ببحث علمي (حصر حالات سلس انبول بالسلطنة).

وإذ تناشد الوزارة الأسر بالتعاون مع المذكورة والمتطوعات المشاركون معها بهدف إيجاد السبل لعلاج الحالات الحرجة والتي تسبب الكثير من الأضرار للحياة الزوجية السعيدة، ودرتها مستقبلًا.

علي بن مصعب بن حسين
مدير عام الإحصاءات الاجتماعية



P.O.Box: 881Muscat-Postal Code: 100- Tel.: 24478900 E-mail: mone@omantel.net.om هاتف: ٢٤٤٧٨٩٠٠٠

Appendix 7 Questionnaire in English

Urinary incontinence and severity tool

Study No

--	--	--	--

Date:

--	--

Region	District (Wilayat)	Locality

Not completed	Reason	Time taken

Demographic status		
Q1	A) In which year were you born? If the lady answers Q 1.A go to Q 2 If the any woman is not be able to answer the question (A) go to question (B)	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
	b) How old are you? If the woman is not able to answer question (A) and (B) will be (C).	<input type="text"/> <input type="text"/> <input type="text"/>
	Unknown	<input type="checkbox"/>
Q2	In which country were you born?	
Q3	What is your marital status?	Married <input type="checkbox"/> 1
		Divorced <input type="checkbox"/> 2
		Widowed <input type="checkbox"/> 3
	If the answer is never married after Q14 go to Q 20	Never married <input type="checkbox"/> 4
Q4	Can you read the paper?	Yes <input type="checkbox"/> 1 No <input type="checkbox"/> 2
	If NO Can you read the Holly Qur'an?	Yes <input type="checkbox"/> 1 No <input type="checkbox"/> 2

	Can you write	Yes <input type="checkbox"/> 1 No <input type="checkbox"/> 2
Q5	Did you attend school?	Yes <input type="checkbox"/> 1 No <input type="checkbox"/> 2
Q6	If yes which one	Primary <input type="checkbox"/> 1
		Intermediate <input type="checkbox"/> 2
		Secondary <input type="checkbox"/> 3
		Diploma <input type="checkbox"/> 4
		Bachelor degree <input type="checkbox"/> 5
		Post graduate <input type="checkbox"/> 6
Q7	Weight in kilograms	<input type="text"/> Kg
Q8	Height in centimeters	<input type="text"/> Cm

Obstetric & Gynaecology History (Risk Factors)		
Q 9	Do you have regular period? (menstruation)	Yes <input type="checkbox"/> 1 No <input type="checkbox"/> 2
Q10	If no has your period stop less than 12 months?	Yes <input type="checkbox"/> 1 No <input type="checkbox"/> 2
Q 11	If no has your period stop for more than 12 months?	Yes <input type="checkbox"/> 1 No <input type="checkbox"/> 2
Q 12	If yes How many years?	Year <input type="text"/>
Q 13	Type of menopausal	Natural <input type="checkbox"/> 1
		Surgical <input type="checkbox"/> 2
		Other <input type="checkbox"/> 3
Q 14	Do you use Hormone replacement?	Yes <input type="checkbox"/> 1 No <input type="checkbox"/> 2

If the answer is never married after Q14 go to Q 20

Q15 Number of Babies	TYPE OF DELIVERY							
	No	Date Of birth	Normal / Vaginal	Forceps Vacuum	Episiotomy /cut stitches	Section/ operation	Hosp	Home
0								
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								

Q16	Have you had miscarriage?	Yes <input type="checkbox"/> 1 NO <input type="checkbox"/> 2
Q17	If yes, how old was the pregnancy?	<p>< 25 weeks <input type="checkbox"/> 1</p> <p>≥ 25 weeks <input type="checkbox"/> 2</p>
Q18	If yes, how many miscarriages you had	<input type="text"/>
Q19	Do you use oral contraceptives?	Yes <input type="checkbox"/> 1 No <input type="checkbox"/> 2

Urinary incontinence and the types		
Q20	Do you understand what urinary incontinence is?	Yes <input type="checkbox"/> 1 No <input type="checkbox"/> 2
Q21	Do you have any urinary leakage while coughing sneezing, laughing, lifting heavy items?	Yes <input type="checkbox"/> 1 No <input type="checkbox"/> 2
Q22	When you have a sudden and strong urge to pass urine, Do you have an involuntary loss of urine? If Yes from any of the above Q go to Q23 If No from all above Q 20, 21 & 22 go to Q 27	Yes <input type="checkbox"/> 1 No <input type="checkbox"/> 2
Q23	When did leakage start? You may tick more than one box	Before marriage <input type="checkbox"/> 1
		After marriage <input type="checkbox"/> 2
		During pregnancy <input type="checkbox"/> 3
		After childbirth <input type="checkbox"/> 4
		If Yes which one 1 ST <input type="checkbox"/> 5
		2 nd <input type="checkbox"/> 6
		3 rd <input type="checkbox"/> 7
		Above 3 <input type="checkbox"/> 8
		After menopause <input type="checkbox"/> 9

Q24	With the leakage, do you wet your clothes?	Yes <input type="checkbox"/> 1 No <input type="checkbox"/> 2
Q25	If yes is it	Underwear <input type="checkbox"/> 1
		Outer wear <input type="checkbox"/> 2
		Dress (outer) <input type="checkbox"/> 3
Q26	Do you wear any pad to protect your underwear?	Yes <input type="checkbox"/> 1 No <input type="checkbox"/> 2
Q27	Do you change your underwear after urine leakage?	Yes <input type="checkbox"/> 1 No <input type="checkbox"/> 2
Q28	How many times do you change your underwear clothes or pads during the day?	1 <input type="checkbox"/> 1
		2 <input type="checkbox"/> 2
		3 and above <input type="checkbox"/> 3

Q29	How often do you have involuntary loss of urine?	Less than once a month <input type="checkbox"/> 1
		Once or more per month <input type="checkbox"/> 2
		Once or more per week <input type="checkbox"/> 3
		Every day/or night <input type="checkbox"/> 4
Q30	How much urine do you leak each time?	Drop or little <input type="checkbox"/> 1
		Small amount <input type="checkbox"/> 2
		Large amount <input type="checkbox"/> 3
Q31	Does urinary leakage bother you?	yes <input type="checkbox"/> 1 No <input type="checkbox"/> 2
Q32	If yes, how much does it bother you?	Little bit <input type="checkbox"/> 1
		Some bother <input type="checkbox"/> 2
		A major problem <input type="checkbox"/> 3
Q33	Does your leakage affect your praying?	Yes <input type="checkbox"/> 1 No <input type="checkbox"/> 2

Q34	If yes	A little bit <input type="checkbox"/> 1 Moderate <input type="checkbox"/> 2 Extremely <input type="checkbox"/> 3
Q35	Does your leakage affect your Sport activity?	Yes <input type="checkbox"/> 1 No <input type="checkbox"/> 2
Q36	If yes	A little bit <input type="checkbox"/> 1 Moderate <input type="checkbox"/> 2 Extremely <input type="checkbox"/> 3
Q37	Does your leakage affect your House work or other?	Yes <input type="checkbox"/> 1 No <input type="checkbox"/> 2
Q38	If yes	A little bit <input type="checkbox"/> 1 Moderate <input type="checkbox"/> 2 Extremely <input type="checkbox"/> 3
Q39	This Q not applicable to Q3 never married Does your leakage affect your Sexual activity?	Yes <input type="checkbox"/> 1 No <input type="checkbox"/> 2
Q40	If yes	A little bit <input type="checkbox"/> 1 Moderate <input type="checkbox"/> 2 Extremely <input type="checkbox"/> 3

Q41	Have you had any vaginal surgery for the treatment of urinary leakage or prolapsed? (Have you had vaginal repair?)	Yes <input type="checkbox"/> 1 No <input type="checkbox"/> 2
Q42	Did you discuss your urinary incontinence problem with anyone?	Yes <input type="checkbox"/> 1 No <input type="checkbox"/> 2
Q43	If yes which one?	Mother <input type="checkbox"/> 1
		Husband <input type="checkbox"/> 2
		Sister <input type="checkbox"/> 3
		Friend <input type="checkbox"/> 4
Q44	Have you consulted any health professionals about the urine leakage?	Yes <input type="checkbox"/> 1 No <input type="checkbox"/> 2
Q45	If yes which one?	A doctor <input type="checkbox"/> 1
		A physiotherapist <input type="checkbox"/> 2
		A traditional <input type="checkbox"/> 3
		Other <input type="checkbox"/> 4 Please specify <input type="text"/>
Q46	If no why?	Embarrassed <input type="checkbox"/> 1
		Don't know that it is a problem <input type="checkbox"/> 2

Q47	Do you pass urine during the day more than 8 times per day?	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2
Q48	Do you pass urine during the night?	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2
Q49	Do you suffer from any chronic cough?	Yes <input type="checkbox"/> 1 No <input type="checkbox"/> 2	If yes, Always <input type="checkbox"/> 1
			Some times <input type="checkbox"/> 2
Q 50	Do you suffer from any allergies which can cause sneezing?	Yes <input type="checkbox"/> 1 No <input type="checkbox"/> 2	If yes, Always <input type="checkbox"/> 1
			Some times <input type="checkbox"/> 2
Q 51	Do you suffer from burning sensation while passing urine?	Yes <input type="checkbox"/> 1 No <input type="checkbox"/> 2	If yes, Always <input type="checkbox"/> 1
			Some times <input type="checkbox"/> 2
Q52	Do you empty your bowels less than three times a week?	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2
Q53	How is the stool?	Hard <input type="checkbox"/> 1	Soft <input type="checkbox"/> 2

Other health issues		
Q54	A) Have you ever been told by a doctor that you have Diabetes?	Yes <input type="checkbox"/> 1 No <input type="checkbox"/> 2
	B) Have you been told by a doctor that you have high sugar levels in your urine?	Yes <input type="checkbox"/> 1 No <input type="checkbox"/> 2
	C) Have you been told by a doctor that you have high sugar levels in your blood?	Yes <input type="checkbox"/> 1 No <input type="checkbox"/> 2
	D) Have you ever been told by a doctor that you have Diabetes while you're pregnant? if No from the above Q A,B,C&D go to Q57	Yes <input type="checkbox"/> 1 No <input type="checkbox"/> 2
Q55	If yes, how many time Are you taking any oral medication for diabetes (tablets)?	Yes <input type="checkbox"/> 1
		No <input type="checkbox"/> 2
		Once a day <input type="checkbox"/> 1
		Twice a day <input type="checkbox"/> 2
		Three times a day <input type="checkbox"/> 3
		Four times a day <input type="checkbox"/> 4
Q56	Are you using insulin injection?	Yes <input type="checkbox"/> 1
		No <input type="checkbox"/> 2
		Once a day <input type="checkbox"/> 1
		Twice a day <input type="checkbox"/> 2
		Three times a day <input type="checkbox"/> 3
	If yes, how many times?	Four times a day <input type="checkbox"/> 4

Q57	Do you take any other medication (for heart/blood Pressure), which can let you go to urinate very frequently?	Yes <input type="checkbox"/> 1	If yes, how many times
		No <input type="checkbox"/> 2	Once a day <input type="checkbox"/> 1
			Twice a day <input type="checkbox"/> 2
			Three times <input type="checkbox"/> 3
			Four times a day <input type="checkbox"/> 4
Q58	Do you drink coffee?	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2
Q59	If yes, How often?	daily <input type="checkbox"/> 1	
		weekly <input type="checkbox"/> 2	
		Occasionally <input type="checkbox"/> 3	
Q60	If daily, how many cups a day? If weekly, how many cups a week? If occasionally, how many cups monthly	<input type="text"/> 1	
		<input type="text"/> 2	
		<input type="text"/> 3	
Q61	Are you circumcised?	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2

That completes the questionnaire.

Thank you for your time.

Appendix 8 Questionnaire in Arabic

أداة البحث حول سلس البول

رقم الدراسة: [] [] [] [] التاريخ: [] [] [] [] [] [] [] []

المنطقة	الولاية	القرية
مسقط	السيب	

وقت بداية المقابلة	نهاية المقابلة	الوقت المستغرق

<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<p>1س1 (أ) ماهي سنة ميلادك؟</p> <p>إذا لم تملئ السيدة من الإجابة على الفرع أ من السؤال نتقل إلى الفرع (ب)</p>
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<p>ب (كم عمرك؟</p> <p>في حالة عدم الإجابة على الأفرع أ و ب ضع إشارة (√) على (ج)</p>
<input type="checkbox"/>	<p>ج) غير معروف</p>
<input type="checkbox"/>	<p>2س2 في أي دولة ولدت؟</p>
<p>1 <input type="checkbox"/> متزوجة</p>	<p>3س3 ما هي الحالة الإجتماعية؟</p>
<p>2 <input type="checkbox"/> مطلقة</p>	
<p>3 <input type="checkbox"/> أرملة</p>	
<p>4 <input type="checkbox"/> عزباء</p>	<p>إذا كانت الإجابة عزباء بعد الانتهاء من السؤال 14 اذهب إلى السؤال 20</p>
<p>2 <input type="checkbox"/> <input type="checkbox"/> 1</p> <p>2 <input type="checkbox"/> <input type="checkbox"/> 1</p> <p>2 <input type="checkbox"/> <input type="checkbox"/> 1</p>	<p>4س4 هل بإمكانك قراءة الصحيفة؟</p> <p>إذا كانت الاجابة بلا هل يمكنك قراءة القرآن؟</p> <p>هل يمكنك الكتابة؟</p>

<p>أ</p> <p>نعم 1 <input type="checkbox"/> لا 2 <input type="checkbox"/></p>	<p>هل سبق لك وأن درستي؟</p>	<p>5س</p>
<p>1 <input type="checkbox"/> ابتدائي</p> <p>2 <input type="checkbox"/> إعدادي</p> <p>3 <input type="checkbox"/> ثانوية</p> <p>4 <input type="checkbox"/> دبلوم</p> <p>5 <input type="checkbox"/> بكالوريا</p> <p>6 <input type="checkbox"/> دراسات عليا</p>	<p>إذا كانت إجابه 5. نعم ، فما هي مؤهلاتك العلمية؟</p>	<p>6س</p>
<p><input type="text"/> كجم</p>	<p>الوزن بالكيلوجرام</p>	<p>7س</p>
<p><input type="text"/> سم</p>	<p>الطول بالسنتيمترات</p>	<p>8س</p>

(عوامل الأخطار) تاريخ الحمل والولادة	
هل الدورة الشهرية (الحيض) لديك منتظمة؟	س9 نعم <input type="checkbox"/> 1 لا <input type="checkbox"/> 2
إذا لا, هل العادة الشهرية توقفت أقل من 12 شهرا إذا نعم إنتقل إلى س رقم 14	س10 نعم <input type="checkbox"/> 1 لا <input type="checkbox"/> 2
فهل توقفت الدورة أكثر من عام؟	س11 نعم <input type="checkbox"/> 1 لا <input type="checkbox"/> 2
إذا كانت الإجابة بنعم من كم سنة توقفت الدورة ؟	س12 <input type="text"/>
ما هي أساليب توقف الدورة ؟	س13 طبيعي <input type="checkbox"/> 1 جراحي <input type="checkbox"/> 2 أخرى <input type="checkbox"/> 3
هل تأخذين هرمونات بديله ؟	س14 نعم <input type="checkbox"/> 1 لا <input type="checkbox"/> 2

نوعية الولادة								س 15 عدد الأولاد
غير	منزل	مستشفى	عملية جراحية	جراحه بسيطة	بواسطة اللقط والشفط	ولادة طبيعيه	سنة الميلاد	
								0
								1
								2
								3
								4
								5
								6
								7
								8
								9
								10
								11
								12

لا <input type="checkbox"/> 2	عم <input type="checkbox"/> 1	هل فقدت أي حمل؟	س 16
1 <input type="checkbox"/>	أقل من 25 اسبوعا	إذا كانت الإجابة بنعم ، فكم كان عمر الحمل ؟	س 17
2 <input type="checkbox"/>	25 أسبوع أو أكثر		
	<input type="text"/>	إذا كانت الإجابة نعم ، فكم مرة فقدت؟	س 18
لا <input type="checkbox"/> 2	نعم <input type="checkbox"/> 1	هل تأخذين حبوب منع الحمل؟	س 19

مرض سلس البول وأنواعه		
س 20	هل تعرفين عن مرض سلس البول؟	1 <input type="checkbox"/> نعم 2 <input type="checkbox"/> لا
س 21	هل يتسرب منك البول عند الكحة ، العطس ، الضحك ، حمل الأشياء الثقيلة؟	1 <input type="checkbox"/> نعم 2 <input type="checkbox"/> لا
س 22	هل يتسرب منك البول عند الشعور بإلحاح شديد ومفاجيء للتبول؟ إذا كانت الإجابة بنعم لكل الأسئلة 21 ، 22 ، 25 و 18 إذهبي للسؤال إذا كانت الإجابة بلا لكل الأسئلة أعلاه س 22 وس 23، س 24 إذهبي إلى السؤال 48	1 <input type="checkbox"/> نعم 2 <input type="checkbox"/> لا
س 23	متى بدأت لديك حالة فقدان التحكم بالبول؟	1 <input type="checkbox"/> قبل الزواج
		2 <input type="checkbox"/> بعد الزواج
		3 <input type="checkbox"/> أثناء الحمل
		4 <input type="checkbox"/> د الولادة
		إذا كانت الإجابة بعد الزواج فبعد أي طفل حدث هذا؟ الأول؟
		5 <input type="checkbox"/>
		6 <input type="checkbox"/> الثاني
		7 <input type="checkbox"/> الثالث
		8 <input type="checkbox"/> بعد الثالث
	9 <input type="checkbox"/> بعد انقطاع الحيض (سن اليأس)	

س 24	هل تبللين ملابسك بسبب فقدان التحكم بالبول؟	1 <input type="checkbox"/> نعم 2 <input type="checkbox"/> لا
س 25	إذا كانت الإجابة بنعم ، فأأي الملابس تصاب بالبلل ؟	1 <input type="checkbox"/> اللباس الداخلي 2 <input type="checkbox"/> اللباس الخارجي 3 <input type="checkbox"/> ملابسك
س 26	هل تلبسين أي فوطة صحية لحماية ملابسك الداخليه ؟	1 <input type="checkbox"/> نعم 2 <input type="checkbox"/> لا
س 27	هل تلبسين أي فوطه لحماية ملابسك الداخليه ؟	1 <input type="checkbox"/> 2 <input type="checkbox"/> لا
س 28	كم مره تضطرين فيها لتغيير ملابسك الداخليه أو تغيير الفوطة الصحيه خلال اليوم الواحد ؟	1 <input type="checkbox"/> 1 2 <input type="checkbox"/> 2 3 <input type="checkbox"/> فأكثر

1 <input type="checkbox"/>	مرة بالشهر	س 29 كم مره تستمر لديك حالة عدم التحكم بالبول ؟	
2 <input type="checkbox"/>	مره أو أكثر بالشهر		
3 <input type="checkbox"/>	مره أو أكثر بالإسبوع		
4 <input type="checkbox"/>	كل يوم أوليله		
1 <input type="checkbox"/>	قطرات	س 30 ما هي كمية البول التي تفقدن التحكم بها في كل مرة؟	
2 <input type="checkbox"/>	قليل		
3 <input type="checkbox"/>	كثير		
2 <input type="checkbox"/>	لا	1 <input type="checkbox"/> نعم	س 31 هل فقدان التحكم بالبول يعيق راحتك؟
1 <input type="checkbox"/>	قليل	س 32 إذا نعم	
2 <input type="checkbox"/>	متوسط		
3 <input type="checkbox"/>	كثير		
2 <input type="checkbox"/>	لا	1 <input type="checkbox"/> نعم	س 33 هل فقدان التحكم بالبول يؤثر على صلاتك؟
1 <input type="checkbox"/>	قليل	س 34 إذا نعم	
2 <input type="checkbox"/>	متوسط		
3 <input type="checkbox"/>	كثير		
2 <input type="checkbox"/>	لا	1 <input type="checkbox"/> نعم	س 35 هل فقدان التحكم بالبول يؤثر الرياضة التي تمارسيتها؟

	هل خضعتي لعملية جراحية لعلاج سلس البول أو سقوط الرحم؟	س 41
<p>نعم <input type="checkbox"/> 1 لا <input type="checkbox"/> 2</p> <p>لا <input type="checkbox"/> 1 نعم <input type="checkbox"/> 2</p>	هل ناقشت مشكلة سلس البول مع احد افراد العائلة او احد من الاصدقاء؟	س 42
<p>1 <input type="checkbox"/> أمك</p>	<p>إذ كانت كانت الإجابة نعم ، فمع من؟</p>	س 43
<p>2 <input type="checkbox"/> زوجك</p>		
<p>3 <input type="checkbox"/> أختك</p>		
<p>4 <input type="checkbox"/> صديقك</p>		
<p>نعم <input type="checkbox"/> 1 لا <input type="checkbox"/> 2</p>	هل إستشرتي أي إخصائي حول مرض سلس البول لديك؟	س 44
<p>1 دكتور</p>	<p>إذا كانت الإجابة بنعم ، فمن أستشرتي؟</p>	س 45
<p>2 أخصائي علاج طبيعي</p>		
<p>3 طبيب طب شعبي</p>		
<p>4 <input type="checkbox"/> غيرهم</p>		
<p><input type="text"/> الرجاء التحد</p>		
<p>1 <input type="checkbox"/> محرج</p>	<p>إذا كانت الإجابة بلا ، فما هو سبب عدم مناقشة المشكلة؟</p>	س 46
<p>2 <input type="checkbox"/> لا أعرف اذا كانت مشاطلة</p>		

س 47	هل تتبولين اكثر من ثمان مرات نهارا؟	نعم <input type="checkbox"/> 1 لا <input type="checkbox"/> 2
س 48	هل تتبولين ليلا؟	نعم <input type="checkbox"/> 1 لا <input type="checkbox"/> 2
س 49	هل تعانيين من الكحة المزمنة؟	نعم <input type="checkbox"/> 1 لا <input type="checkbox"/> 2
		إذا كانت الإجابة نعم ، دائما <input type="checkbox"/> 1 أحيانا <input type="checkbox"/> 2
س 50	هل تعانيين من حساسية تسبب لك العطس؟	نعم <input type="checkbox"/> 1 لا <input type="checkbox"/> 2
		إذا كانت الإجابة نعم ، دائما <input type="checkbox"/> 1 أحيانا <input type="checkbox"/> 2
س 51	هل تعانيين من حرقان أثناء التبول ؟	نعم <input type="checkbox"/> 1 لا <input type="checkbox"/> 2
		إذا كانت الإجابة نعم ، دائما <input type="checkbox"/> 1 أحيانا <input type="checkbox"/> 2
س 52	هل تذهبين لقضاء الحاجة(البراز) اقل من ثلاث مرات في الاسبوع؟	نعم <input type="checkbox"/> 1 لا <input type="checkbox"/> 2
س 53	ما هي نوعية الإخراج (البراز) ؟	صلب <input type="checkbox"/> 1 ليين <input type="checkbox"/> 2

متعلقات صحية أخرى	
س 54	<p>أ) هل سبق وأن أخبرك الطبيب أن عندك مرض السكري؟ إذا نعم، اذهب إلى س 57 إذا لا، اذهب إلى س 56 ب و ج</p> <p>نعم <input type="checkbox"/> 1 لا <input type="checkbox"/> 2</p>
	<p>ب) هل سبق وأن أخبرك الطبيب أن نسبة السكر بالبول لديك عالية؟</p> <p>نعم <input type="checkbox"/> 1 لا <input type="checkbox"/> 2</p>
	<p>ب) هل سبق وأن أخبرك الطبيب أن نسبة السكر بالبول لديك عالية؟</p> <p>نعم <input type="checkbox"/> 1 لا <input type="checkbox"/> 2</p>
	<p>نعم <input type="checkbox"/> 1 لا <input type="checkbox"/> 2</p>
س 55	<p>هل تأخذين أي حبوب لعلاج السكري؟</p> <p>إذا كانت الإجابة بنعم فكم مره</p> <p>مره واحده <input type="checkbox"/> 1</p> <p>مرتين <input type="checkbox"/> 2</p> <p>ثلاث مرات <input type="checkbox"/> 3</p> <p>مرات <input type="checkbox"/> 4</p>
س 56	<p>هل تأخذين إبر الأنسولين لعلاج السكري؟</p> <p>إذا كانت الإجابة بنعم فكم مره</p> <p>مره واحده <input type="checkbox"/> 1</p> <p>مرتين <input type="checkbox"/> 2</p> <p>ثلاث مرات <input type="checkbox"/> 3</p> <p>مرات <input type="checkbox"/> 4</p>

هذه نهاية الأسئلة

شكراً على وقتك

Appendix 9 Data dictionary

	Questions	Definition	Source of validation
1	<p>a) In which year were you born? <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/></p> <p>b) How old are you? <input type="text"/> <input type="text"/> <input type="text"/></p> <p>c) Unknown <input type="text"/></p>	<p>Age will be calculated as the present year minus the year the lady born, eg (2007-1990 = 17) If the lady answers Q 1.a go to Q 2 If the lady is answer question (a) go to question (b) b) How old are you? If the lady is not able to answer question (a) and (b) the answer will be (c). If both questions are not answered will be recorded <i>unknown</i></p>	Omani Censuses 2003
2	In which country were you born?	Subject will be defined according to the country indicated.	National Health Survey 2001 (Australian Bureau of Statistic)
3	<p>What religion do you practice?</p> <p>Islam</p> <p>Christian</p> <p>Other</p>	Subject will be defined according to the three categories indicated.	
4	<p>What is your marital status?</p> <p>Married <input type="checkbox"/></p> <p>Divorced <input type="checkbox"/></p> <p>Widowed <input type="checkbox"/></p> <p>Never married</p>	Subject will be defined according to the four categories indicated.	Omani Censuses 2003
5	<p>Did you attend school? Yes</p> <p>No</p> <p>If yes which one</p> <p>Primary</p> <p>Secondary</p> <p>Bachelor degree</p> <p>Post graduate</p> <p>If No can you Read Yes</p> <p>No</p> <p>Write Yes</p> <p>No</p>	<p>Subject answer Yes will be defined according to the six levels.</p> <p>If the subject answers Yes will be defined as literate. If the answer is No she will be defined as illiterate.</p>	Omani Censuses 2003

<p>6</p>	<p>Weight in kilograms (kg and grams)? (to the nearest 0.5kg)</p> <p style="text-align: center;"><input type="text"/></p> <p>The researcher and other interviewers, will use the weighing scale in kilograms.</p>	<p>Table 1. This will be used to calculate the body mass index (BMI). The formula for the calculation is weight in kg divided by square of height in metres (kg/m²).</p> <p>Table 2.</p>	<p>www.who.int/entity/mediacenter/factsheets/fs311/en/</p> <p>www.who.int/bmi/index.jsp?introPage=intro_3.html</p>
<p>7</p>	<p>Height in centimetres (cm)</p> <p style="text-align: center;"><input type="text"/></p> <p>(to the nearest 0.5cm) Height using a metal tape measure in centimetres</p>	<p>Table 3. This will be used to calculate the body mass index (BMI). The formula for the calculation is weight in kg divided by square of height in metres (kg/m²).</p> <p>Table 4. The World Health Organization (WHO) defines underweight as BMI below 18.5 "overweight" as a BMI equal to or more than 25, and "obesity" as a BMI equal to or more than 30.</p> <p>a) Any one who will have BMI 25 and above will be defined as overweight. b) Any one who will have BMI 30 and above will be defined as obesity. c) Any one who will have BMI below 18.5 will be defined as underweight</p>	<p>www.who.int/entity/mediacenter/factsheets/fs311/en/</p> <p>www.who.int/bmi/index.jsp?introPage=intro_3.html</p>
<p>8</p>	<p>How long ago was your last period? (Menstruation)</p> <p>Last week</p> <p>Last month</p> <p>Last six month</p> <p>Last year 12 months</p> <p>If the answer is less than twelve month go to Q13</p> <p>If the answer is above 12 month go to Q 9</p>	<p>Menopause occurs with the final menstrual period (FMP) which is known with certainty only in retrospect a year or after the Last year 12 months t"</p> <p>Any lady who is 45 years and above, stop getting her period ≥ 12 months ago will be defined as "nature menopause if younger the cause should be given eg pathology. If the lady has her period go to Q 12</p>	<p>(Society 2004) http://www.menopause.org.au/public/content.asp?PageID=7</p>
<p>9</p>	<p>Age at menopause</p>	<p>Should be recorded in years</p>	
<p>10</p>	<p>Do you know why your periods stopped?</p> <p>Natural</p> <p>Surgical</p> <p>Other</p>	<p>Subject age 45 and above will be defined as natural menopause. And the rest will be defined in two categories.</p>	

11	Do you take hormone replacement therapy? Yes No	A subject who answers Yes will be defined as a hormone replacement therapy user.	
12	Do you use oral contraceptives? Yes No	A subject who answers Yes will be defined as taking contraceptive pills.	
13	Number of deliveries Date of childbirth Type of delevary: Normal/vaginal Forceps <input type="checkbox"/> Vaccum <input type="checkbox"/> Episiotomy <input type="checkbox"/> Section <input type="checkbox"/>	Number of deliveries will be defined as number of children who were born either dead or alive. The date of childbirth will be defined as the interval between child to child in years. Subject will be defined according to the four categories given. For episiotomy if a lady does not understand the word, she will be ask “did you have a cut or stitches?” “Have you had an operation?”	
14	Have you had miscarriage? Yes <input type="checkbox"/> No <input type="checkbox"/> If yes < 25 weeks <input type="checkbox"/> > 25 weeks	If the subject answers Yes and 25 weeks and above it will will be defined as normal delivery.	
15	Have you heard about urinary incontinence before? Yes No	Any subject who answers Yes will be defined as having heard about UI but the one who answers No will be defined as not having heard about UI	
16	Do you have any urinary leakage? Yes No	If answer is Yes she will be defined as having incontinence and if the client answers No the researcher will continue with the following questions. This question will identify the prevalence of urinary incontinence in Omani women. This is the ICS definition “ any involuntary leakage of urine”(Abrams et al.,2003) International Continence Society (ICS) Women who respond “Yes” will be defined as incontinent.	International Continence Society (ICS) (Abrams et al.,2003)
17	Do you have any involuntary loss urine when you are coughing, sneezing, and laughing, lifting heavy items? Yes No	Any lady who answers Yes will be defined as having UI and SUI Stress urinary incontinence is defined by (ICS) “a complaint of involuntary leakage on effort or exertion, or coughing or sneezing” ((Abrams et al., 2003)	International Continence Society (ICS) (Abrams et al., 2003)

<p>18</p>	<p>Do you have involuntary loss of urine in connection sudden urge to pass urine?</p> <p>Yes <input type="checkbox"/> No <input type="checkbox"/></p>	<p>Any lady who answers Yes will be defined as having urge incontinence.</p> <p>Urge incontinence is define by (ICS) “ a complaint of involuntary of leakage accompanied by or immediately preceded by urgency” (Abrams et al.,2003)</p>	<p>International Continenence Society (ICS).(Abrams et al., 2003)</p>
<p>19</p>	<p>With the leakage do you wet your underwear clothes?</p> <p>Yes <input type="checkbox"/> No <input type="checkbox"/></p> <p>if yes</p> <p>Under wear <input type="checkbox"/></p> <p>Out wear <input type="checkbox"/></p>	<p>Any lady who answers Yes will be defined that she wet her clothes and the question below will be defined according to two categories.</p>	
<p>20</p>	<p>How many times do you change your clothes or pads before praying during the day due to leak</p> <p>0 <input type="checkbox"/></p> <p>1-2 <input type="checkbox"/></p> <p>3-4 <input type="checkbox"/></p> <p>5 and above <input type="checkbox"/></p>	<p>Any subject answer will be defined according to the level given.</p>	<p>Saleh 2005</p>
<p>21</p>	<p>Do you wear any pad?</p> <p>Yes Non</p>	<p>Any lady who answers Yes will defined as a pad user</p>	
<p>22</p>	<p>When did leakage start?</p> <p>Before marriage</p> <p>After marriage</p> <p>During pregnancy</p> <p>After childbirth</p> <p>Yes No</p> <p>If Yes which one 1ST</p> <p>2nd</p> <p>3rd</p> <p>Above 3</p>	<p>Subject will be defined <i>start leakage</i> according to the categories given.</p> <p>If the subject answers Yes after childbirth she will be defined as having UI after childbirth and the following will be placed in four categories.</p>	

<p>23</p>	<p>How often do you have in voluntary loss of urine?</p> <p>1. Less than once a month</p> <p>2. Once or more per month</p> <p>3. Once or more per week</p> <p>4. Every day/or night</p>	<p>Subject will be allocated to categories and then we will use the formula of Sandvik. Severity will be calculated using the result of question 23 multiplied by question 24, using this formula: "<i>In the level severity index, responses to the second question are the first aggregated into drops (1) and more (2), and then multiplied with the frequency, resulting in the following index values (1-8):</i>" In severity the index has 3 level 1-2= slight 3-4= moderate 6-8= severe</p>	<p>(Sandvik et al 2000)</p>
<p>24</p>	<p>How often do you have involuntary loss of urine?</p> <p>1. Drop or little <input type="checkbox"/></p> <p>2. Small amount <input type="checkbox"/></p> <p>3. Large amount <input type="checkbox"/></p>	<p>A severity index developed by Sandvik et al was for the epidemiology studies to evaluate the degree of incontinence index was calculated was by multiplying the reported frequency by the amount of leakage. (Sandvik et al., 2000) Subject will be allocated in four categories</p>	<p>(Sandvik et al 2000)</p>
<p>25</p>	<p>How much urine do you leak each time?</p> <p>2-4</p> <p>5-8</p> <p>9-12</p> <p>More</p>	<p>Any one who passes urine more than eight times a day will be recorded as having urinary frequency.</p> <p>The normal voiding per day should not be more than 7-8 times (day frequency)(Sapsford, 1998).</p>	<p>(Sapsford, 1998).</p>
<p>26</p>	<p>How often do you pass urine night times?</p> <p>0</p> <p>1</p> <p>2</p> <p>3</p> <p>More</p>	<p>Any one who answers one and above will be recorded as having nocturia</p> <p>Nocturia is when you get up to pass urine one or more times at night.</p>	<p>International Continence Society (ICS).(Abrams et al., 2003)</p>
<p>27</p>	<p>How much does urinary leakage bother you?</p> <p><i>No problem</i></p> <p><i>A small nuisance</i></p> <p><i>Some bother</i></p> <p><i>Much bother</i></p> <p><i>A major problem</i></p>	<p>Subject will be defined as bothered if she did not answer <i>No problem</i>, and then will be defined according to four categories.</p>	<p>EPICONT (Sandvik et al., 2000).</p>

<p>28</p>	<p>How do you experience your Leakage, problems? Praying</p> <p>Sport activity</p> <p>House work or other</p> <p>Sexually</p>	<p>The subject will answer one or more activities and then be defined as having leakage problem with activities and each activity will be identify in different category below. (Not at all (1), A little bit (2), Moderate (3), Quite a bit (4), Extremely (5)</p>	
<p>29</p>	<p>Would you discuss your urinary leakage with</p> <p>Mother <input type="checkbox"/></p> <p>Husband <input type="checkbox"/></p> <p>Sister <input type="checkbox"/></p> <p>Friend <input type="checkbox"/></p> <p>Doctor <input type="checkbox"/></p> <p>None <input type="checkbox"/></p>	<p>Subject will be defined according to up to four categories</p>	
<p>30</p>	<p>Have you consulted any of health professions due the urine leakage?</p> <p>Yes <input type="checkbox"/> No <input type="checkbox"/></p> <p>If yes which one</p> <p>A doctor <input type="checkbox"/></p> <p>A physiotherapist <input type="checkbox"/></p> <p>A traditional</p> <p>Other specify</p> <p>If No why embarrassed</p> <p>Normal</p> <p>No help</p> <p>Other</p>	<p>If any lady answers No this will be defined as not seeking help. If yes, she will be defined as seeking help and will be allocated to the different category given</p>	
<p>31</p>	<p>Do you suffer from any cough?</p> <p>Yes No</p> <p>If yes, Always</p> <p>Periodic</p>	<p>Any lady who answers Yes will be defined as having a respiratory problem</p>	<p>EPICONT</p>
<p>32</p>	<p>Do you suffer from any allergies Which can cause Sneezing?</p> <p>Yes No</p> <p>If yes, Always</p> <p>Periodic</p>	<p>Any lady who answers Yes will be defined as having an allergy problem or (hay fever)</p>	

38	Do you take any other medication let you go to urinate, very frequently? Yes No	Any lady who answers Yes will be defined as being on diuretic medication.	
39	Do you drink coffee)? Yes <input type="checkbox"/> No <input type="checkbox"/> If yes how many cups per day	Any lady who answers Yes will be defined as drinking coffee. Number of cups of coffee defined according to how many cups per day	EPICONT (Yngvild et al 2003)
40	Are you circumcised? Yes No	Any lady who answers Yes will be defined as being circumcised. Female circumcision refers to the practice of removing parts of the woman's genitalia, partial or total removal of clitoris.	World Health Organization. Female genital mutilation – a joint WHO/UNICEF/UNFPA Statement. Geneva: WHO,1997
41	Have you had vaginal repair? Yes No	Any lady who answers Yes will be defined as having a vaginal repair.	
42	Do you Smoke? Yes No If answer is no, go to question 45	The number of pack years will be calculated by multiplying the cigarettes consumed per day(in packs) by years of smoking (Yngvid S 2003) Any subject answering Yes on question 45 will be defined as a smoker.	EPICONT (Yngvild et al 2003)
43	If yes how many Cigarettes, per day?	The number of cigarettes will be recorded and it will be calculated using the above calculation.	
44	How many years are smoking?	The number of the years will be recorded and will be calculated using the calculation in question 42	
45	Have you smoked in the past? Yes No	Any lady who answers Yes the subject will be defined as a smoker and if No the lady will be defined as anon smoker	
46	If yes, how many years did you smoke?	The calculation used will be the same method as in question 42.	
47	How many cigarettes per day?	The number of cigarettes will be recorded and it will be calculated using the above calculation.	