From The Division of International Health (IHCAR), Department of Public Health Sciences Karolinska Institutet, Stockholm, Sweden

and

The Nordic School of Public Health, Göteborg, Sweden

Equity and Equality

Case detection of Tuberculosis among Women and Men in Vietnam

Anna Thorson

Stockholm 2003

Published and printed by Karolinska University Press
Box 200, SE-171 77 Stockholm, Sweden

ISBN 91-628-5689-8

Cover: Bavi district, Vietnam. Photograph by Anna Thorson

"The growing tuberculosis epidemic is no longer an emergency only for those who care about health, but for those who care about justice."

A Kochi, Manager of the WHO Global Tuberculosis Programme
quoted in J Grange "The global burden of tuberculosis." In: Tuberculosis-an interdisciplinary perspective. J. G. J Porter. London, Imperial college press. 1999

"There will be no peace until man gets equal rights/
equal rights and justice."

Peter Tosh, artist, "Equal rights" 1977

Abstract

Background: The global Tuberculosis (TB) control strategy recommended by the WHO, DOTS, is based on identification of sputum smear-positive pulmonary TB cases by self-referral to health services. The target set by the WHO is to detect 70% of all sputum smear-positive TB cases. Currently global case detection is estimated to 40% of an approximated 8.74 million new sputum smear-positive pulmonary TB cases yearly. Vietnam reports to have reached 80% case detection. About 2/3 of the detected and reported TB cases, world-wide and in Vietnam, are men and 1/3 is women. Whether this in all contexts represents a true difference in incidences or if there is an under-detection of female TB cases is not known.

Aim: This thesis analyses and assesses how case detection of tuberculosis is influenced by gender as a structural factor, including differences between women and men in tuberculosis epidemiology, and health-seeking behaviour in a low-income setting.

Methods: Within the setting of a demographic surveillance site in Bavi district, Northern Vietnam, we performed two cross-sectional population-based surveys (papers I-III). Among 35,000 adults, individuals with cough of more than three weeks' duration were interviewed about their health seeking behaviour and knowledge in TB characteristics. TB diagnostics were offered to all cases with cough and sputum production (paper III). To explore doctors' views and explanations for a longer doctor's delay among female than male TB patients, clinicians in Quang Ninh were interviewed in focus group discussions and in-depth interviews. Content analysis was used to describe the findings (paper IV). In paper V we examined the chest x-rays of 299 men and 67 women diagnosed with sputum smear-positive TB at TB units in four Vietnamese provinces.

Results: Crude prolonged cough prevalence was 1.4% and did not differ between men and women. We estimated the true prevalence of sputum smear positive TB in this population to 90/100.000 among men and 110/100.000 among women, representing a male: female ratio of 0.8:1 to be compared with the ratio within the district TB programme of 2.7:1. Case detection of smear-positive TB in this district was low among both men, 39%, and women, 12%. Possible reasons for this under-detection of especially female TB cases could be identified in gender specific barriers faced by the female TB suspect, and in health care providers' actions. Women took more health care actions than men, but did more often choose to visit unregulated providers where quality has proven to be low. Women spent less per health care action and women reported less knowledge in medical TB characteristics than men. More men than women reported providing a sputum sample for TB diagnosis. The interviewed doctors emphasised their equal treatment of men and women in any situation, though some doctors recognised that gender specific needs might exist among TB suspects. In addition we found chest x-ray presentations to differ among male and female TB patients, with men having more advanced findings, including more frequently pleurosis and miliary disease.

Conclusions: So far, the WHO recommended DOTS strategy based on self-referral has prevailed. The under-detection of women found in Bavi highlights a need for a discussion on gender equity aspects of the internationally recommended strategy. We have identified several factors that determine possibilities to get adequate care within the diversified health care system of Vietnam. Gender interacts with poverty and creates a situation in which women more often than men face important barriers towards adequate health care. An increased understanding of the socio-cultural or biological factors in Vietnam, influencing the woman or man with TB should not be regarded as the goal in itself, but rather as a way of identifying processes, leading to the 'structural violence', that actually creates inequities detrimental to health.

Keywords: tuberculosis, case detection, gender, DOTS, health-seeking behaviour, doctor's delay, equity, chest x-ray, Vietnam

List of original papers

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

I. Thorson A, Hoa NP, Long NH. *Health seeking behaviour of men and women with a cough for more than three weeks* Lancet 2000;356:1823-24

II. Hoa NP, Thorson A, Long NH , Diwan V *Knowledge of tuberculosis and associated health-seeking behaviour among rural Vietnamese adults with a cough for at least three weeks* Scand J Publ Health (in press)

III. Thorson A, Hoa NP, Long NH, Allebeck P, Diwan V *Do women with Tuberculosis have a lower likelihood of getting diagnosed? Prevalence and case detection of sputum smear positive pulmonary TB, a population based study from Vietnam* J Clin epidemiol (accepted)

IV. Thorson A, Johansson E *Equality or equity in health care access: a qualitative study of doctors' explanations to a longer doctor's delay among female TB patients in Vietnam* (submitted)

V. Thorson A, Long NH, Diwan V, Larsson LO *Chest x-ray findings in patents with smear positive pulmonary tuberculosis in Vietnam-A gender perspective* (submitted)

Contents:

Background 4

Tuberculosis-Then and Now 4

TB Control 5

The Global Initiative to TB Control-Direct Observed Therapy, Short course (DOTS) 5

How to reach and maintain an 85% cure rate 7

Reaching 70% case detection -
what the DOTS recommendation includes and leaves out 8

Where does this research fit into
the concepts of gender or feminism? 18

Epistemology and choice of methods 18

Sex and gender 19

On social generalisation 20

Gender and health research 21

The Vietnamese context 22

Gender in Vietnam 22

TB epidemiology in Vietnam 23

Aims and objectives 25

Main aim 25

Specific objectives 25

Methods 26

TB control in Vietnam 26

Organisation of the National TB programme 26

Studies I-III 27

Bavi district-Filabavi 28

Definitions of variables 30

Data analyses 30

Reliability, internal validity and response rate 31

Study IV 32

Study setting, data collection and analysis 32

Internal validity and methodological concerns 33

Study V 33

Study setting and data collection 33

Data analysis 34

Internal validity and response rate 34

Ethical aspects in studies I-V 34
Results 36
Cough prevalence 36
Prevalence of sputum smear positive pulmonary TB 37
Barriers towards a possible TB diagnosis 41
Health seeking behaviour 41
Knowledge of TB characteristics 42
Resources 43
Sputum smear microscopy examinations 44
Chest x-ray 44
Doctor's delay; doctors' explanations 45
The patient-doctor encounter 46
Discussion 47
Case detection 47
Under-detection of sputum smear positive pulmonary TB cases 47
No detection equals no treatment? 49
Obstacles along the way towards a TB diagnosis 49
Seeking health care-negotiating obstacles 49
Obstacles to seeking health care in due time 51
Obstacles among private health care providers 52
Obstacles among national health care providers 53
Sputum smear testing and chest x-ray 54
Towards equity in case detection of TB 55
Gender and case detection estimates 55
How to promote equity in access to adequate health care? 56
Equity or equality? 58
On challenges of gender theory and social generalisation 59
Methodological concerns 59
Studies I-III and V 60
Study IV 60
Conclusions 61
Future research recommendations 61
Acknowledgements 63
References 65
Appendix 75

Background

Tuberculosis-Then and Now

"*One place for diseases to hide, is among poor people, especially when the poor are socially and medically segregated from those whose deaths might be considered more important*" (Farmer 1996).

Mycobacterium tuberculosis was isolated and identified as the etiological agent of tuberculosis (TB) in 1882, and some 60-70 years later, chemotherapy was in practice in the form of streptomycin, para-aminosalicylic acid (PAS) and isoniazid (Davis 2000; Haas 2000). During the 19th and early 20th century, TB was a high prevalence disease in northern European and American countries (Walt 1999; Davis 2000). Notification rates were e.g. more than 100/100.000 per year in England, Denmark and Norway during the first part of the 20th century (Holmes, Hausler et al. 1998). Seemingly following the introduction of chemotherapy, incidence rates decreased in this region during the latter half of the 20th century, though it has later been shown that the TB epidemic started its decline before the widespread use of chemotherapy. Societal developments involving improvements in terms of overcrowding and malnutrition are described as being the major causes of the favourable development (Farmer 1996; Walt 1999). Grange et al put forward what they call a "biosocial" model of causation, which includes environmental, ecological and possibly evolutionary factors in addition to socio-economic conditions (Grange, Gandy et al. 2001).

The decline of the epidemic in North America and Europe lead to the assumption that TB was well controlled, which resulted in neglect on the part of the international community (Walt 1999). Walt describes how research funding and the number of TB-related publications drastically declined during the 1970s and -80s, and how no global initiatives were taken by WHO. She points to the fact that WHO interests at this time seemed to be focused on public health concerns of high-income member states rather than priorities of low-income member states (Walt 1999), where the TB epidemic was an ever-present public health problem. During the early 1990s, TB received increasing interest. Its re-emergence in high-income countries together with the growing awareness of the implications of HIV-TB co-infection finally brought global attention to TB (Frieden, Fujiwara et al. 1995; Walt 1999), and in 1993, TB was declared a global emergency by the WHO (Nakajima 1993). Farmer argues against the perspective of TB as an "emerging infectious disease", since there has been no significant decrease in global mortality from TB. Instead, he emphasises the lack of a discussion of poverty and inequality when describing dynamics of the TB epidemic (Farmer 1996).

TB in figures today

Today, TB is estimated to cause about 1.64 million deaths (1.08 million men and 0.57 million women), and 8.74 million new cases yearly. Of these estimated TB cases, 3.6 million cases, of which 1.5 million were new sputum smear positive, were reported to the WHO in 2000. The male to female ratio of reported cases in most countries is about 2:1 (WHO 2002a; WHO 2002b). The WHO has identified 22 high-burden

countries that account for 79% of all TB cases worldwide, and all of them are low or middle-income countries (WHO 2002a).

Close to 2 billion people are infected with M. tuberculosis and thus constitute a reservoir for potential disease. Among infectious diseases, TB and HIV/AIDS are the two single most important causes of death (WHO 2002b). Co-infection with tuberculosis and HIV promotes the development of TB, to the extent that HIV positive individuals face a yearly risk of about 10% of developing TB, compared to the life-time risk of 10% among HIV negative individuals. TB is also the most common cause of death among HIV positive individuals (Grange 1999; Hopewell P 2000).

TB-poverty-gender

98% of deaths from TB occur in low and middle-income countries and the relationship between TB and poverty has been demonstrated in several contexts (Spence, Hotchkiss et al. 1993; Grange 1999; WHO 2002b). Poverty has been described as a form of structural violence, where the individual living in poverty has no choice but to find her- or himself at risk of TB (Farmer 1997). Poverty interacts with other structural, organising factors like ethnicity and gender, which leads to inequities in disease such as risk of getting infected with M. tuberculosis, developing active TB and achieving successful treatment of TB (Doyal 1995; Farmer 1997; Diwan and Thorson 1999). Among the groups of men and women living in absolute poverty, women are less in control of the little resources that exist. The social structure of many societies in low-income countries today relies on women having a double or triple workload, including household, agricultural and/or waged work (Vlassoff 1994; Vlassoff and Bonilla 1994). As women are the primary caretakers in the family, the impact of them having TB is severe, not only for their families, but also in terms of society, through workforce reduction, and orphaned children. These gender-related, socio-economic aspects of TB seem to be neglected in the current model for TB control. (Diwan V 1998; Diwan and Thorson 1999; Thorson and Diwan 2001; Uplekar, Rangan et al. 2001). Accordingly, the general aim of this thesis is to analyse how case detection of tuberculosis is influenced by gender as a structural factor.

TB Control

The Global Initiative to TB Control-Direct Observed Therapy, Short course (DOTS)

In 1994, the WHO, together with the International Union Against Tuberculosis and Lung Disease (IUATLD), launched the Direct Observed Treatment, Short-Course (DOTS) Strategy to fight TB (WHO 1999) . This five-pillar strategy has been proven cost-effective in some studies (Frieden, Fujiwara et al. 1995; Grange 1999) and is now recommended worldwide as a solution to the "global emergency" of TB. The strategy includes the following components:

1. *Government commitment* to sustained TB control activities.
2. *Case detection by sputum smear microscopy* among symptomatic patients self-reporting to health services.

3. *Standardised treatment regimen of six to eight months* for at least all sputum smear-positive cases, with *directly observed therapy (DOT*) for at least the initial two months.
4. *A regular, uninterrupted supply of all essential anti-TB drugs*.
5. *A standardised recording and reporting system* that allows assessment of treatment results for each patient and of the TB control programme performance overall.

(WHO 1999)

The WHO and the millennium development goals for TB control

The WHO and the Stop TB Partner Forum have identified targets for TB control to be reached by 2005 (WHO 2000). These targets, which are also included in the millennium development goals, state that by 2005, 70% of new smear-positive cases of pulmonary TB should be detected under the WHO global TB strategy DOTS, and 85% successfully treated. In addition, by 2010, TB prevalence and mortality levels should be halved compared to those in the year 2000 (Dye, Watt et al. 2002; WHO 2002a).

The WHO estimates that in the year 2000, 55% of the world's population lived in countries or parts of countries covered by DOTS. Global case detection of smear positive cases in 2000 was estimated to be 40%, and 27% of the smear positive cases were detected under DOTS (Dye, Watt et al. 2002; WHO 2002a). Calculations of cure rate show a 80% treatment success rate in DOTS areas, and a 22% cure rate in non-DOTS areas (WHO 2002a). Recent predictions show that at the current pace of case detection, the TB control goals will not be reached until 2013. The major challenge is for TB-endemic countries to accelerate case detection, while still maintaining high cure rates. The chance of even reaching these goals by 2013 is also highly dependent on the HIV epidemic. In countries that face the double burden of TB and HIV epidemics, it will be difficult to reduce the impact targets (prevalence and deaths) to the extent that is postulated (Dye, Watt et al. 2002).

The relation between case detection and TB incidence

Case detection of TB under DOTS refers to the proportion of TB cases that are diagnosed and reported within a DOTS programme, divided by the assumed true TB incidence. Since the true incidence of TB in a given population is rarely known, calculations of case detection are based on estimates of the true incidence of TB. Different methods are used for estimating TB incidence, including extrapolations made from assumed annual risk of infection and information from sentinel studies (Dye, Scheele et al. 1999).

The impact of case detection on incidence decline has been examined in a mathematical model based on various data sources (Dye, Garnett et al. 1998). The magnitude of decrease in TB incidence given a specific level of case detection will depend on whether the TB incidence is already declining, as was the case in early 20th century Europe, or whether the incidence has reached a steady-state. When the epidemic is in decline, a greater proportion of cases will arise from temporally remote infections, and since case detection reduces transmission, its effect will be more dramatic in a situation where recent infections are more common (Dye, Garnett et al.

1998). It is generally considered that 70% case detection of smear-positive cases is required to have an effect on the TB incidence (WHO 2002a). This mathematical model suggests a close to linear relationship between incidence decline and case detection. If cure rate is constant at 85% and the age distribution similar to sub-Saharan Africa, a change from zero to 70% case detection in a year would lead to a yearly decline in TB incidence of about 11%, whereas the decline is closer to 8%, if the incidence is already declining (Dye, Garnett et al. 1998).

In another model of the effect of control strategies on the global TB epidemic, Blower et al suggest that the WHO goals of case detection and cure rate should be discussed in relation to the cumulative fraction of TB cases treated and also the proportion of cases requiring treatment yearly. Given the sometimes long duration of untreated TB these parameters need not necessarily to correspond. The authors conclude that the WHO targets may not lead to eradication of TB, though they may significantly reduce TB morbidity and mortality (Blower, Small et al. 1996).

How to reach and maintain an 85% cure rate

If increased case detection is to have an effect on the TB epidemic, high cure rates are necessary. The WHO recommends National TB programmes to first ensure a sufficient level of cure rate, and thereafter expand the programme in terms of case detection (WHO 1997). The way to reach the set target of 85% cure rate, once adequate chemotherapy is available is, according to the DOTS strategy, to ensure patient compliance by Direct Observed Therapy (DOT). This component, that literally recommends observation of each intake of TB medication, at least during the first two months of treatment, has been widely criticised for its top-down structure and underlying concept of "supervised swallowing" (Volmink and Garner 1997). Criticism has been voiced from ethical and human rights perspectives and with regard to the method not being evidence based (Farmer 1997; Hurtig, Porter et al. 1999; Walt 1999; Porter and Ogden 2001; Singh, Jaiswal et al. 2002). Following the lack of scientific evidence, a few randomised control trials have been performed, specifically evaluating the component of Direct Observed Treatment (DOT) (Zwarenstrin M 1998; Volmink, Matchaba et al. 2000; Walley, Khan et al. 2001). In a recent Cochrane review, the authors conclude that the effects of direct observation on cure or treatment completion were similar to those of self-administered treatment (Volmink and Garner 2003).

Multi-drug resistance (MDR) to TB chemotherapy (resistance against both isoniazid and rifampicin) creates new challenges for TB control. So far MDR TB is concentrated to a few hot spots in the world, like the former Eastern European countries, and the first-line treatment recommended by the WHO is still adequate in most settings (Dye, Espinal et al. 2002). A DOTS-plus programme has been introduced in a few settings, adding second-line chemotherapy to the regular DOTS TB programme. There has been a reluctance from the international TB community, represented by the WHO and the IUATLD, to expand the DOTS strategy to include the MDR treatment, though through actions from i.a. Medecins Sans Frontières, some of the most important second-line drugs are now included on the WHO list of essential drugs (Walton and Farmer 2000; Farmer 2001b; Farmer 2001a; Gupta, Kim et al. 2001).

Reaching 70% case detection – what the DOTS recommendation includes and leaves out

The way to reach the target of 70% case detection, through passive case detection and case identification through sputum microscopy, has not been challenged to the same extent as the DOT model. However, a lack of knowledge of gender implications has been recognised (Diwan V 1998; Holmes, Hausler et al. 1998; Diwan and Thorson 1999; Thorson and Diwan 2001). Passive case detection refers to the lack of active initiative from health care providers, i.e. the patient reports her- or himself to health care, as opposed to active case detection, where health care providers actively screen for TB in the population. The success of passive case detection is thus highly dependent on both the patient's health seeking behaviour and the awareness among health providers of TB suggestive symptoms and the possibility to act on them.

The following gender aspects of the case detection strategy of DOTS may be identified:

- **Passive versus active case detection (self-reporting versus screening).** What is the evidence for the strategy? Are women with TB more likely to be under-detected?
- **TB-suggestive symptoms**. Are they equally frequent among women and men with TB disease? How are they perceived and reported?
- **Health seeking behaviour**. Does it differ between women and men with TB-suggestive symptoms?
- **Diagnosis by sputum microscopy and chest x-ray**. What is the gender- specific sensitivity of these methods?
- **Patient-doctor encounter**. Are there gender differences in doctor's delay and why?

Active versus passive case finding

Rieder reviews active case finding by two different methods, mass radiography in the US and other countries, and involvement of community leaders in Kenya, and concludes that both methods are disappointing in terms of case yield (Rieder 2000). Likewise, a South-African study found only 2 undiagnosed sputum smear-positive TB cases per 9 currently treated TB cases, and concludes that the burden of TB cases undiagnosed by passive case detection in this setting is modest (Pronyk, Joshi et al. 2001).

The most important finding in the Kenyan studies is, according to Rieder, the fact that 80% of the new smear-positive cases claimed to have attended a health care facility because of their respiratory symptoms, but they had not been investigated for TB (Rieder 2000). The latter finding speaks against the conclusion made by Dye et al:

"*Passive case detection is recommended because countrywide, active case finding would be prohibitively expensive in most countries and because population surveys typically find that four in five cases have already sought medical attention at the time of detection by mass screening*" (Dye, Garnett et al. 1998).

In 1998, using mathematical modelling Murray and Solomon - in one of only a few studies that examine the passive case detection principle - predicted that between 1998 and 2030, 23 million lives could be saved by active case finding, using mass miniature radiography (Murray and Salomon 1998).

Active versus passive case detection and gender

In countries with a high prevalence of TB at the beginning and middle of the century, notification of TB cases showed a sex and age distribution that differs from the 2:1 male to female ratio reported today (Holmes, Hausler et al. 1998; WHO 2002a; WHO 2002b). In Denmark (1939-41), Norway (1937), England and Wales (1952-54), notification rates were similar for both sexes below age 15, but higher among women until their mid-twenties or early thirties. After age 40, notification rates among men were higher in most of these countries (Holmes, Hausler et al. 1998). Thus, the question of whether the reported gender difference today represents a true incidence difference in all contexts has been raised (Holmes, Hausler et al. 1998; Diwan and Thorson 1999; Thorson and Diwan 2001).

Few published studies exist that have studied passive versus active case finding and the relation to gender (Holmes, Hausler et al. 1998). A study carried out in Eastern Nepal in the early eighties showed that when using active case finding by household visits, 46% of the detected cases were females compared to 28% in the self-referral group. The male to female ratio was 1.2:1 in the active case finding group compared to 2.6:1 in the self-referral group. This study does not present the age and gender distribution of the population (Cassels, Heineman et al. 1982).

Figures one and two show published results of two active case-finding studies, where age and gender distribution of both population and pulmonary TB cases were available. These studies show a gender gap in prevalence of cases, whereas the magnitude at different ages varies.

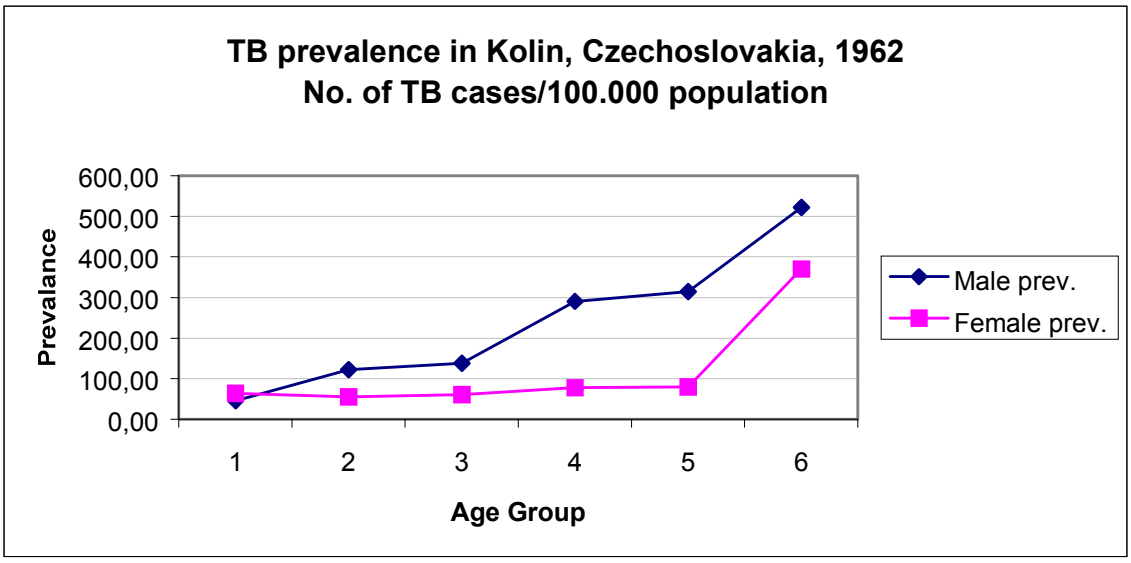

Figure 1: Prevalence of pulmonary TB among men and women in different age groups, Kolin, Czechoslovakia 1962. Age group: 1= 15-24 years, 2=25-34, 3=35-44, 4=45-54, 5=55-64, 6= >64 (Styblo, Dankova et al. 1967).

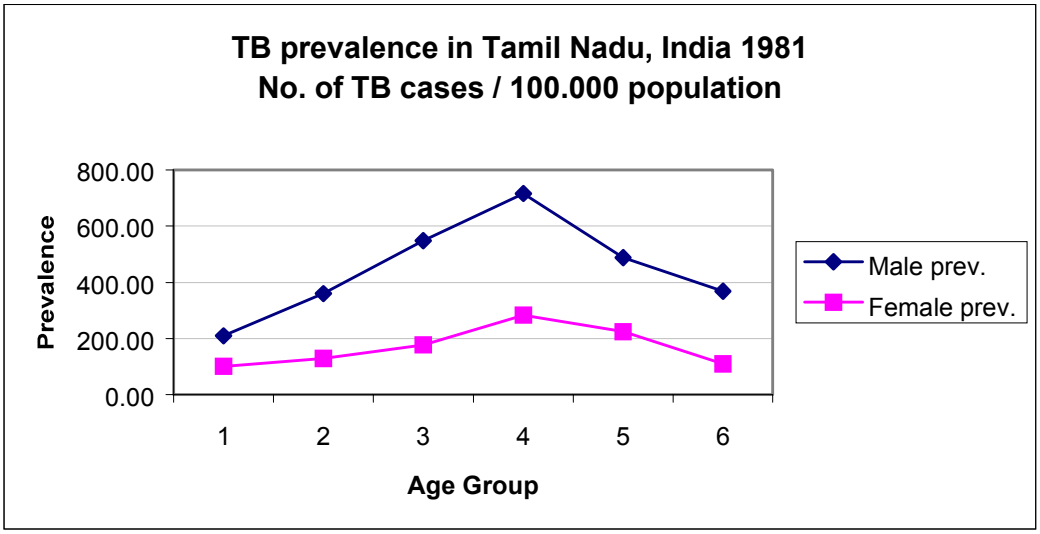

Figure 2: Prevalence of pulmonary TB among men and women in different age groups, Tamil Nadu, India 1981. Age group: 1= 15-24 years, 2=25-34, 3=35-44, 4=45-54, 5=55-64, 6= >64 (Ray and Abel 1995).

In table 1, results from published screening studies are presented, including a male-to-female ratio of cases. These are comparisons of crude, non-age adjusted rates. Many of the studies used mass x-radiography to identify potential cases, and those with x-ray changes were asked to provide often on-the-spot sputum samples. The studies that used household screening, used various symptom combinations to identify suspected cases, where the individuals then provided sputum samples.

Table 1: Results from studies on mass screening of smear or culture positive pulmonary Tuberculosis, including a male-to-female ratio of cases.

Country	Screening method-diagnostic method	Population screened	Male-to-female ratio
India: Tumkur, Mysore (1961) (Narain 1963)	X-ray-sputum	21,021	2.24:1
India: Tumkur, Mysore (1973) (Gothi 1979)	X-ray-sputum	24,785	2.7:1
India: Madras (1970) (Baily 1980)	X-ray-sputum	206,609	4.2:1
India: Tamil Nadu (1981-83) (Ray and Abel 1995)	Household survey-sputum	18,688	2.6:1
India: Bangalore (1984-86) (Chakraborty, Suryanarayana et al. 1995)	Tuberculin test-sputum	29,400	2.78:1
Czechoslovakia (1961) (Styblo, Dankova et al. 1967)	X-ray-sputum	10,0418	1.7:1
Nepal (1980) (Cassels, Heineman et al. 1982)	Household survey-sputum	67,068	1.2:1

Notably, many of the published studies were performed in India, and some of them are parts of the same longitudinal studies (Table 1). Apart from the Nepal study, these studies present male: female ratios similar to what is currently reported today. The Indian and Czechoslovakian studies do not compare self-referral with screening results, which makes identification of an under-detection of women or men difficult.

In an attempt to assess under-detection, Borgdorff et al performed a retrospective analysis of age- and sex-specific tuberculosis prevalence rates of smear-positive tuberculosis compared to age- and sex-specific notification rates in 14 countries (Borgdorff, Nagelkerke et al. 2000). A patient detection ratio was calculated through the comparison of prevalence rates representing active case finding, and notification data representing passive case finding. The study did not find any evidence for male-female differences in detection rates by comparing these measurements, and interpreted sex differences in notification rates as differences in actual incidences of TB (Borgdorff, Nagelkerke et al. 2000). However, the prevalence studies included

had sometimes been carried out many years before the notification rates were reported, and some of the included prevalence studies had small sample sizes (Borgdorff, Nagelkerke et al. 2000).

Instead, in order to assess an under-detection of women or men, data from active case detection of TB cases should be compared with data from passive case-detection, collected within the same context and time frame. The typical activities and involvement in society and family of women and men has changed rapidly during the last fifty years. In India for example, female enrolment in secondary education has almost doubled from 20% per age group in 1980 to 39% in year 2000, and the fertility rate has gone down from 5.0 to 3.1 (World Bank 2003b). These societal changes are likely to have an effect on the infection rate and probably also on disease progression among women and men.

In conclusion:

- Reported TB notification rates from many countries today show a male-to-female ratio of about 2:1.
- Active case finding in several population-based studies from the 1960-80s show a male: female ratio between 1.2-4:1.
- Most of the active case detection studies do not compare results with passive case detection. Knowledge in under-detection of female or male TB cases is thus scarce.

TB infection, disease and gender

Only about 10% of those being infected ever develop tuberculosis in HIV negative populations and there is sometimes a long latency before active disease. Transmission dynamics are complicated to assess and it is not evident that risk of infection correlates to actual incidence of disease (Rieder 1999). Tuberculin surveys carried out during the 1950s and early 1960s show a rather uniform pattern, with an equal prevalence of infection among boys and girls till age 15, after which male prevalence began to exceed female (Dolin 1998). Similar to the situation with the active case finding studies, the magnitude of the gender difference varies between different contexts. A study from India shows TB infection to be 1.8 times higher among 25-year-old men, whereas a Danish study shows a lesser peak difference of about 1.2 times at age 20 (Rieder 1999). It is difficult to extrapolate a possible under-detection of TB disease from any of this data on TB infection rates. In addition, Bothamley presents evidence that suggests different sensitivity in Tuberculin testing among men and women with active TB, and relates this to differences in immune response to TB (Bothamley 1998). A few longitudinal studies of tuberculin positive individuals and development of active TB exist, and these generally show a higher progression from infection to disease among women than men (Holmes, Hausler et al. 1998; Rieder 1999).

In conclusion:

- Tuberculous infection measured by tuberculin testing in different settings shows higher infection rates among men compared to women after puberty.
- Sensitivity of tuberculin testing may be lower among females with TB infection.

Diagnostic methods: Sputum smear microscopy

The WHO recommends case finding to be focused on contagious cases, i.e. identification of sputum smear positive cases of pulmonary TB (WHO 1999). The focus on smear positive cases has a public health benefit since case identification and reduction of transmission is a major part of fighting the epidemic (WHO 1999). Sputum smear microscopy examinations by light microscopy with Ziehl-Nielsen staining detects about 45% of pulmonary TB cases in a HIV negative population, if HIV prevalence is high sensitivity decreases to 30-40% (Dye, Scheele et al. 1999). A case of pulmonary TB yields a positive smear examination if there are at least 5000 bacilli per ml present in the sputum specimen (Rieder 1999). A positive sputum smear examination correlates well to infectiousness, whereas the sensitivity for identifying pulmonary TB cases thus is quite low. The use of light microscopy for case detection is cost effective for this purpose, and requires no advanced or expensive equipment.

Three consecutive sputum samples are recommended, one of which should preferably be a freshly expectorated morning sample. A review study showed that sensitivity of a repeated smear examination increased from 30-40% to 65-75% (Daniel 1989). In a WHO publication, it is reported that among sputum culture positive TB cases, 74% had a positive smear examination the first time, and after the second examination, in all 89% of the culture positive cases were identified (Toman 1979). Another concern is the frequency of Mycobacteirum avium-intracellulare complex (MAC) in the population. These non-tuberculous mycobacteria cannot be distinguished from M tuberculosis in a sputum smear examination, and the specificity for identifying M tuberculosis depends on the MAC prevalence in the population (Lobue P 2000).

Culturing of sputum specimen is considered close to a gold standard for diagnosis of pulmonary TB, and when sensitivity of the sputum smear examination is assessed it is most often in relation to positive culture results. Mycobacterium tuberculosis grows slowly, and when inoculated in Löwenstein-Jensen media it may take 3-8 weeks before a result is ready (Haas 2000). BACTEC or other newer techniques enables detection by identifying mycobacterial growth components within 2-3 weeks (Drobniewski 2003). The use of probe detection for rapid identification of M tuberculosis has become widespread in high-income settings. The PCR technique enables direct identification of Mycobacterium tuberculosis in a specimen. Sensitivity and specificity is generally high, but dependent on individual laboratory conditions and possibilities to use the probe without contamination from airborne fragments of mycobacteria (Haas 2000).

Chest x-ray

In most low-income settings primary diagnostic investigations are restricted to sputum smear examination by light-microscopy and chest x-ray. Chest x-ray is recommended as a tool to complement bacteriological investigations, and of special importance to the identification of sputum smear negative cases of pulmonary TB (WHO 1997; Lobue P 2000). In several studies chest x-ray findings in patients with post-primary pulmonary TB have been described (Woodring J H 1986; Miller T. W. 1993; Mc Adams H P 1995; Haas 2000; Reichman L 2000). Common findings are involvement of apical, posterior segments of the upper lobe and the superior segment

of the lower lobe, and in about 50% of the cases there are multiple cavities. Adenopathy, pleural effusion and miliary disease are findings that are described as typical for primary infection.

In an immuno-suppressed HIV infected individual chest x-ray findings usually described as associated with primary disease are more frequent. These include a higher frequency of miliary findings, intrathoracical adenopathy and lower lung field involvement, whereas cavity and upper lung lobe changes are less common (Haas 2000; Hopewell P 2000).

Diagnostic methods and gender

In studies from Bangladesh and Malawi, proportionally more men than women among those who submitted a sputum smear had a positive sputum smear examination (Boeree, Harries et al. 2000; Begum, de Colombani et al. 2001). To what extent these findings reflect a true incidence difference in pulmonary TB among men and women rather than differences in sensitivity of the investigation, is not known. Differences in sensitivity may exist both due to sex-specific differences in physiological characteristics of TB lesions, and because of cultural restrictions. The latter could be restrictions for women against coughing and spitting, making women less likely to produce a good sputum sample.

In a study from the Netherlands, which used DNA fingerprinting techniques to study clustering of pulmonary TB cases, it was concluded that women with pulmonary TB seemed to generate fewer new incident cases than men. The analyses indicated also that men with pulmonary TB more often than women had a positive sputum smear examination (Borgdorff, Nagelkerke et al. 2001). These findings could imply that sputum smear microscopy for diagnosing pulmonary TB has a lower sensitivity among women compared to men, in this setting.

It has been suggested that chest x-ray findings appear differently in men and women with TB, due to sex differences in the immune response to the disease (Bothamley 1998). In a Turkish study, female TB patients had a higher frequency of lower lung field involvement, a finding which is less often reported in post-primary disease (Bacakoglu, Basoglu et al. 2001).

In conclusion:

- Sputum smear microscopy may have a lower sensitivity among women due to physiological and/or cultural characteristics of TB.
- Chest x-ray findings may be “atypical” in women with TB.

Symptoms of TB

The diagnostic methods recommended in the DOTS strategy focus on identifying sputum smear positive cases of pulmonary TB. The WHO and the IUATLD recommend that all individuals with a cough lasting for more than three weeks should be offered TB diagnostics, i.e. a sputum smear examination when seeking health care in TB high-prevalent settings (Crofton J 1992). Thus, long-term cough together with sputum production are key features of the TB suspect case. Other general symptoms

of pulmonary TB are fever, weight loss and night sweats together with additional respiratory symptoms like blood cough, chest pain or laboured breathing.

TB symptoms and gender

A study on symptoms among 757 men and 270 women with smear positive pulmonary TB was performed in Vietnam (Long, Diwan et al. 2002). This study showed that at the time of diagnosis, fewer women reported each of the symptoms of cough, sputum production or haemoptysis. At follow up after one month of treatment, more women than men had recovered from their symptoms of cough and sputum production.

The proportion of pulmonary TB cases is estimated at about 80% of all TB cases (Lobue P 2000); in populations with a high HIV prevalence extra pulmonary TB is more frequent (Rieder 1999; Haas 2000). Several studies have shown a higher proportion of extra pulmonary TB among women (Bothamley 1998; Rieder 1999), though there is little knowledge about possible underlying reasons for this. Aspects of case detection among extra pulmonary TB patients are different and beyond the scope of this thesis.

In conclusion:

- Occasional evidence points at gender differences in reported symptoms of TB patients, with women reporting less cough, sputum production and hemoptysis.
- Little is known about gender differences in symptoms among TB suspects and their implications for symptom recognition and diagnosis.

Health seeking behaviour and gender

From a patient perspective, the health seeking process has been described as having various components. They include symptom recognition (to recognise a symptom as a health problem), sick role (to consider yourself as "sick" and ready to take an action), lay referral (discussions and guidance by people within your own social network), and treatment action (Chrisman 1977; Ngamvithayapong-Yanai 2003).

Several gender and health studies in high-income countries have shown that women use more health care than men (Verbrugge 1989; Kandrack, Grant et al. 1991). The higher frequency of health care use has been explained through different mechanisms such as a) Actual morbidity being higher among women. b) Since women of reproductive age often have close contact with the health care system through ante-natal and mother and child care, women would have an easier access to the system. c) The female gender role allows women to acknowledge ill health to a higher degree than the male, whereas the male gender role states that men should be stoic and resist feelings of weakness (Verbrugge 1989; Kandrack, Grant et al. 1991; Doyal 1995).

The situation is described differently in low-income settings. Women face more barriers to adequate health care since women have less access to financial resources and less decision-making power of their own, despite women's work-load being heavier compared to men's in many low-income settings. Being responsible for the health of the family, women often have to put their own needs in the background, whereas resources are spent on the husband or children. Access to adequate health

care cannot be taken for granted. (Rathgeber and Vlassoff 1993; Vlassoff 1994; Vlassoff and Bonilla 1994; AbouZahr, Vlassoff et al. 1996). In India, women are found to under-report morbidity and are said to practice a "culture of silence" regarding their illness (Nathanson 1977; Rangan S 1998).

The Bangladesh TB study showed that more men than women sought public health care for respiratory complaints, which is interpreted as a possible barrier in access to public health care for these women (Begum, de Colombani et al. 2001). A study from urban Vietnam shows that female TB patients had more often used a private provider in their health seeking process (Lonnroth, Thuong et al. 2001). In a qualitative study from Vietnam, stigma and fear of social consequences were factors described to influence female TB patients' health care seeking to a higher extent than male TB patients' (Johansson, Long et al. 2000). These factors were considered to potentially lead to symptom denial, and were also related to a preference for private or other non-public providers (Johansson, Long et al. 2000). Similar findings are reported from a study using in-depth interviews with TB patients in Pakistan (Khan, Walley et al. 2000). Women reported more problems receiving adequate TB treatment than men because of restriction of movements of women in Pakistan, and a general unwillingness to pay for treatment for women on the part of the household decision makers. TB-related stigma was also reported as being greater for women than for men, and unmarried women were afraid to announce their TB disease, for fear of not being able to get married.

In a study from Zambia somewhat conflicting evidence regarding factors associated with long patient delay among cough patients was presented. Old age and severe disease were linked to a long delay, whereas gender, stigma or less knowledge in TB characteristics were not associated (Godfrey-Faussett, Kaunda et al. 2002). This opposes earlier findings from the same context, where female gender and low educational level were factors linked to longer delay among TB patients (Needham, Foster et al. 2001).

In conclusion:

- Barriers to general health care seeking in terms of low access to time, money and decision-making power is described among women in low-income countries.
- TB-related stigma and social consequences might influence health seeking behaviour of women with TB to a higher extent than men.

Delay to TB diagnosis and gender

In a study by Long and Johansson in Vietnam, the diagnostic delays among smear positive pulmonary TB patients were measured (Long, Johansson et al. 1999b).They found that the patient's delay, i.e. the time from first symptom to contact with a licensed medical doctor, was similar for men and women, whereas the doctor's delay (the time from first contact with a licensed doctor to TB diagnosis; Table 2) was almost two weeks longer for women. Lönnroth found in his study on TB patients and private providers in Ho Chi Minh City, Vietnam, that female sex was significantly associated with a longer health care provider delay (Lonnroth, Thuong et al. 1999). Similarly, a longer health care providers' delay for women with TB compared to men has been described in studies from South Africa, Nepal, Ghana and Thailand (Lawn,

Afful et al. 1998; Ngamvithayapong, Yanai et al. 2001; Pronyk, Makhubele et al. 2001; Yamasaki-Nakagawa, Ozasa et al. 2001). More women initially contacting a traditional healer explained the longer delay among women in Nepal, whereas in the other settings, the health care provider delay consisted of a delay after contact within the regular/national health care system. The patient delay was not significantly different between women and men in these studies. It should however be remembered that none of these studies were population based; they all studied the health seeking of TB cases diagnosed within the regular/national health care system retrospectively, and represent selected observations.

In Bangladesh, Begum et al showed that women, who present with respiratory symptoms, are less likely to undergo sputum smear examination, (Begum, de Colombani et al. 2001). In the previously mentioned Malawi study, more men than women submitted sputum specimens for TB diagnosis, though the study did not relate the data to the number of cases with TB-suggestive symptoms seeking health care (Boeree, Harries et al. 2000).

Little is known about what actual mechanisms are involved in creating a longer doctor's delay, including a lower access to diagnostic investigations for female TB cases in these settings. The patient-doctor encounter is likely to be of importance not only for patient satisfaction and compliance, but also for a successful health outcome estimated for example by doctor's delay. In an interview study with health care providers in Vietnam, male doctors expressed that female TB patients are more difficult to diagnose due to communication problems, whereas female doctors did not perceive any gender-related problems in diagnosing TB (Johansson E 2002).

In conclusion:

- A longer doctor's delay among female TB patients has been found in several contexts.
- Underlying reasons for the doctor's delay are to a large extent unknown.
- Gender of patient and health care provider is probably of importance for the outcome of the encounter.

Table 2. Doctor's delay defined as the time from first contact with a licensed doctor to TB diagnosis. Total delay defined as the time from first symptom to diagnosis of TB (Long, Johansson et al. 1999b).

* For the difference in means between men and women.

Delays Mean (weeks)	Doctor's delay	Total delay
Men	3.8	11.4
Women	5.4	13.3
p-value*	0.003	0.02

Where does this research fit into the concepts of gender or feminism?

Epistemology and choice of methods

Following the ideological movement of feminism during the 1960s, women's, feministic or gender studies were concepts introduced to label scientific work that studied the relations between the sexes, their relationship to power, and the function of sex as a structural ordering of society. There are many definitions of feminism, based on various theoretical standpoints (Harding 1991; Björk 1996). A universal feminism has been considered problematic for its focus on what concerns women belonging to the white, western middle-class, the same women that to a large extent have dominated feminist theory; instead there is a call for decentralisation (Harding 1991; Doyal 1995)

In the creation of new scientific disciplines arose the need for rethinking on epistemology, away from positivism. Much of the critique lies in the taken for granted objectivity of positivist research, which is challenged for its "androcentric character" and its focus on research questions within research paradigms that are constructed with men and their interests as the norm. Feministic or gender researchers wish instead to identify and focus on hierarchies and power relations in society, often in models of action-oriented research (Harding 1991; Oakley 1998).

The feministic standpoint epistemology versus feminist empiricism

Sandra Harding advances the feminist standpoint epistemology as the theoretical framework of choice for feminist research (Harding 1986; Harding 1991), whereas the research performed in this thesis does not fit into this model. The standpoint epistemology takes it starting point in women's lives and argues for a close link between research and politics. Which research questions and what is considered "objective knowledge" should be decided by democratic procedures and in close connection with the research subject. In turn, the research methodology used needs to be qualitatively orientated, in order to listen to women's voices and to avoid a disempowered study subject as opposed to the empowered researcher.
Instead, this research shows more similarities to what Harding names feminist empiricism, a strategy that she says to be "less threatening to the practices of the sciences than the standpoint strategies". This strategy does not really criticise the norms of science, but rather the non-rigorous use of methodology and the gender bias that may be introduced as a result of this. Harding acknowledges that feminist empiricism is frequently the strategy that best meets the criterion of being persuasive to reasonable and informed listeners, or that has a better chance of being funded. Though she also claims that by following traditional research norms and using conventional methods this research is not powerful enough to detect culture-wide sexist or androcentric bias (Harding 1991).

The methodological paradigm debate

The debate and criticism of positivist research traditions has not prevailed in medicine in the same way as within for example the social sciences (Malterud 2002). The methodological paradigm discussion on the use of quantitative versus qualitative methods appears within medicine, whereas in general the focus is the opposite with researchers using qualitative methods having to argue for their case (Sandelowski

1986; Popay, Rogers et al. 1998; Lönnroth 2000). The paradigm dispute within gender or feminist research has been concerned with what could be interpreted as the methodological implications of what Harding proposes. Methodology is itself considered gendered and the quantitative/qualitative dichotomy represents ideology, where qualitative methods are regarded as superior for the purpose of feminist studies (Oakley 1998). Oakley defines the feminist critic as "the case against the 3 Ps": positivism, power (unequal power relations between researcher and researched) and p-values (the use of statistical methods as a means of establishing validity). She points to the fact that the quantitative-qualitative polarisation repeats the creation of traditional essentialist and unequal dichotomies that are otherwise criticised from a feminist perspective. Instead, Oakley argues for a range of methods within which quantitative methods would have an accepted and respected place. My standpoint in this work has been similar to what Oakley formulates: "*the critical question remains the appropriateness of the method to the research question*".

Sex and gender

In 1975, American anthropologist Gayle Rubin presented a definition of the concept of gender (Rubin 1975) in order to distinguish the socio-cultural factors that create "maleness" or "femaleness" from the pre-determined biological characteristics of the sexes. The use of gender, or "social sex", opposed the essentialist view on femaleness and maleness as created by the biological sex, and as such being predetermined and unchangeable, and emphasised the hierarchical ordering of society, and power imbalance between men and women. The development thereafter in feministic, women's and gender research, predominantly in the social sciences, has provided new and wider definitions (Gothlin 1999). The dichotomy of sex and gender, and the conception of the pre-determination of sex have been criticised by post-structuralist thinkers like Judith Butler. She argues that sex should not be regarded as pre-determined, but instead gendered in itself (Butler 1990). Gender, according to Butler, is not an interior state, but a performance that each of us acts and re-enacts daily. Put in other words, gender is a multiple rather than dichotomous feature, and categorising men and women into two groups, implying internal common characteristics, would always lead to generalisations, oversimplifications and a gender bias in itself. Terminology is thus closely related to epistemology, and the use of "gender" evidently need not indicate a shared philosophy of knowledge, but rather requires its own definition (Gothlin 1999).

Gender and biology

Alison Jaggar shows in an essay on human biology in feminist theory, how " we cannot say that 'biology determines society', because we cannot identify a clear non-social sense of 'biology' nor a clear non-biological sense of 'society'." (Jaggar 1997). Inspired by Jaggar and Carolin Vlassoff, I define gender as including not only the biological differences between men and women but also the wide variety of behaviours, expectations and roles attributed by social structures to men and to women (Rathgeber and Vlassoff 1993; Vlassoff and Bonilla 1994; AbouZahr, Vlassoff et al. 1996).

I do not believe it is possible to distinguish between possible social and biological causes of tuberculosis, and the biology versus socio-cultural dichotomy is therefore

disregarded. Following is an example of this. A pre-requisite, or a necessary causal factor, for tuberculosis disease is Mycobacterium tuberculosis. However, individuals in different contexts face different risks of encountering the bacteria and it is not evident that all individuals exposed to the mycobacterium would be infected or develop the disease. Malnutrition, which is socio-cultural and biologically related, has been shown to effect the immune system; in turn the immune system steers the response following infection with mycobacteria, and a malnourished person is more likely to develop tuberculosis (Rieder 1999). Thus, when in this thesis gender is discussed, it implies a complex of biological and socio-cultural factors, which I see as context specific and interrelated. I consider gender a structural factor, implying that gender is created on societal as well as individual levels, having both concrete and symbolic meanings, while still sharing the same structurally organising character regarding power.

What about "sex"?

Given the definition I use, the reason for distinguishing between what is sex and what is gender diminishes, and in this thesis sex and gender are both used to describe men and women; maleness and femaleness.

On social generalisation

The setting of these studies is Vietnam. It goes without saying that the situation of women and men in Vietnam differs from for example the situation for women and men in Sweden. Even discussing the situation of "women in Vietnam" or "men in Sweden" may be generalising too widely. Thereby, the theoretical interpretation of gender introduced by Butler leads us to practical concerns (Butler 1990).

How, then, to avoid what is sometimes called the "The Achilles' heal of feminism", the problem of conducting gender and policy-orientated research, without falling into the trap of defining, restricting and categorising women and men into groups of implied homogeneity (Barrett M 1992; Smiley 2000).

Marion Smiley argues for a change of perspective to avoid social generalisation (Smiley 2000). She suggests what she calls a pragmatic view, which starts not from gender-or other- theories on oppression, but instead with an analysis of what actually disempowers women in a certain context. These could be specific policies that create common obstacles for large groups of women, without implying that all women face the same barriers, or that all those women who do, share a common identity. This approach is useful in this type of gender and health research, where the research questions are closely related to policies, and where disempowerment is more than an abstract concept but instead rather a distinct feature, which may lead to ill health. It is of course also applicable to other analytical categories than gender (women and men), such as class or ethnicity.

Another way to handle categorisation is to emphasise the relational aspects of the gender concept. According to Flax, gender is fundamentally a relation, not a thing (Flax 1990). Harding elaborates on this thought and writes that

"*The content of womanliness and manliness can vary immensely…the gender relations in any particular group are not shaped only by the men and women in that group, for those relations too are always shaped by how men and women are defined in every other race, class or culture in the environment. Gender relations in any particular historical situation are always constructed by the entire array of hierarchical social relation in which "woman" or "man" participates.*" (Harding 1991)

In this research, I have aimed at focusing on the relational aspects and tried to identify possible barriers to TB case detection that exist among these specific women and men in Vietnam.

Gender and health research

Sue Rossner describes the gender bias in clinical medical research as acting on several levels (Rossner 1994). Parts of this critique are similar to what I described above from other disciplines, such as the androcentric bias in defining priorities for medical research, in theory development and conclusions as well as a lack of funding for clinical research on women. Other parts deal with the practical effects of not recognising the effects of gender, which may lead to inadequate treatment of diseases in women and also inequities in actual health care management. Not only has there been a gender bias in research questions and interpretations, but in a Swedish study on allocation of research funding by the Swedish Medical Research Council it was also shown how female medical researchers are disfavoured compared to their male colleagues. Female applicants had to be 2.5 times more productive than the average male applicant in order to be considered as equally competent (Wenneras and Wold 1997).

So far, most of the interest in gender and health has focused on women's health. It may be considered relevant due to the general subordinate status of women in most cultures and the major gender bias introduced by using men as the norm in medical research (Rossner 1994; Doyal 1995; Malterud 2002). But inequalities in health do not only affect women; men also face specific risks of ill health that are linked to their gender (Doyal 1995; Doyal 2000). A pertinent but not often debated example is the globally observed shorter life expectancy among men compared to women. Maria Danielsson shows that these observed gender differences are highly sensitive to social change, and of great relevance to public health (Danielsson 2002).

Research within the field of gender and health is expanding in high-income countries but has previously mainly been limited to diseases common in these parts of the world. In low and middle-income-countries, women's health issues have until recently been restricted to conditions related to reproductive functions. The view of women as important primarily for their reproductive role has been supported by a focus on reproductive health in many aid- and development programs directed towards low-income countries, whereas lately the focus has been shifting to include infectious diseases. (Rathgeber and Vlassoff 1993; Vlassoff 1994; Vlassoff and Bonilla 1994; Danielsson 2002).

The Vietnamese context

Table 3. Data on Vietnam; year 2001 if not otherwise indicated (World Bank 2003a; World Bank 2003b).

Population	79.5 million
Adult illiteracy, total	7.3%
Female adult illiteracy	9.1%
Female participation in labour force	48.9%
GNI per capita	410 USD
Life expectancy at birth	Men: 66.9 Women: 71.8
Fertility rate	2.2
Births attended by skilled health staff (% of total)	69.6% (year 2000)
Under 5 mortality rate	38 /1000 children
Child malnutrition (% of under 5)	34% (year 2000)
Child immunization, measles, (% under 1 year)	97%

Gender in Vietnam

Gender in today's Vietnam is created by Confucian traditions combined with political actions promoting equality, following the Communist revolution in 1945. The system is often described as one in transition (Barry 1996).

Confucianism states that women are inferior to men, made evident in the "three submissions", which state that: "Daughter: she obeys her father; Wife: she obeys her husband; Widow: she obeys her son (Minh-Ha quoted in (Rydström 1998)). Long quotes a proverb saying: "The boat follows its steering wheel. The wife follows her husband" (Long 2000). Son preference as reflected in household behaviour and reproductive patterns has been described by several authors (Haughton and Haughton 1995; Johansson, Hoa et al. 1996).

Already in the 1940s, the Communist party introduced a development towards equal opportunities in society for men and women. The strategy included changes in legislation, promoting women's role in production, family planning goals, the replacement of old cultural beliefs of female inferiority, and the creation of a state-funded support organisation, the Women's union (Barry 1996).

Rydström describes how the old Confucian ideas about morality politically were replaced by a new "revolutionary morality", defining a woman's role as both a good mother and a good worker, responsible for the welfare of her family (Rydström 1998). Both Rydström and Gammeltoft describe in their anthropological work how old Confucian beliefs still prevail side by side, or intertwined with, party rhetoric about equality (Rydström 1998; Gammeltoft 1999). In addition, the party equality policy is described as building on old values of female subordination. In their

message about "the good mother and the good worker", the traditional double burden of work associated with the female gender role is emphasised, which results in an increased work-load and more responsibilities for the woman, without necessarily increased resources to act upon them (Thi 1996; Gammeltoft 1999).

Vietnamese women are often described as being more equal versus men compared to women in other countries in South East Asia, and the UNDP gender equality index is higher than in other countries in the same region (Barry 1996; Que 1999). During the last two decades, female participation in the labour force has been high, 48% in 1980 and 49% in 2000 (World Bank 2003b). Still, gender inequality is identified as a problem. The power sphere of women is restricted, both on the family level and the societal level. If women have responsibility for the household chores and daily small-scale decision-making, men make decisions about big spending and control the resources. The representation of women in decision-making positions in society is low (Barry 1996; Que 1999). In 1995, women held 5% of ministerial positions (World Bank 2003b) Long writes that out of 62 Ministry of Health Institutions, 6% were managed by female directors, and out of 61 provinces, 20% had female directors of the provincial health bureau (Long 2000).

Gender relations are context-dependent, and when rapid changes take place in urban life, old values may be persistent in rural life. In rural northern Vietnam, where studies I-III took place, the gender system has undergone fewer changes and is still based on a traditional family and power structure (Rydström 1998; Que 1999).

TB epidemiology in Vietnam

In the year 2000, Vietnam ranked as number 13 among the 22 countries that the WHO has identified as "TB high-burden countries" in terms of absolute number of TB cases (WHO 2002a). A total of 89,792 cases, 53,169 (59%) of which are smear positive pulmonary TB cases, were reported to the WHO in 2000, all of these notified within the national DOTS programme. The estimated incidence rates were 189/100,000 TB cases, including 85/100,000 sputum smear-positive cases (WHO 2002a). The male: female ratio of detected TB cases has been 1.8-2.0 during the last 10 years (Long 2000). The Vietnamese National TB Programme (NTP) is identified as one of only a couple of these high-burden national programmes that have succeeded in reaching the WHO targets for TB control. For the year 2000, Vietnam reported 80% case detection and 92% cure rate (year 1999). 2.3% of all new cases are estimated to be multi-drug resistant (WHO 2002a).

During the last decade, an increasing number of new smear positive pulmonary TB cases has been reported in Vietnam, from 30,728 in 1990 to 53,169 in 2000 (Long 2000; WHO 2002). The increase in case load has been explained by the rapid expansion of the NTP coverage, improved case detection gained by both a strengthened health care system and improved knowledge in the population, together with an actual increase in TB incidence (Long 2000).

Repeated tuberculin surveys in different regions of Vietnam were performed during the early and mid-part of the 1990s. Annual risk of infection (ARI) in the respective areas has been calculated (Styblo quoted in (Cauthen, Pio et al. 2002)). A comparison

of the ARIs shows an increase in ARI both in absolute and relative numbers in five out of six areas with the highest increases being in the urban areas of Hanoi and Ho Chi Minh City (Long 2000). This increase is likely to correspond to an increase in true incidence of TB, though the magnitude of the incidence increase is difficult to determine (Borgdorff 2002).

These Vietnamese surveys do not report tuberculosis infection by age or sex. Data from 1963 on tuberculosis infection show a sex and age trend in tuberculin positivity similar to those in other regions in the world, whereas the actual difference between women and men of reproductive age is less than in other settings, only about 10% (Dolin 1998).

TB and HIV

The impact of the HIV epidemic in Vietnam is still considered to be restricted compared to the case in other parts of Asia. It started in the intravenous drug use community (IDUs), and has then spread further in the population, especially among commercial sex workers (CSWs). Still, IDUs account for almost 90% of the new cases.

There is a vertical national programme for HIV/AIDS prevention and treatment, and diagnosed HIV cases are reported to the national level. HIV is diagnosed by several means such as serology surveys, voluntary counselling and testing, partner tracing and epidemiological field investigations. Sentinel sero-surveillance is performed to assess HIV prevalence. This is carried out annually or semi-annually in sentinel populations (IDUs, CSWs, STD patients, TB patients, pregnant women and military recruits) (Quan, Chung et al. 2000).

In 1996, when the first data collection for this thesis took place, 1681 new cases were diagnosed with HIV/AIDS, corresponding to a rate of 2.3/100.000 population. The estimated HIV prevalence among new TB cases was 0.5% and only slightly higher in the south. In 1999, the reported prevalence of co-infection among TB patients was less than 3% in most provinces; the estimated national prevalence of adult TB cases with HIV was 1.4% in 2000. The HIV epidemic started out in the southern provinces including HCMC, where at that time the highest rates of co-infection were reported. Due to the nature of the HIV/TB interaction there is likely to be a time lag before any bigger changes are seen in other parts of Vietnam. (Ministry of Health 2000; Quan, Chung et al. 2000; Quy, Nhien et al. 2002)

The cumulative incidence of HIV in 1996 was 7/100.000, the CI has then increased drastically and in 1999 was estimated to be 22.5/100.000. The biggest increase in HIV prevalence has taken place in the Northeast part of the country (including Quang Ninh, Hai Phong and Hanoi), mainly because of a high prevalence of IDUs (Quan, Chung et al. 2000).

Aims and objectives

This thesis comprises studies on aspects of case detection of Tuberculosis in Vietnam. Gender has been used as analytical category to enable studies of how women and men are differentially influenced by the structural organisation of society in relation to case detection of TB. The intention has been to approach case detection from both the patient's and the health care provider's perspective, and to put this in relation to the existing strategy for TB control in Vietnam. The studies have been performed in a rural district in Northwest Vietnam (studies I-III.) and in four different provinces (Quanh Ninh (studies IV,V), Hanoi, HCMC and Qang Nam-Da Nang (study V)).

Main aim:

To analyse how case detection of tuberculosis is influenced by gender as a structural factor, including assessing differences between women and men in tuberculosis epidemiology, and health-seeking behaviour in a low-income setting.

Specific objectives:

- To analyse health-seeking behaviour and possibilities to get a sputum smear test among men and women with a cough for more than three weeks. (Paper I)

- To assess knowledge of TB among men and women who had had a cough for more than three weeks and to analyse how knowledge affects the health-seeking behaviour of these men and women. (Paper II)

- To estimate the "true" TB prevalence through screening of men and women in a population-based survey, as well as to calculate case detection rate ratios of the National TB Programme in Bavi district, Vietnam. (Paper III)

- To explore doctors' views and explanations for a longer doctor's delay among female TB patients. (Paper IV)

- To analyse gender specific chest x-ray characteristics among men and women, with smear positive pulmonary TB, and to assess chest x-ray findings in relation to clinical symptoms. (Paper V)

Methods

TB control in Vietnam

Study V was conducted within the National TB Control Programme (NTP) in Vietnam. The studies I-IV were not conducted within the NTP, but because of their focus on health-care seeking among TB suspects and TB case detection, the studies have been designed with close consideration of NTP activities.

Organisation of the National TB programme

Tuberculosis control has a long history in Vietnam, starting already in 1957 with the establishment of the Institute of Tuberculosis Control. The NTP has, in addition to getting support from the national government, also received technical and financial aid from the Royal Netherlands' Tuberculosis Association (KNCV), the Medical Committee Netherlands-Vietnam (MCNV), and the International Union Against Tuberculosis and Lung Diseases (IUATLD). Today, tuberculosis control has a vertical structure with the NTP, administratively controlled by the Ministry of Health, being nationally responsible for organisation and implementation. The National Institute of Tuberculosis and Respiratory Diseases (NITRD) in Hanoi, together with the Pham Ngoc Thach TB and Lung Centre in Ho Chi Minh City, are regionally responsible for implementation and constitute national reference hospitals. Vietnam is divided into provinces, each of which has a provincial TB centre, either with a separate TB hospital or with a special TB ward at the provincial hospital. Next in the health care structure follows district TB units, often situated at the district hospital. The district units are staffed with a doctor, laboratory technicians and a pharmacist, and in addition there are usually 5-10 beds in the district hospital, reserved for TB patients. Community health centres are responsible for the identification of TB suspects, referral to sputum sample examination at the district unit and supervision of TB treatment. In 1997 11,977 health care personnel were working with TB control. (Long 2000; Lönnroth 2000). The Vietnamese NTP follows the WHO-recommended DOTS strategy, and coverage of DOTS in the population is reported to be close to 100% (WHO 2002a).

The National TB programme has so far been restricted to the National Health Care system in terms of organisation and administration; private providers are not included in the organisation. Lönnroth et al report from their studies on private TB care in Ho Chi Minh City (HCMC), Vietnam, that they estimate as many as 40% of prevalent TB cases in HCMC to be treated within the private sector (Lönnroth 2000).

Diagnosis of TB

Three consecutive sputum smear microscopy examinations are conducted to diagnose pulmonary TB, in addition a chest x-ray is recommended to at least all cases with less than two out of three positive sputum smear examinations. In practice, a chest x-ray is often performed together with the first sputum smear examination.

TB treatment

Most new sputum smear positive pulmonary TB cases (>95%) receive 8 months of chemotherapy with 2SHRZ/6HE [1]. The DOT concept of the DOTS strategy is often, but not in all cases, solved by hospitalisation during the intensive phase of treatment, i.e. the first two months. After that period, district units and community health centres are responsible for treatment administration. The programme has a clear referral order, whereas patients can still seek care and be diagnosed directly at regional, provincial or district levels. Extra-pulmonary, sputum smear negative or complicated cases are diagnosed and often treated at regional or provincial levels.

Financing TB control

The budget estimate for TB control activities in Vietnam is 7 million USD per year (average estimated per year 2002-05). The cost per patient for each treated TB case in Vietnam is 71 USD, or 202 USD including health-care costs that are not TB specific (WHO 2002a). Governmental spending on TB control in Vietnam, including World Bank loans is estimated to 5 million USD per year, leaving a gap of 2 million USD. One million is pledged from donor funds and the actual resource gap left is of one million USD or 14% of the total TB control budget. (WHO 2002a).

Treatment of sputum smear positive TB is free for the patient once a definite diagnosis is available. Diagnostic investigations like chest x-ray, initial medical consulting, any additional medications, transport, food and utilities in the hospital are paid by the patient him- or herself. Health insurances of various kinds exist, e.g. for governmental staff, and there is an additional health insurance targeted at the population living in poverty (Segall M 2000).

TB health education

Since around 1995, the Vietnamese NTP has supplied health education to the public, focusing on TB, and how to act upon suspected symptoms. Earlier studies from Vietnam have shown how traditional beliefs exist side by side with modern medicine, especially among old people in rural areas, but also among TB patients diagnosed within the NTP. Different forms of TB were reported from a qualitative study: Lao truyen-hereditary TB, thought to be transmitted through “family blood”; Lao tam-mental TB, caused by too much worrying, and more common among women; Lao luc-physical TB, caused by hard work, more common among men, and Lao phoi-lung TB, caused by a germ, also more common among men (Long, Johansson et al. 1999a)

Studies I-III

Studies I-III are cross-sectional surveys, where data collection was performed within the FilaBavi, Bavi district, described below. A structured questionnaire and a screening question were used to identify individuals with cough for more than three weeks in studies I and II. In study III, these identified cough cases were offered TB diagnostics. Studies II and III were carried out within the same survey and build on findings from study I.

[1] 2 months Streptomycin, Isoniazid, Rifampicin, Pyrazinamid followed by 6 months Isoniazid and Ethambutol

Bavi district-Filabavi

Bavi district, Ha Tay province, north east Vietnam is a north Vietnamese rural district, including low-, mid- and high land of about 410 square km, with altitudes ranging from 20-1297 meters above the sea. The district is situated within the Red River delta area. The climate is a monsoon tropical climate with a warmer and wetter season during June-October, and a cooler and drier season during the rest of the year. Bavi district includes 32 communes. The district had 241 812 inhabitants in 1999, about 91% belonging to the ethnic group of Kinh, the major ethnic group of Vietnam. Minority ethnic groups live in the mountainous areas, most of them farmers. Life expectancy at birth in Bavi is estimated to 78.8 years for females and 71.1 years for males (Byass In press). In 1999, the median reported monthly income per household member was 61,000 Vietnamese Dong (VND), or 4.4 USD (Khe In press). In the district, there is one district hospital and there are 32 communal health centres. Private doctors, private pharmacies and drug-sellers can also be found (Chuc In press).

This district has been selected for a socio-demographic surveillance site (hereafter called FilaBavi) in a collaboration for health systems research [2]. Bavi district was purposely selected for its similarity with many other Vietnamese districts in terms of socio-economic conditions and health status. (Chuc In press)

Sampling for Filabavi

A sample of about 20% of the Bavi district population (50,000 out of 240,000) was identified. The whole district population was included in the sample size calculations, except for boat people and military personnel only living in the district temporarily. The sampling unit was based on villages. Small villages put together were regarded as one unit, and large villages were divided into several units. In total, 352 population units were identified, and a stratified, random cluster sampling, proportional to population size per unit, was performed. The average size of each unit was 676 individuals. 67 clusters were selected in the study sample, including 49,710 inhabitants in 11,473 households in 1999. (Chuc In press)

Data collection - Filabavi

Since January 1999, demographic surveillance of the study population has been carried out every three months, involving collecting data on vital events, in-and out migration, and individual health status. In addition, two base-line surveys have been conducted, in 1999 and 2001. Within these surveys, data has been collected on household level regarding various socio-economic variables, geographic access to health care services, and detailed information on all individuals in the household. Specially trained female interviewers perform the data collection; a structured questionnaire is used for this purpose. For each household a household representative

[2] The collaborating institutions are: The Health Strategy and Policy Institute (HSPI), Hanoi Medical University and the Ministry of Health, Hanoi, Vietnam and in Sweden the Division of International Health (IHCAR), Karolinska Institutet and the Division of Epidemiology and Public Health, Umeå University.

is chosen, in most cases the senior female head of the family. She is considered to be the person in the household with the best knowledge of family conditions and the general health of the respective household members. (Chuc In press)

Data collection in studies I-III

In order to identify cough cases/potential TB cases, a screening question was added to the regular surveillance interviews within FilaBavi:

"Xin Ong/ba cho biet hien tai trong gia dinh minh co ai bi ho tu 3 tuan tro len, o bat cu thoi diem nao trong khoang thoi gian 3 thang tro lai day khong?" ("Has anyone in your household suffered from a cough of more than three weeks' duration anytime during the last three months?") (Study I)

"Xin Ong/ba cho biet hien tai trong gia dinh minh co ai bi ho tu 3 tuan tro len khong?" ("Does anyone in your household suffer from cough of more than three weeks' duration?") (Studies II-III)

The questions were put to the household representative, and if she identified such a person, the cough case/potential TB case was interviewed in person. The study population included all individuals of 15 years or more in the Filabavi population, comprising 16,037 men and 18,088 women in study I, which took place in June-August, 1999, and 16,737 men and 19,095 women in studies II and III in April-June, 2000.

A structured questionnaire was developed in English by the research team and then translated to Vietnamese by one of the Vietnamese researchers. Questions included background variables, symptoms other than cough, symptom duration, health care-seeking behaviour, examinations performed by health care providers and health care expenditure. In study II, background variables and health-seeking behaviour were explored further, and in addition, knowledge-related questions based on the medical perspective of TB, promoted by the NTP, were added.

In study III, the individuals identified as cough cases/potential TB cases were asked to provide three sputum samples for TB diagnostics and were referred for a chest x-ray examination. One sputum sample was collected on the spot at the time of interview; the second was a morning sputum expectorate. The individual was then revisited a day later, and the morning sample plus the third on- the- spot sample were collected and brought to the District TB Unit (DTU) by the respective interviewer twice a week. One specially trained laboratory technician works at the DTU. She regularly prepared and read all sputum smear examinations the same day. On average, the study added about 15 new sputum samples for examination each day. The staining method used is Ziehl-Nielsen staining. The samples were read and classified according to WHO guidelines, and the sputum examinations were all registered, both in a separate research protocol and in the regular laboratory book of records. (WHO 1997). Individuals who could not provide sputum samples were revisited and information was collected regarding the reasons for this. The chest x-rays were read by the physician at the TB unit and one researcher performed a second reading

without knowing the results of the first reading. The x-ray was classified as positive if both readers classified it as suggestive of TB.

Definitions of variables

Socio-economic status: Finding the most accurate way of classifying socio-economic status in Vietnam is recognised as being difficult (Khe In press). Reflecting these problems, papers I-III use three different measures of socio-economic classification. In paper I, a simple self-reported assessment is used (poor, average, rich), whereas paper II uses the official Ministry of Labour Classification of households, and paper III the reported yearly income per person.

Health care action: Any health care action taken because of the cough symptom, classified into the following: (i) *self-treatment,* (ii) *private practitioner,* (iii) *pharmacies,* (iv) *traditional healer,* (v) *communal health centre* (CHC), (vi) *hospitals* and (vii) *others*.

Qualified health care providers: The providers included in the government health-care system. Less qualified providers were defined as providers who are less regulated by the government, and where quality of TB/care has proved to be low (Van Duong D 1997; Lonnroth, Lambregts et al. 2000).

Knowledge score: Several alternatives were allowed for the responses to the knowledge questions. Answers were categorised into either correct (if matching the medically correct answer), or else incorrect. One score was given for each of the correct answers. If several alternatives were given, and at least one was defined as correct, a single score was given.

Data analyses

Data were processed and analysed in Epi-info version 6.04, and in SPSS version 10.0. Proportions were calculated with 95% confidence intervals, where appropriate. The 95% confidence interval formula for a relative risk was used to calculate confidence levels for the case detection rate ratios. The chi-square test was used to assess statistical significance for differences between proportions. In study I, the numbers of health care actions taken was transformed to ranks and a rank regression analysis with age, sex, education and income levels as independent variables was performed. Multiple linear regression was done to examine confounders of delay to hospital and cost per visit with mean delay to a hospital/cost per visit as the dependent variables, and sex, age, education level, income level and number of disease symptoms as independent variables. Logistic regression analysis was performed in study II to study association between background variables and dependent variables: 1.health-care action, and 2.seeking hospital care. The following variables were included as independent variables: sex, age, education, economic status, cough duration, number of symptoms, health insurance, means of transportation and TB knowledge score.

The WHO case definition of new and relapse cases of pulmonary, smear positive TB was used in study III (WHO 1997). To compare TB prevalence between the screening model in study III and passive case detection by the NTP, records from the National TB programme (NTP) were used, together with demographic data from Filabavi and the population census in the year 2000 in Bavi district. Cases identified in the screening survey in study III were double-checked against NTP report books. The estimated true prevalence of TB in Filabavi was compared to the passive case

detection-NTP prevalence of TB in the whole of Bavi district (excluding FilaBavi). A case detection ratio was calculated by dividing the NTP prevalence rate from Bavi district with the estimated "true" prevalence rate in Filabavi. Filabavi is considered a representative sample of Bavi district, and comparisons of prevalence rates between our study in Filabavi and Bavi district could thus be done.

Reliability, internal validity and response rate

For the purpose of studies I-III, the Filabavi interviewers were trained to probe questions on symptoms duration and health-care seeking, and to collect sputum samples and instruct respondents on how to provide them. Medically educated supervisors participated in quality checking of the data collection. In study I 25% and in study II 15% of the cases were re-interviewed by a supervisor, using random selection. Agreement was in general good and if conflicting answers were provided the answer given to the supervisor was used. 25% of the questionnaires were randomly selected by one of the researchers and reviewed for inconsistencies. A researcher who did not participate in data entering cross-checked 10% of the data entries.

The laboratory assistant at the DTU in Bavi is trained to stain and examine sputum samples according to standardised routines within the National TB programme (NTP) [3]. In addition, extra training sessions were provided. All the individual smears were re - read blindly at either the National or Provincial TB laboratory. The rate of smears that were classified as positive during the first reading and negative during the second was 0%, and the rate classified as negative during the first reading and positive in the second was 2.3%. An additional laboratory technician at national level read discrepant smears together with one of the researchers, who is a trained TB physician in Hanoi, and a final agreement was reached. Misclassification of sputum smears as false positive or false negative is likely to be systematic with a higher rate of positive smears wrongly classified as negative (Van Deun and Portaels 1998; Nguyen, Wells et al. 1999). All laboratory records on the sputum smear examinations were crosschecked against the research protocol for accuracy.

The original intention in study III was to culture all sputum samples to check for growth of Mycobacteria, but due to logistic reasons this was not possible. Given the estimated sensitivity of sputum smear microscopy analysis about 55% of potential pulmonary TB cases could be missed (Dye, Scheele et al. 1999). In the Bavi district the estimated HIV prevalence is low, about 0.02% (Dr H D Hanh 2002), which implies that there is little risk of a high HIV prevalence further decreasing the efficiency of sputum smear microscopy. Earlier studies within the Vietnamese NTP have shown that the prevalence of environmental Mycobacteria is very low, so there is little risk for misclassification of Mycobacterium tuberculosis (Dr N P Hoa 2002).

Response rate of the households in Filabavi was close to 100%. All individuals identified with a cough of over three weeks' duration consented to participate in the two interview surveys and to provide a sputum sample if possible. In study III, 30%

[3] <10 AFB/100 fields = exact number; 10-99 AFB/100=1+;1-10/field=2+;>10/field=3+. To conclude a smear is negative 300 microscopy fields should be checked, to categorise a positive smear 100 fields.

of the participants did not go for the chest x-ray offered. 103 (40%) of the men and 151 (50%) of the women did not provide a sputum sample. All of them cited lack of sputum production as the reason for not providing a sample. Crosschecking with a question about symptoms in addition to coughing showed 100% concordance. Those individuals that had a positive chest x-ray but lacked a positive sputum smear were clinically followed at the TB unit and within the household surveys.

In general, reactions from Bavi community to the Filabavi project have been very positive. However, despite the informed consent asked for from household representatives, and also from each interviewed individual, it is not possible to judge to what extent household representatives in the study population report "no prolonged cough", just to avoid being part of the study. Involvement in community projects in Vietnam is sometimes called for by an authoritarian approach, which may make it difficult for the individual household to stay outside such initiatives.

Study IV

Study setting, data collection and analysis

Study IV is a qualitative study with the aim to explore doctors' views on why women with TB seem to have a longer doctor's delay to diagnosis. Data collection was carried out in Quanh Ninh Province in Northeast Vietnam, at one general hospital, and at two district TB units in April 2001. Key informants were purposely selected among staff at the general hospital and the two district units. These were all medical doctors from various departments.

Data was collected by means of focus group discussions (FGDs) together with in-depth interviews. The main themes of the FGDs and in-depth-interviews were developed from findings in earlier studies from Vietnam (Long, Johansson et al. 1999b; Johansson, Long et al. 2000; Johansson E 2002). In order to introduce the themes, the participants were shown a table illustrating the doctor's delay from first contact with a qualified doctor to TB diagnosis for male and female TB patients (table 1). FGDs were used since little is known about possible reasons for doctor's delay, and the FGDs did allow for different opinions to emerge.

Five focus group discussions (FGDs) with 7-8 participants in each were carried out. One group included both men and women (mixed), while the other four groups were either male or female. To validate the data emerging from the FGDs, and to enable a deeper probing into certain areas, two physicians (one male, one female) working at TB units, and one senior male physician, were in-depth interviewed individually. One of the Swedish researchers ran the FGD with the mixed group in English (without translation). A Vietnamese researcher moderated the exclusively male or female FGDs. The in-depth interviews were performed by the Swedish researcher and interpreted simultaneously by the sociologist.

All FGDs and interviews were tape-recorded and translated verbatim into English by the research team. The in-depth interviews were transcribed into English with the assistance of the interpreter. The moderator crosschecked all transcripts. FGDs and interviews were

regularly transcribed the same day or the following morning. The interview process was finished when the team considered that data saturation had been achieved.

A preliminary analysis was performed immediately following each FGD and interview to help focus the next FGD or interview. Open codes were generated and organised manually, and similar codes were grouped into categories. Categories were then organised into emerging themes. Overall, the analyses followed the procedures for qualitative thematic content analysis (Barnard 1991). This method was chosen since the translation process did not allow a word-by-word interpretation of data.

Internal validity and methodological concerns

By close collaboration between the research team and the Vietnamese moderator/interpreter, the language barrier was diminished and the cultural understanding of the material increased. One of the Swedish researchers has worked for a long time at the hospital where the data was collected. Many of the doctors at the hospital had been in contact with Swedish researchers or health care personnel before, which facilitated openness and improved mutual trust.

Focus group methodology was used since this method fitted well with the objectives to explore an area where little is known and many different opinions may prevail (Agar M 1995; Morgan 1996). In a study exploring doctor's delay a risk is that the individual doctor may perceive the discussion/interview as criticism against him or herself. The FGD design enabled the discussion to leave concerns of performance by the individual doctor in favour of open opinions and explanations, which increased validity of the data. Gender equality is on the political agenda of Vietnam today, hence there might be a risk of only obtaining "politically correct" opinions from FGD members (Rydström 1998). In retrospect it could be concluded that contrasting opinions did emerge.

Study V

Study setting and data collection

This study was part of a larger project, in which different aspects of TB epidemiology and gender in Vietnam were studied (Long 2000). A stratified random-sampling procedure selected 23 out of 66 districts by probability proportional to size. The districts were located in four provinces, which were chosen to represent the northern, central and southern parts of the country, respectively. The stratification of the districts was based on whether they were urban or rural and whether they had a high or low TB prevalence. All new adult cases, (> 15 years) of sputum smear positive pulmonary TB diagnosed during January-June, 1996 at the district TB units, were included and all diagnosed patients agreed to participate in the study. Diagnosis of TB was performed, according to the Vietnamese National TB Programme (NTP) standard procedure, by three sputum smear microscopy examinations and a chest x-ray (CXR). In total, 540 sputum smear positive adult TB cases were included. A CXR was available for 366 cases, i.e. 299 men and 67 women. The mean age among the study subjects was 34 years (range 15-49) for men, and 31 (16-48) years for women. TB physicians in the NTP interviewed all 540 cases at time of diagnosis. A structured questionnaire was used for socio-economic and demographic variables, initial clinical

symptoms, clinical symptoms at the point of diagnosis, as well as time lag between symptom appearance and diagnosis.

The CXR examinations were performed at the local TB units and were interpreted and used during the regular clinical procedure. All original CXR were collected at the end of treatment and brought to Sweden. A standardised form was used to describe the CXR findings. The form included localisation (left or right side; upper-middle-lower lobes) and extent of major CXR findings. CXR outcomes were divided into major categories: 1. miliary disease, 2. pleurosis, 3. adenopathy, 4. cavitation, 5. calcification, 6. fibrosis. A senior lung specialist and a senior radiologist read all the CXRs. Each reader read the CXR twice, blinded for sex as well as non-blinded. Blinding was performed by covering the lower part of the film with a standardised paper cover. Only the readings of the lung specialist are presented here.

Data analysis

A preliminary kappa-analysis was performed to assess agreement between the two independent readers. For three major variables, cavities, miliary findings and pleurosis, the kappa values were 0.41, 0.69, and 0.58, respectively, representing moderate to good agreement. These levels are in accordance with previously published results on inter-reader agreement (Graham, Das et al. 2002).

Intra-reader agreement between the blinded and non-blinded readings was very good for the lung specialist, i.e. kappa-values between 0.87-1.00. The non-blinded/unmasked readings could therefore be used in the following analyses. Epi info version 6 and SPSS version 10 were used for statistical analyses. In order to test differences between proportions the chi-square testing (independent samples) and the McNemar test (related samples) were used. Logistic regression analysis with miliary findings and pleurosis as dependent factors and sex, age, symptoms duration as independent factors were performed to identify possible confounding factors. Anova testing was used to examine differences between means.

Internal validity and response rate in study V

A dropout analysis, stratified by sex, was performed to check for significant differences between the patient group, providing a chest x-ray (366 cases), and those who did not (174 cases). The following variables were used: age, socio-economic status and major symptoms at diagnosis. This analysis showed no significant differences between the groups.

Ethical aspects in studies I-V

Ethical approval was received from the Karolinska Institute, Sweden, the Ministry of Health, the National Institute of Tuberculosis and Lung Disease, and the Local people's committee, Bavi district, Vietnam for the respective studies I-V. The Filabavi research collaboration has been ethically approved by Umeå University. All participants (cough cases, doctors and TB cases) in the different studies were asked to give their informed consent.

The TB cases diagnosed within study III, were prompted to start TB treatment and included in the NTP in Bavi. The potential TB cases with a TB-suspect chest x-ray, but negative sputum smear samples, were followed within the NTP.

Results

The results from the papers and the respective studies included in the thesis are presented below. The focus is on aspects relevant for case detection, gender, and possible barriers towards TB diagnosis. A few reanalyses have been added, in addition to what is reported in the different papers.

Cough prevalence

In study I, we identified 492 individuals with a cough of more than three weeks' duration, representing prevalence rates of 1.3% [95% CI 1.2-1.5] men, and 1.5% [95% CI 1.4-1.7] women. In the next survey, 1.5% [95% CI 1.4-1.7] of the men, and 1.6% [95% CI 1.4-1.8] of the women, in total 559 cases, reported a cough of more than three weeks duration (paper II). The prolonged cough prevalence was similar among men and women in the age groups up to 54 years, but significantly higher among men in the age groups above 54 years in study II, and in the 70-79 years age group in study I (6.4% vs 4.2% p=0.05). The mean duration of cough was significantly longer among men than among women (21.1 weeks vs 16.2 weeks; p<0.00 paper II), and sputum production was more common among men than among women (61% vs. 50% p=0.02 in paper II, 53% vs. 47% p=0.20 in paper I).

In summary:

- Prolonged cough prevalence did not differ significantly between men and women, though men in older age groups had higher prevalence rates (papers I-II).
- Cough duration was significantly longer among men (papers II).
- Sputum production was more frequent among men (papers I-II).

Prevalence of sputum smear positive pulmonary TB

Among the 35 832 adults in the study population, we diagnosed 25 individuals with sputum smear positive pulmonary TB. According to the WHO classification, 23 of these cases were new sputum smear positive TB cases, and one man a relapse case (WHO 1997). One woman was not chest x-rayed, and was classified as a sputum smear positive TB case on the basis of a clinical assessment, and one out of three sputum smear samples being positive. (Table 4)

Table 4. Yield of positive sputum smear examinations among cases diagnosed with smear positive pulmonary TB (Paper III)

Number of cases	Positive sputum smears; out of 3 samples	Chest X-ray
2 women; 3 men	3	4 positive 1 male case not done
4 women; 4 men	2	7 positive 1 male case not done
9 women; 3 men	1	11 positive 1 female case not done

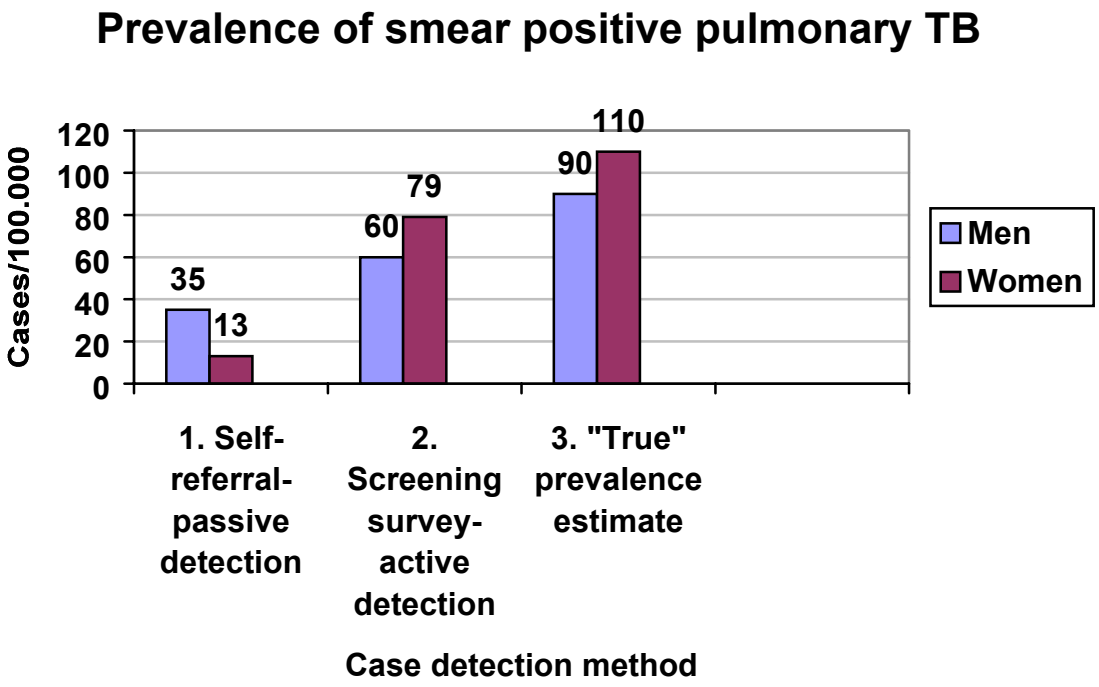

Figure 3: Prevalence of sputum smear positive TB

The following data were used for the prevalence calculations:

1. Self-referral; NTP in Bavi district (Filabavi excluded): 22 male; 9 female cases n=62,312 men and 67,570 women.
2. Screening Filabavi: 10 male;15 female cases n=16,737 men and 19,095 women
3. "True" estimate Filabavi: (10+5) male; (15+6) female cases n=16,737 men and 19,095 women

Prevalence rates of TB cases detected in our screening survey showed a male to female ratio of 0.7:1, as opposed to the reported ratio in the Bavi NTP of 2.7:1. (Table 5). The estimated "true" prevalence rate among women differed significantly from the reported rate in Bavi NTP (110 [95% CI 63-157] versus 13 [95% CI 5-22] cases/100.000) whereas the "true" estimate for male prevalence did not (90 [95% CI 45-135] versus 35 [95% CI 21-50] cases/100.000). (Table 5; Figure 3) In our screening survey, all of the detected prevalent cases had had a cough for at least three weeks; 64% reported more than three months, and 40% more than one year of cough. (Paper III)

Table 5: Prevalence and case detection of smear positive pulmonary Tuberculosis

Gender	**1. Self-referral** Reported by the NTP (Bavi district)	**2. Screening survey** Study population (FilaBavi)	**3. "True" estimate** Screening survey + cases reported by the NTP Study population (FilaBavi)	**Case detection** (Column 1 divided by Column 3)
Men /100.000 population (95% CI)	35 (21-50)	60 (23-97)	90 (45-135)	39% (20-76)
Women /100.000 population (95% CI)	13 (5-22)	79 (39-118)	110 (63-157)	12% (6-26)
Male:female ratio	2.7:1	0.7:1	0.8:1	

Positive predictive value of cough for more than three weeks

The positive predictive value of a cough of over three weeks duration, in terms of detecting sputum smear positive pulmonary TB in this population, was 4.47% (5.3% for women; 4.0% for men). 149 of the women, and 156 of the men, had prolonged cough and sputum production. The predictive values of both symptoms for detecting sputum smear positive pulmonary TB were 11.2% and 6.8% among women and men, respectively.

Case detection of the National TB Programme (NTP), Bavi

From the prevalence rates presented in table 5, we estimated the case detection rate ratio of sputum smear positive TB by self-referral to the NTP in Bavi, by dividing the reported NTP-TB prevalence rate with the "true" TB prevalence rate estimate for men and women respectively, which is showed in figure 4. The case detection ratio in the Bavi NTP among both sexes, but most clearly for women, is lower than the reported case detection ratio for Vietnam of 80% (WHO 2002a). A worst and best case scenario of case detection, estimated by the lower and higher confidence limits of the case detection ratios, the "true" prevalence rates for men and women respectively, and the adult population of Bavi, 79,049 men and 86,665 women, generates 166 cases (71 men and 95 women) at any given point in time. In the worst case scenario, only 14 men and 6 women would be detected, leaving 146 undetected cases, 61% (89) of which would be women. In the best case scenario, on the other hand, 54 men and 25 women would be detected, leaving 87 undetected cases, 80% (70) of which would be women.

In summary (Paper III):

- Estimates of the "true" prevalence of sputum smear positive TB in Filabavi showed rates of 90/100.000 among men and 110/100.000 among women.
- Significantly more female cases were detected in the screening survey as opposed to in the Bavi NTP. The male to female ratio was 0.8:1 as opposed to 2.7:1 within the NTP.
- Case detection of TB was low among both men (39%) and women (12%) in Bavi, and most obviously so among women.
- The positive predictive value of a cough of over three weeks duration in terms of diagnosing smear positive TB was 5.3% for women and 4.0% for men, and for cough together with sputum production 11.2% and 6.8% among women and men, respectively.
- A worst case scenario calculation estimates 146 undiagnosed (39% male, 61% female) contagious prevalent TB cases in Bavi district at any point in time.

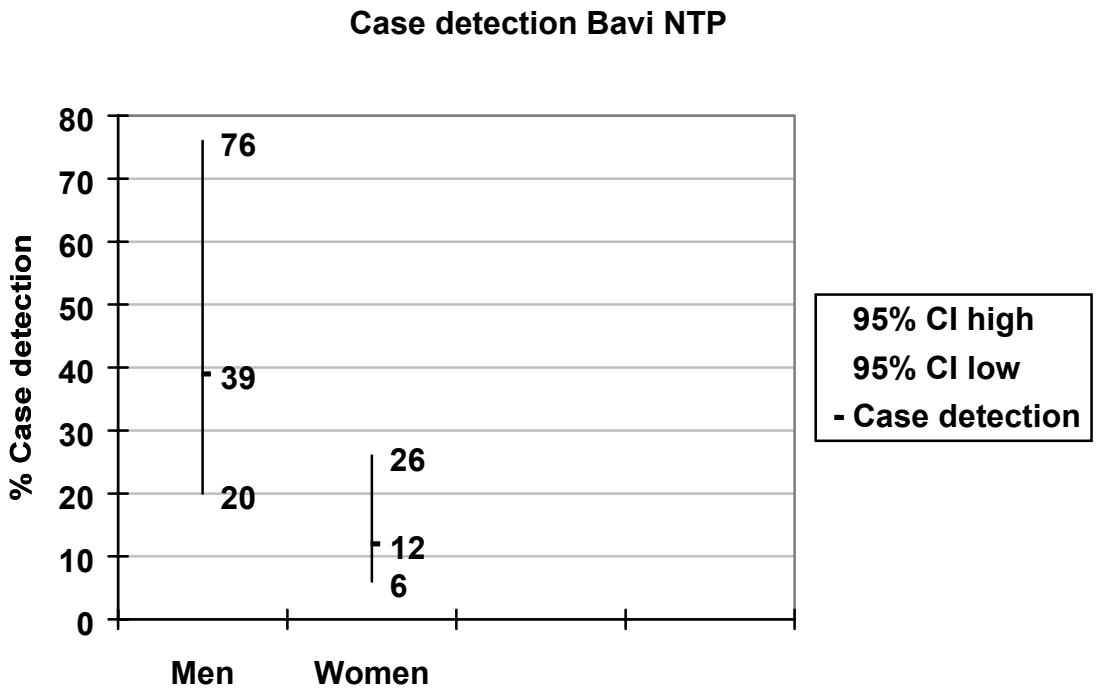

Figure 4: Estimated case detection ratios (with 95% confidence intervals) of smear positive pulmonary TB for men and women within the National Tuberculosis Programme (NTP) in Bavi, Vietnam.

Barriers towards a possible TB diagnosis

Health seeking behaviour

91% of the women, and 88% of the men, in study I reported taking a health care action because of the persistent cough; in study II, the gender difference was greater (95% versus 79%; p=0.00). The most common reason given for not taking action, was that the disease symptoms were not considered serious (Paper II). Rank regression analysis showed that being a woman was the only variable associated with an increased number of health care actions (p=0.05). (Paper I)

Types of health care actions

Mean values of types of health care actions reported showed that women self-medication to a greater extent, and visited private practitioners more often than men. The pattern of different health care actions taken shows that the use of low-quality health care providers is high during the whole health care process, among both men and women. (Paper I) (Table 6). These findings were confirmed in study II, where significantly more women than men chose self-medication, or a visit to the pharmacy, as their first health-care action (33% versus 20%, p=0.015). Close proximity to home was more commonly reported by women, 60.7%, than among men, 51.1%, (p=0.05) as a reason for choosing the first action. (Paper I) Among the TB cases diagnosed in our survey, all women and 8 out of 10 men, had taken some kind of health-care action during their current disease episode. The health care seeking pattern was similar to that described for the whole group of cough cases. (Paper III)

Table 6: The table shows the health care actions taken by men and women with cough for more than three weeks, expressed as **column percentages** of cases. Actions 1-4 refer to the time order of health care actions taken. (Paper I)

Health care provider	**Action 1**		**Action 2**		**Action 3**		**Action 4**	
	M n=183	F n=253	M n=74	F n=116	M n=18	F n=44	M n=5	F n=14
Self-medication	17.5	25.7	16.4	18.1	22.2	27.3	60.0	35.7
Drug seller	27.3	24.9	16.4	12.1	22.2	13.6	0	14.3
Private practitioner	15.3	19.0	28.9	27.6	11.1	22.6	20.0	28.6
CHC	13.7	9.5	8.2	8.6	0	2.3	0	0
District hospital	17.5	14.2	19.2	22.4	27.8	11.4	0	14.3
Prov/central hospital	8.2	6.3	9.5	6.0	16.7	20.5	0	7.1
Others	0.5	0.4	1.4	5.2	0	2.3	20.0	0

Hospital care

Though visiting a hospital was equally frequent among men and women in study I, the mean delay from onset of symptoms to the first visit to a hospital was more than double among women than among men (41 vs 19 days; p=0.04). In study II, significantly more men than women reported seeking care at a hospital (31 vs 19%

p=0.00), though gender was not significantly associated with hospital seeking in a logistic regression analysis. Among the men and women diagnosed with TB in our survey, only 20% (2 men and 3 women) had gone to a hospital at any point during their disease episode. (Paper III)

One of the interviewed doctors in paper IV formulates his perception about a gender difference in delay to health care as follows:

"Women are always busy with something so they don't think about themselves, they think about others. Men are quicker than women to seek care and find out about the disease. Women are busy with the family and may think it is of no importance; they always come late." Male TB Dr

In summary:

- More men than women reported not taking any health care action at all. (Papers I-II)
- Women took more health care actions, and the pattern of chosen actions differed between men and women. (Papers I-IV)
- In general, women more often chose low-quality providers. (Papers I-IV)
- Women reported a longer delay to hospital seeking. (Papers I, IV)
- The health care seeking pattern of the TB cases diagnosed in the survey, was similar to that described for the cough group. (Paper III)

Knowledge of TB characteristics

Among the 559 people, who reported a prolonged cough in paper II, traditional beliefs about the cause and characteristics of TB were frequent among both men and women. However, some significant gender differences existed. More men knew that bacteria cause TB, that TB is curable, and more men than women also reported the transmission mode correctly.

Men had a higher knowledge score than women (3.04 and 2.55, respectively). A higher knowledge score was significantly associated with higher education, being younger than 65 years old, being married, working for the government, or being a student. In a logistic regression model, seeking hospital care was significantly associated with having a higher knowledge score, longer cough duration, more disease symptoms (p=0.002), and having a health insurance.

Television and radio were commonly reported as sources of TB information (54% of men, 46% of women, p=0.00), and equally frequent were friends and relatives (50% of men and 49% of women). Individuals who reported television and radio as information sources, had higher knowledge scores, compared to those who reported receiving information from friends or relatives.

In summary (Paper II):

- Traditional beliefs about TB characteristics still exist
- Men reported significantly better knowledge about medical characteristics of TB than women

- TV and radio were commonly reported as sources of knowledge about TB characteristics, and were associated with a higher knowledge score, compared to those who did not report using these resources
- A higher knowledge score was associated with younger age and higher education, seeking health care and seeking hospital care

Resources

In paper IV, the relationship between gender and poverty was interpreted as follows. Where resources are scarce, the allocation of funding for women's illnesses is even less than the small amount available for men. In rural areas in Vietnam, married women often live with their husband's family. The wife's status in the family is inferior to both that of her husband and her in-laws.

"*The TB patients usually come from very poor families, and they usually live under poor conditions. Popular rules state that the man should get treatment before the woman, since he is the pillar of the household. In the rural areas, the status of women is lower than that of men. When men get TB, all family resources may be spent, but that is not done for women. So first of all the woman hides her illness, and then maybe the family does not support her financially, so she has more difficulties.*" Female Dr FG3

The above descriptions confirm the results of paper I, where the mean value of the reported cost per health care action for women was 70,465 VND [4] and for men 127,935 VND, with a mean difference of 57,470 VND (95% CI 12,802; 102,139). (Paper I)

In summary:

- Resources for health care seeking for women, in terms of time and money, were considered scarce, due to their inferior position in the family. (Paper IV)
- Men spent significantly more per health care action than women, on average 57,470 VND (4.1USD) more per visit. (Paper I)

Sputum smear microscopy examinations

The first line diagnostic investigation for TB in Vietnam is the sputum smear examination, which should be offered by the Community Health Centres (CHC) to all patients with prolonged cough and sputum production, either directly or by referral to the District TB unit (DTU).

The cough cases in survey I reported, that sputum smear examinations were prescribed only in the hospitals. Among those men and women who visited a hospital, significantly more men than women reported providing a sputum sample, 35.5%, versus 13.6% (p=0.00). This difference was statistically significant in the whole group as well, irrespective of health care actions. In total, 5% of the women and 13% of the men (p=0.00) reported providing a sputum sample for examination. There were no statistically significant differences in duration of cough or sputum production between these men and women.

[4] about 14,000 Vietnamese Dong (VND) =1 USD

In the qualitative discussions, the doctors reported that women often do not follow their doctor's prescriptions such as referral to sputum smear examination. This was said to be mainly because of a need to double-check any action with the husband, family and neighbours before following prescriptions, whereas men were said to even "push the doctor" in order to get the proper diagnostic investigations done. (Paper IV)

In summary:

- Significantly more men than women visiting a hospital reported providing a sputum sample for TB diagnostics, despite similar cough duration and frequency of sputum production. (Paper I)
- Women are perceived to have a need to double-check before following prescriptions, whereas men were said to "push the doctor" in order to get the investigations done. (Paper IV)

Chest x-ray

In study V, 299 men and 67 women, with new sputum smear positive pulmonary TB, providing a chest x-ray, were identified. The distribution of the major CXR characteristics is presented in table 7 . Significantly more men had pleurosis or/and miliary findings. Cavitation was more often present in the male group, and the mean value of number of cavities was also higher among men than women (0.53 versus 0.39; p=0.31). (Table 7)

Table 7: Major chest x-ray outcomes among men and women with smear positive pulmonary TB

	Men		Women		P-value*
	n = 299	(% of men)	n=67	(% of women)	
Mediastinal adenopathy	34	(11.4)	3	(4.5)	0.09
Hilar adenopathy	194	(64.9)	41	(61.2)	0.56
Cavitation	153	(51.2)	28	(42)	0.19
Non-cavity infiltrate	295	(98.7)	65	(98.5)	0.91
Miliary findings	33	(11)	2	(3)	0.04
Pleurosis	52	(17.4)	2	(3)	0.002
Calcification	30	(10)	4	(6.2)	0.32
Fibrosis	13	(4.3)	4	(6.1)	0.55

The CXR findings of pleurosis and cavities (29 men), miliary findings and cavities (17), pleurosis and miliary findings (11) were found in men only. CXR lesions were most common in the upper lobes, and cavities in the upper as well as lower lobes were equally distributed in men and women. Significantly more men than women had hilar adenopathy on the left side (48 versus 34%; p=0.03); otherwise there were no gender differences in right versus left CXR findings.

During the time between initial symptoms and diagnosis of TB for cavitary disease as well as pleurosis and miliary disease, there was an increase in the reporting of weight loss, cough, laboured breathing and chest pain. The reporting of blood cough and

fever at diagnosis unexpectedly decreased among the patients with cavities or miliary disease, and reporting of blood cough also decreased among those with pleurosis.

In summary (Paper V):

- Men had significantly more chest x-ray findings of pleurosis and miliary findings.
- Cavities were more frequent among men, though non-significantly.
- There were no major gender differences in localisation of chest x-ray findings.
- Clinical correlation between chest x-ray outcomes and clinical symptoms was in general good without significant gender differences, though blood cough and fever unexpectedly decreased with time among cases with cavities and miliary disease.

Doctor's delay; doctors' explanations

The longer doctor's delay among female TB patients discussed in the focus groups and interviews, was interpreted by the doctors as being caused by the patient delaying investigations, by simply not attending them immediately. In addition, this was explained by references to gender characteristics. (Paper IV)

"TB is a very common disease in the rural areas. When somebody gets TB it is easier if it's a man, he can bike to the hospital. Women have to ask their husbands or children to be transported to the hospital. Not every woman can go by herself. So men can supply the [sputum] test during 3 subsequent days, if the doctor asks for it, but women cannot." Male Dr FG2

"Vietnamese women are very shy, they have a character of their own. You know they are afraid when they make contact. They consult me about their health, and after examining them I propose an investigation. After some 5 days they will come back with the result and I ask 'what took you so long?' They say that they were very busy taking care of the children and the family. Maybe this is how the TB diagnosis gets delayed." Male Dr FG1

Our informants repeatedly stated that doctors in Vietnam give men and women the same treatment without any gender bias, and thus would not be responsible for a longer doctor's delay among female TB patients. They argued that the patient-doctor encounter should be based on an equality principle, i.e. identical treatment of men and women, despite the fact that they also acknowledged gender-specific needs regarding diagnosis and treatment of TB.

"*I think we examine all patients equally, without any difference between men and women. In my opinion, the delay only depends on the attitude of the patient.*" Male Dr FG1

"*The woman is always busier with work at home than the man is. Who will take care of the family if the woman has to stay at the TB unit*?" Male Dr FG4

"I don't discriminate against any patients, male or female, it is the same for me. I have the same attitude towards all patients. I usually encourage them to follow the

treatment, and advise them that TB is a curable disease. During the encounter, I can make them feel the same, I can ask them about their lives and about previous contacts with TB patients and their economy, so I get to know them." Male TB Dr FG7

In summary (Paper IV):

- Gender characteristics were perceived as explanations for differences between men and women in health care seeking and delay, with men being more willing to follow prescriptions.
- Doctors denied any responsibility for a longer delay among female TB patients; instead, responsibility was shifted towards the patient or towards the TB unit.
- Women were described having problems following prescriptions and the referral system due to gender-related requirements. This was perceived as the major cause of "doctor's delay".
- Doctors emphasised their equal treatment of men and women in any situation, though some doctors recognised that gender specific needs may exist among TB patients.

The patient-doctor encounter

Some physicians in paper IV thought the success of the patient-doctor encounter was dependent on gender and much easier if doctor and patient were of the same sex, whereas others said communication was just as easy regardless. The respondents seemed also to see that gender create different needs and expectations during the doctor-patient encounter.

"I would like to emphasise that the understanding between doctor and patient depends a lot on the sex of the doctor. If the doctor is male and the patient is male, they have an easy understanding." Male Dr FG2

" *I explain more to women. I inform them that TB is a curable disease. I inform that it's better if treatment is started sooner, it is easier to cure. With women we have to talk softly, not directly. We spend more time with the female patient."* Female Dr FG5

The senior male doctor interviewed recognised the importance of the patient-doctor encounter. He also brought up lack of empathy leading to stereotypical behaviour and lack of understanding of the individual patient.

"*I agree they [the doctors] are busy, but they are robots; they use one-way communication. They fulfil their responsibilities with techniques. I have stated the need for a reorientation several times now*." Senior male Dr

In summary (Paper IV):

- Conflicting views were expressed by the doctors regarding the importance of gender in the meeting between patient and doctor.
- Gender was recognised by some respondents as creating differential needs during the patient-doctor encounter.

Discussion

This thesis describes the pathways towards case detection of TB in Vietnam, especially focusing on what characterises the obstacles met by women and men on their way to TB diagnosis. The pathways towards diagnosis often cross borders between the national and the private health care system, and involve personal and community life.

Below the findings will be discussed in relation to the pathway to TB diagnosis and barriers along its way, starting with a discussion on TB case detection, including the WHO perspective.

Case detection

Under-detection of sputum smear positive pulmonary TB cases

There is clear evidence that TB in many countries is under-diagnosed, though the magnitude of under-diagnosing is difficult to estimate (Dye, Scheele et al. 1999). In Bavi district in Vietnam, the estimated "true" prevalence of sputum smear positive pulmonary TB in the population was higher compared to the reported prevalence rates among both women and men (paper III). Nationally reported notification rates in Vietnam show a similar male-to-female ratio to what is reported in Bavi, suggesting that sputum smear positive TB is more common among men, whereas the findings in paper III suggest an equal prevalence of TB among men and women in Bavi.

The point estimates of case detection within the NTP in Bavi were 39% among men and 12% among women, which is far from the nationally reported case detection rate of 80% of all smear-positive TB cases (WHO 2002a). The findings suggest that TB is under-diagnosed among both men and women in this district, and most clearly among women.

Very few studies comparing active versus passive case finding have been published; however the previously mentioned study from Nepal shows findings similar to our results. In the Nepal study from 1980 the male: female ratio was 1.2:1 in the screening group, as opposed to 2.6:1 in the passive case detection/self-reported group (Cassels, Heineman et al. 1982). The setting where this investigation was performed, was an area where health services were difficult to access for parts of the population, and the study took place well before the expansion of the DOTS programme. Study III was performed in a country where National TB Programme (NTP) guidelines are widely applied, and where close to 100% of the population are reported to have access to DOTS through the Vietnamese NTP framework (WHO 2002a). The Vietnamese NTP is one of the 22 TB high-burden countries identified by the WHO, and the NTP in Vietnam reports having reached the WHO targets of 70% case detection and 85% cure rate (WHO 2002a). However, the findings of significant under-detection of TB in Bavi district provide reasons to reassess the progress of the Vietnamese NTP.

Are the methods used to estimate TB case detection relevant in Vietnam?

There exists no gold standard method for estimating case detection ratios, given the fact that true prevalence or incidence data rarely is available. In their Global burden of Tuberculosis study, Dye et al use three different methods for extrapolation of case detection (Dye, Scheele et al. 1999). These were based on a) Data on case notification reported to the WHO, b) Data on annual risk of infection (ARI), based on tuberculin surveys, and, c) Data on smear positive TB from prevalence surveys. For each country assessed, the best available data was used.

In Vietnam, results from the prevalence of infection surveys during the 1980-90s were used to calculate incidence of sputum smear positive cases. An ARI of 1% has been approximated to correspond to 50 new sputum smear positive TB cases, which was the ratio used for Vietnam in the consensus statement (Dye, Scheele et al. 1999). The "1% ARI corresponds to 50 incident cases" formula by Styblo was developed in the absence of TB control activities, and well before the HIV epidemic started (Rieder 1999). Criticism has been raised against this method for estimating true incidence (Borgdorff 2002). If a TB programme identifies many TB cases early on in the disease process, the average number of infections per case is likely to go down, and, in turn, a 1% ARI in such a setting would correspond to a higher number of incident smear positive TB cases. (Borgdorff 2002). The HIV epidemic does not yet pose a big challenge to TB control in Vietnam, but, given the well-structured NTP, the increasing ARI rates in Vietnam could be associated with a higher number of actual incident smear positive TB cases. The estimated national case detection ratio may thus be too high (80% [low:high 70-85] (Dye, Scheele et al. 1999)). The findings in paper III indicate, that case detection is actually lower than estimated among both men and women, and most clearly this is so for women. This supports the criticism against current methods used for extrapolating case detection. Thus, the need for actual prevalence or incidence surveys to evaluate case detection is evident.

Extrapolations of under-detection of TB in Bavi

Styblo's formula states that one prevalent infectious TB case infects about 10 people per year. If lifetime risk of developing active TB is about 10%, one prevalent, contagious TB case with 2 years of disease duration would cause 2 incident TB cases (Rieder 1999), assuming an epidemiological steady state. Bearing in mind that the formula might underestimate the incidence, it could still be applied to the findings from Bavi in order to get a rough approximation of the magnitude of the TB problem.

It is likely that some of the undetected prevalent TB cases in Bavi would eventually get diagnosed and become subject to treatment, after which infectiousness diminishes and these extrapolations no longer hold true. Ten individuals with TB (40%) in study III had been coughing for more than one year. Approximating each one of these cases infects 20 people, implies 200 new infections, and subsequently about 20 new TB cases, given current low HIV prevalence rates. In the estimated worst-case scenario, 146 cases would be undetected in Bavi. If 40% of those cases also remained long-term undiagnosed cough cases with infectious TB, there would be an additional 117 new TB cases generated. These are crude extrapolations, not reliable regarding absolute numbers. Still, they do provide a possibility for reflection on the magnitude of the problem with untreated TB cases that might exist in Bavi.

No detection equals no treatment?

In his work from Ho Chi Minh City (HCMC) in Vietnam, Lönnroth reports that the non-detection ratios of TB should be regarded as an indicator of individuals who are treated by other types of providers than the NTP, such as practitioners within the private sector, rather than cases that do not receive any TB treatment at all (Lönnroth 2000). Lönnroth describes how TB patients and suspected TB patients use private providers and private pharmacies, sometimes in combination with treatment received from the NTP, sometimes as the only providers. His studies are based on interviews with diagnosed TB patients and suspected TB patients seeking care at district TB units, and may not be representative for the parts of the population that neither reach the NTP nor get a TB diagnosis (Lönnroth 2000). In addition, HCMC, situated in southern Vietnam, is the largest city in Vietnam and represents an urban setting where life in many respects differs from that in rural areas in northern Vietnam.

In the Bavi context, it does seem more likely that non-detection could actually imply no TB treatment. Only 20% of the men and women with TB diagnosed in our population-based study, had been to a hospital, the only provider who offered sputum smear testing for TB (papers I,III). Though all women and most of the men who got a TB diagnosis in the screening survey had taken a health care action, these individuals did neither report being informed about a possible TB diagnosis, nor starting any kind of TB treatment. Still, 64% of the TB cases identified reported cough of more than 3 months duration. Both men and women with TB took health care actions, and the pattern of preferences of providers sought, was similar to what was found among all the cough cases, a high frequency of visits to the unqualified providers in favour of those within the national health care system. Thus, non-detection of TB in Bavi may actually equal no treatment.

Obstacles along the way towards a TB diagnosis

Seeking health care-negotiating obstacles

Following the reformation of the Vietnamese society towards a market-oriented society starting in 1989 with the "Doi Moi" (renovation) reform, a fee-for service system for national health-care services was introduced. The reforms and unregulated market for health care services also opened up the way for private providers of all kinds, who now exist side-by-side with the national health care system. These are often unlicensed providers selling drugs or health care services for financial benefit (Falkenberg, Nguyen et al. 2000). Several studies from Vietnam have shown irrational dispensing and use of antibiotics, including TB drugs (Van Duong D 1997; Chalker, Chuc et al. 2000; Larsson, Kronvall et al. 2000; Lonnroth, Lambregts et al. 2000; Chuc, Larsson et al. 2001).

As a consequence of the "Doi Moi" reforms, the national health care system in Vietnam has been described as failing to reach the poorest parts of the population (Segall M 2000; Khe, Toan et al. 2002). Despite poverty alleviation programs, where individuals identified as poor should get exemption from some of the user fees in the national health care system, the poorest strata of the population spend a proportionally greater part of their income on health care. A major share of this spending is on rather inexpensive but frequent health care actions, that escape

political attention, like visits to unregulated providers within the private sector (Segall M 2000).

The findings in papers I, II and IV suggest, that the choice of health care provider is not only determined by financial opportunities, but also by gender. The health-seeking pattern differed significantly between men and women with TB suggestive symptoms. Women were more likely to use unlicensed, unqualified health care providers, and to make repeated health care visits. Men made more visits to hospitals, and they also spent more per visit than women. These findings support other studies from Vietnam, where a similar pattern with differences in preferences of providers sought has been described among male and female TB patients (Lonnroth, Thuong et al. 1999; Johansson, Long et al. 2000).

Johansson et al identify TB-related stigma, and fear of social consequences of TB, as having gender-specific impacts, and steering the choice of health care provider, factors that were also mentioned in paper IV (Johansson, Long et al. 2000). In paper II, it was shown that women with cough in Bavi had less knowledge than men did about medical TB characteristics, and that less knowledge in turn was associated with seeking less qualified providers. Traditional beliefs about TB seem to be strongly related to disease stigmatisation (Long, Johansson et al. 1999a; Johansson, Long et al. 2000; Johansson E 2002). Lack of knowledge about medical TB disease characteristics could thus be related to experiences of stigma and lead to disempowerment regarding the perceived available choices for seeking health care.

According to the interviewed doctors, women have to perform health care actions sanctioned by others more empowered (paper IV), and women's choices of health care providers could in view of that be interpreted as a kind of negotiation. Personal health and quality of care are at stake, and resources, convenience, social consequences, and stigma related to TB are factors, that all have to be negotiated, before a choice is made. Women in these studies seem to be more vulnerable than men to the synergistic impact of these factors, and the results imply that women with TB symptoms are more likely than men to seek care within the unregulated provider sector. Thus, gender appears as a factor predicting options for health care seeking, and the possibilities of getting a TB diagnosis.

Interaction between gender, age and socio-economic status?

Significantly more TB patients belonged to the lowest income group (64%) than in the general population (20%), which is in line with previously described findings from various contexts, where TB has been associated with poverty (Spence, Hotchkiss et al. 1993; Rieder 1999). The interaction between female gender and poverty, and its consequences for ill health has been described before, and 70% of the world's poor are estimated to be women (Puentes-Markides 1992; Paolisso and Leslie 1995; Pradep 1997). Similarly, for a disease of poverty like TB, being both socio-economically disadvantaged and female seems to create a vicious combination, displayed e.g. in the significant risk of under-detection of TB among women in paper III.

In order to examine the possible effects of this interaction, and in addition interaction with age, on health seeking behaviour, logistic regression analyses were performed.

For the indicators of health seeking behaviour in study II (hospital seeking and health care seeking), logistic regression models to evaluate interaction of gender and age, and gender and estimated yearly income, were performed (results not presented here). These calculations showed that gender together with age was significantly related to health care seeking, whereas no significant interaction effect was found between sex and income, or for hospital seeking. Socio-economic status is recognisably difficult to assess in Vietnam, and there is no obvious choice regarding which indicator to use (Khe In press). In studies II and III, the Filabavi base-line data was used to assess both total yearly income, and official classification of socio-economic status. These variables are estimated by data collected on household level. The true access to financial resources for a particular man or woman is not necessarily the same as the household's status, but is also dependent on the intra-family power hierarchy. Interaction regression analyses may therefore not reveal the true interactions between these factors.

Obstacles to seeking health care in due time

In a study from Vietnam, a longer doctor's delay to TB diagnosis among women has been reported (table 1) (Long, Johansson et al. 1999b). In the same study, the patient's delay from symptom debut to seeking a licensed medical doctor was reported to be equally long between men and women (Long, Johansson et al. 1999b). This is in contrast to the situation in paper I, where the patient's delay to hospital among women with prolonged cough was longer than among men. A reason for this difference in terms of findings between the two studies could be, that the study performed by Long et al, is based on observations done among diagnosed TB patients, i.e. hospital-based data (Long, Johansson et al. 1999b). In paper I, cough patients were studied in a population-based survey. Those women and men who delay seeking hospital care, are also the least likely to get a TB diagnosis.

In addition to the results presented from paper I, a Kaplan-Meyer survival analysis was performed with hospital seeking as the outcome event, including censored cases where cough duration represented observation time (results not presented here). This analysis showed no significant differences between men and women regarding time to event. This may reflect the fact that among those men and women who sought hospital care, men seemed to act quicker on their symptoms, whereas a majority of both men and women did not seek hospital care at all, despite quite long symptom duration. The interpretation would be in line with findings by Johansson et al, who described men in Vietnam as seeking hospital care directly, but only when symptoms were considered serious, whereas women would recognise symptoms earlier but not necessarily seek qualified care (Johansson, Long et al. 2000).

Gender-specific obstacles for men?

In line with the above-described findings, men reported less health care actions because of their cough symptoms in papers I and II, and more men than women reported not taking any health care action at all.

Masculinity research studies from high-income countries have described how expectations on the "strong, macho male" might have negative effects in terms of

recognizing symptoms and taking subsequent health care actions (Doyal 1995; Doyal 2001).

Whether similar explanations might be applied in the Vietnamese setting, has not been explored. There are probably gender-related factors, that may in fact be detrimental to men's health seeking pattern, such as the tendency to wait for symptoms to get serious before seeking care, described by Johansson et al. (Johansson, Long et al. 2000). The different cultural meanings of male and female bodies, where, according to Confucian beliefs, the male body is associated with strength and honour, may also be of importance for symptom recognition among men in Vietnam. (Rydström 1998). Yet, under-detection of TB was not significant among men in paper III. Symptoms among these men with cough may not have been perceived as being serious enough to merit health care seeking, and one explanation for this could be the high- smoking prevalence among men. Prolonged cough associated with sputum production is a common and well-known symptom among long-term smokers, and may therefore not lead to immediate health care actions, despite the possibility of these being signs of a serious disease like e.g. TB.

Obstacles among private health care providers

Despite these facts, a majority of both men and women did indeed take a health care action. Symptoms of prolonged cough were in general recognised and also acted upon, even though actions within the unregulated private health care sector were favoured at the expense of national health care providers. These findings are in correlation with what has previously been described regarding health care use in Vietnam (Chalker 1995; Toan 2001; Khe, Toan et al. 2002).

It has been shown that the market constituting private pharmacies and private providers seems detrimental to TB care (Lönnroth 2000). Sputum smear microscopy for diagnosis is not always used, record keeping is poor and treatment evaluation is rarely done. Even when the "best possible" of private providers were interviewed, senior lung-specialists in HCMC, Lönnroth concludes that the discrepancy between knowledge and practice regarding TB case management is alarming (Lönnroth 2000). Similarly, in paper I, only 13% of the men and 5% of the women had provided a sputum smear sample for TB diagnostics, despite 88% and 91% respectively having taken a health care action, and none of these sputum samples had been initiated from the private sector.

The preference of, in particular, women, but also men, to opt for care within the private sector, when seeking care for TB-suggestive symptoms, should not be neglected, if the aim is to seriously fight the current TB epidemic in Vietnam. In accordance with Lönnroth's conclusions, these providers seem to be preferred by parts of the population, and actions to involve or increase collaboration between the private and public sector regarding TB care seems crucial (Lönnroth 2000). In addition, papers I-IV emphasise that the use of unregulated providers needs to be recognised as a gender issue, which has also been shown in other low-income countries (Rangan S 1998; Uplekar, Rangan et al. 2001). Special attention is needed in order to facilitate health care seeking and case detection of TB, among especially women.

Obstacles among national health care providers

At this point, we must ask ourselves the following question. If the private providers hypothetically could be excluded from TB care because of the low quality of care provided, is there then a ready-made solution for well-functioning TB control waiting within the national health care system?

According to the findings in papers I-IV, there does not seem to be one. In paper I, it was shown that sputum smear samples for TB diagnosis were requested only from those seeking hospital care, and - apart from in one exceptional case - not at all among those visiting community health care centres. Among those seeking hospital care, still only 35% of the men, and 14% of the women, provided sputum smear samples. This finding indicates an important failure of health care providers to recognise especially these women as potential TB suspects.

These findings point towards two important, concrete problems within the national health care system in Bavi district (Paper I-II):

1. The failure to use recommended referral systems, where suspected TB cases should be referred to TB diagnostic investigations, if not performed locally.
2. The failure of hospital/high levels of care to identify suspect TB cases, especially among women, and to perform TB diagnostics.

It is easy to see how these possible failures within the national health care system could be part of an explanation for the previously reported longer doctor's delays among female TB patients, if the situation is similar elsewhere in Vietnam (Long, Johansson et al. 1999b).

However, according to the interviewed doctors from the national health care system (paper IV), the explanation is not to be found in any factors like those mentioned above. Instead, it is to be found in the gender of the TB suspects, where a longer delay among women than men with TB, is considered by these doctors to be more or less caused by the female patients themselves. The doctors regarded the patient-doctor encounter as a standardised meeting, which should preferably be equal for all patients, even though they themselves simultaneously acknowledged the existence of different, gender-specific needs. This view of the patient-doctor encounter is in line with the equality affirmative policies, promoted by the Communist Party, which states that men and women should be treated in the same way, without differences (Rydström 1998).

The equal treatment principle reported by these doctors can be questioned on the basis of the results, showing a possible gender bias in sputum smear testing (paper I). Still, even if doctors do in fact treat men and women in exactly the same way, this equality principle leads to other concerns. Women can be described as having to negotiate their health care seeking to a higher degree than men (papers I-IV), which emphasises that the positions of men and women, when meeting the doctor as a TB suspect, are not equal to start with. Thus, when an equality principle is applied to an encounter, in which positions are already unequal, the result may instead become gender blindness. The gender-specific needs are neglected, and the basic organising

gender principles still prevail, which in fact may lead to the female TB patients being under-detected (Sen G 2002).

To summarise, indirect consequences of failures on the part of the national health care services and the NTP may be identified as the following, all of them which, according to the findings in papers I-IV, seem to strike hardest against women:

1. Low knowledge of medical TB characteristics within the general population, despite NTP health education programmes targeted at increasing knowledge of these TB issues.
2. Low accessibility of the NTP and the national health care system, compared to the private sector.
3. The guiding equality principle leading to neglect of gender-specific needs during the patient-doctor encounter.

All in all, potentially leading to:

4. Lower than estimated case detection of smear positive pulmonary TB, especially among women.

Sputum smear testing and chest x-ray

If TB diagnostics were really offered to all those with suspect TB symptoms, would the diagnostic investigations then have a similar sensitivity among men and women?

The positive predictive values for smear positive TB of cough for at least three weeks, together with sputum production, were 11% for women, and 7 % for men. Given the unspecific character of these symptoms, the relatively low positive predictive values are not unexpected. The development of more advanced symptom algorithms is problematic for TB, because of the clinical diversity of the disease (Haas 2000; Miller, Asch et al. 2000; Lobue P 2000). There is also a risk of introducing a gender bias, if diagnostic algorithms are used too strictly, since symptom differences among men and women with pulmonary TB have been shown. Women with smear positive TB in Vietnam reported sputum expectoration, hemoptysis and cough at diagnosis less often than men, and their lack of symptoms were associated with a longer doctor's delay, compared to the case among men (Long, Diwan et al. 2002).

Differences in tuberculin reactions among men and women with TB, have lead to hypotheses being formulated regarding gender-specific differences in immune response to TB, that would also cause differences in chest x-ray presentation (Bothamley 1998).

The findings in paper V did not support that chest x-rays among female TB patients would show signs of a less active immune response. Instead, despite a similar delay to diagnosis, men presented advanced chest x-ray findings more often than women, and men had an unexpectedly high prevalence of radiological findings that are associated with primary manifestations of TB, or with immune-suppression, like miliary findings and pleurosis (Woodring J H 1986; Miller T. W. 1993).

Severity of TB among men and women has rarely been studied, whereas a few studies have assessed gender-specific case fatality rate and mortality of TB, which in both cases have been found to be higher among women, compared to men with TB, and do not add any possible explanations to these findings (Holmes, Hausler et al. 1998). Male pulmonary TB cases were shown to generate more new incident TB cases than female pulomonary TB cases, in a DNA-fingerprinting study from the Netherlands. It is possible that this finding might correlate to physiological gender differences in the features of pulmonary TB (Borgdorff, Nagelkerke et al. 2001). In a study of 202 patients with diabetes and TB and 226 TB patients without diabetes in Mexico, the pattern of male predominance changed in the group who had both TB and diabetes. The proportion of women was higher than the proportion of men from age 50 and onwards. The authors interpret the findings as evidence for that factors other than socio-cultural ones cause the male predominance in pulmonary TB, i.e. biological mechanisms that are triggered to a higher extent in men than in women, and in addition by diabetes in females. (Perez-Guzman C 2003). However, more information is needed before conclusions may be drawn from these studies on clinical implications, and it is difficult to speculate on their possible relation to the observed gender differences in chest x-ray findings in this setting. The major risk factor for these kind of advanced chest x-ray findings would be HIV-infection, which was reportedly low in Vietnam, and among TB cases at the time of the study (VNTP 1999; Quan, Chung et al. 2000; Quy, Nhien et al. 2002).

The chest x-ray findings need to be further explored, and two gender-specific concerns can be identified:

1. The more advanced chest x-ray findings among men compared to women could imply a combination of known or unknown risk factors for TB among men in this setting, which may also have treatment implications, and as such needs further investigation.
2. Women had less advanced chest x-ray findings, which may be more difficult to recognise as TB, and which could also correspond to a slower rate of conversion to sputum smear positivity, and contribute to the explaining why female cases go undetected.

Towards equity in case detection of TB

Gender and case detection estimates

Methodological problems with the methods, that are used to assess true incidence rates, have been acknowledged (Dye, Scheele et al. 1999; Borgdorff 2002; Cauthen, Pio et al. 2002). In current WHO publications on the global TB epidemic, estimated rates are rarely disaggregated by sex or age (Dye, Scheele et al. 1999; WHO 2002a). Given the crude rates cited, it is thought that any such approximations would be inaccurate (Dye, Scheele et al. 1999). Nevertheless, in paper III, female gender seemed to predict significant under-detection and thus gender-related barriers to TB diagnosis should be taken into account in current case detection estimates.

In addition, paper III indicates the importance of a well-functioning and regular surveillance system of TB control activities. It seems that current models for

estimating true incidence rates, may be suffering from a gender bias, at least in this context. More population-based studies in other settings, together with sentinel surveillance activities are therefore recommended, in order to enable calculations of the true prevalence and incidence of TB, and more accurate estimates of case detection and evaluation of NTP activities.

How to promote equity in access to adequate health care?

The findings in this work indicate the importance of gender as a determinant of health seeking actions, and possibilities of getting a TB diagnosis. The most important intervention recommended is thus clearly to continue the general struggle towards a society based on equity principles in terms of gender as well as regarding socio-economic determinants. These studies do not give any guidance as to promote gender equity on a societal level, whereas they do supply some indications of possibilities for change or future research from the TB control perspective. Hence, in the following, I will present different initiatives that could be discussed from the perspective of improving possibilities for gender- sensitive case detection of TB.

Health education and the 'broker' system

The health education programme promoted by the NTP did not seem to have been effective in this Vietnamese context, most evidently failing to reach women (Paper II). The top-down approach of health education programmes organised by the NTP may have suffered from a lack of contextualisation in the prevailing traditional beliefs of TB (Long, Johansson et al. 1999a). In addition, women in Bavi reported less access to the media sources of information, TV and radio. In the discussions with doctors in paper IV, the top-down perspective was also evident when proposals for reducing patient's delay were discussed. This authoritarian approach has been described as typical within the Vietnamese society, and the Vietnamese media (Finer, Thuren et al. 1998) where "education of the population" by the Communist Party is a characteristic feature of daily life (Barry 1996; Rydström 1998).

Another, potentially more successful, way to reach putative TB patients with advice on health care seeking could be what Johansson describes in her work as the informal 'broker' system. The 'broker' is a former TB patient with considerable influence on TB suspects and TB patients (Johansson 2000; Johansson E 2002). She suggests that 'brokers' could be used in Vietnam to advise TB patients during their treatment course. They could also advice TB suspects regarding knowledge about TB and health care seeking, and act as a link between the community and the NTP (Johansson 2000). This seems relevant in relation to the findings in these studies and could be one way of increasing case detection without using an authoritarian approach. In paper IV, it was demonstrated that women did perform "sanctioned health care actions" by seeking advice from family and neighbours as opposed to men, who acted directly by seeking hospital care. The 'broker' system suggested by Johansson could be a possibility to reach these women that face barriers towards adequate health care in due time, and who seem to have limited access to radio and TV, and subsequently to health education programmes.

Lay health workers and active case detection

More formally organised than the 'broker' system, is early symptom identification among TB suspects by specially trained lay health workers. A lay health worker system for increasing case detection of TB could be regarded as a way of by-passing the failure of the national health care system to cater for marginalized groups of the population, such as the women and men diagnosed with TB in Bavi in paper III.

In the Western Cape region, South-Africa, where TB is highly prevalent, a TB control lay health worker project among farm workers has been ongoing for several years (Dick, Clarke et al. 1997). The regular health care TB staff train lay health workers to recognise TB suspects among farm workers, refer them to diagnosis, and to increase adherence in diagnosed TB cases by providing continued support and information in the immediate environment at the farm (Dick, Clarke et al. 1997; Clarke M 2003).

Active case finding in the proper sense, i.e. mass-screening of TB on population level, has been discounted by the WHO and the IUATLD as less cost-effective than passive case detection (Rieder 2000). A lay health worker system in TB control could be seen as a way of performing a version of "active case finding-light". This may be achieved in the community by a combination of informal, antiauthoritarian, early case identification by the lay-health workers and through raising awareness of TB and bridging the physical as well as psychological distance between the TB suspect patient and the health care system. In the South-African setting, the farm owners employ the lay health workers, and the project is considered of mutual benefit to both the farming community and TB control (Clarke M 2003). Currently, too little is known about these kinds of initiatives to be able to properly judge the gender sensitivity of such a system, and its cost-effectiveness.

Vietnam is, despite being a low-income country, recognised for its well-functioning health care system, coupled to governmental commitment to public health (Toan 2001). There ought, therefore, to be good possibilities of diminishing gender and socio-economic inequities regarding TB control, from within the national health care system, compared to the case in other low-and middle-income settings. Still, it may be concluded that within the Vietnamese setting in Bavi, where case detection of TB seems to be much lower than estimated, new initiatives to promote TB case detection are urgently needed. These may require involvement or collaboration with providers, or individuals acting outside the national health care system in order to succeed.

Gender of lay health workers

Lay health workers are most often women. Programmes seeking to involve mothers as key persons in the identification and treatment of for example malaria have put extra stress on an already vulnerable group, which has been criticised (Rathgeber and Vlassoff 1993; Standing 2002). By asking mothers to be responsible for the treatment of sick children without supplying extra resources, the caring role of women is emphasised without the women themselves having any additional power to act on their increased knowledge. Thus, any intervention designed to make use of the involvement of lay persons, should be carefully reviewed, so that the intervention in itself does not place an additional burden on women, who, in low-income countries in

particular, are shown to already face double or triple workloads (Rathgeber and Vlassoff 1993; Vlassoff and Bonilla 1994).

Equity or equality?

In the public health context, gender equality indicates identical treatment, whereas gender equity implies differentiated treatment, when it is needed. When biological disease characteristics interact with social determinants to create situations of different needs among men and women with potential disease, the equity principle is essential (Sen G 2002). Defined in this way, gender equity in health is equal to the absence of gender bias. For a disease like TB, it is particularly important to ensure that "bias does not masquerade as 'natural' biological differences", as could be the case given the assumption that TB is more common among men in Vietnam (Sen G 2002).

To avoid gender blindness in the patient-doctor encounter, the possibility of getting a TB diagnosis should be governed by an equity principle, i.e. by the particular needs of each women or man with suspected TB. In practice, this means that the patient-doctor encounter has to be individualised and lead to the empowerment of the patient. For a disease associated with stigma and traditional beliefs, patient empowerment is of great importance for successful case detection and treatment (Johansson E 2002).

In order to provide TB control guided by an equity principle, it is necessary to increase the awareness of possible sources of gender bias and disempowerment among those providing TB care. Whereas health education among TB-suspected patients seems to partly have failed (paper II), targeted education to increase gender sensitivity among providers has yet to be tried in Vietnam. Provider attitudes and gender are areas that have been studied in some settings (AbouZahr, Vlassoff et al. 1996; Rangan S 1998). Lack of time and motivation within the Indian health care system have been shown to negatively effect utilisation, especially among women (Rangan S 1998). It has been shown that the gender of provider and patient are important, and if doctors share the opinion voiced in paper IV, where communication was said to be easier if the doctor and patient are of the same gender, it seems to be of uttermost importance that both male and female providers are available to start with (Vlassoff 1994).

The "one-size-fits-all" structure of the National TB programme (NTP) also needs to be discussed from an equity perspective (WHO 1999). In the light of our findings, several barriers to actual TB diagnosis can be found within the structure of the NTP. Suspect TB patients in papers I-III had to pay for the initial examinations as well as for transport to the TB unit, which in rural areas could represent a considerable distance. As mentioned in paper IV, these requirements are especially difficult for women to meet. Apart from the practical concerns associated with daily health care contacts, there are, in the case of a stigmatising disease like TB, additional aspects to consider, when analysing the DOTS policy from an equity perspective. Fear of being associated with TB may lead to a fear of the DOT regimen, where it is more or less obvious to anyone in the neighbourhood that the patient is being treated for TB, and may in turn lead to delays in following the referral chain. These factors seem especially important to the female TB patients (paper IV) (Johansson, Long et al.

2000; Johansson E 2002). In addition, criticism has been raised against the authoritarian approach represented by the DOT regimen, which is considered to work against patient empowerment (Hurtig, Porter et al. 1999; Ogden, Rangan et al. 1999; Porter and Ogden 2001). If equity during the patient-doctor encounter, and in recognising patient's needs is the desired aim, then the subsequent introduction to DOT may serve a completely opposite purpose.

On challenges of gender theory and social generalisation

The theoretical starting point for this work was that it would be less meaningful to divide any findings into predetermined categories of biology, on the one hand, or socio-cultural factors, on the other. When looking at possible reasons for the under-detection of TB in women, the difficulty of categorisation is self-evident. Female TB cases, more often than male, seem to be under-detected in this setting, and possible reasons could be identified in the context of these women's lives. Focusing on to what extent biological or social factors contribute to the differences identified among men and women appears less meaningful. Instead, it seems crucial to recognise that the described situation is in no way pre-determined but changeable.

What is evident in the findings, is the very same relational aspect of gender that was discussed from a theoretical point of view in the background. The women, facing the greatest barriers to TB diagnosis in these studies, share context- specific experiences and characteristics that interact in establishing their disadvantaged situation. The female and male TB patients detected in paper III, were poorer than the general population in Filabavi, and older than the reported NTP TB patients in Bavi. Thus it is not possible to generalise these findings to "any woman" or "any man" in Vietnam, while it is still important to recognise the vicious circle created by interactions of gender and poverty, in order to identify those groups that are at most risk of suffering its consequences.

More research focusing on gender analysis of TB and public health issues in the transitional society that Vietnam is today is needed. Living conditions vary extensively between urban and rural areas, and change rapidly. The implications of future societal changes on the findings in this study are difficult to foresee, and further situation analyses are needed.

Methodological concerns

Quantitative observational studies and a qualitative study have been performed in this work, and - given the research questions formulated - these study designs are considered to have been appropriate. There do however naturally remain design flaws, some of which are discussed in detail in the methods' section, whereas some more general concerns are raised below.

Studies I-III and V

A major strength of studies I-III is their population-based design. Filabavi is a random sample of the population in Bavi, and the studies performed during household visits represent the population in Bavi rather than hospital-based or other kinds of

selected observations. The population-based design was a prerequisite for studying under-detection of TB. However, despite a sample of more than 35,000 adults, the screening survey of TB identified only 25 TB cases, which means that analyses of gender (or other) differences among the TB cases lacked statistical power.

Due to the cross-sectional design of study III, prevalence, rather than incidence, of new smear positive pulmonary TB, was estimated. A diagnosed TB case was considered a case during the full treatment period, 8 months within the Vietnamese NTP.

The case detection ratios estimated were based on comparisons of the estimated "true" TB prevalence in Filabavi with the TB prevalence of the NTP in Bavi (exclusive of Filabavi). Another choice could have been to compare the Filabavi NTP prevalence with the estimated "true" prevalence in Filabavi. Apart from a smaller number of cases, this would have raised other methodological concerns. The screening survey for TB took place during three months in the villages/clusters. It is likely that news about the screening survey increased awareness of TB. Therefore, potential TB cases may have been more likely to seek health care contact and get diagnosed within the NTP. This effect is beneficial for the estimate of "true" prevalence, which is likely to be under-estimated in any case, but would have effected an evaluation of the efficacy of the Vietnamese NTP, diluting the magnitude of under-detection.

Study V represents selected observations, i.e. patients who have reached health care services and the National TB programme. It is difficult to estimate how differences in health care seeking between men and women might have influenced the findings of differences in chest x-ray presentation, especially since patient delay to diagnosis was similar among men and women in this study. This study was performed as part of a larger study on gender differences in TB epidemiology, and shared its cross-sectional design. A way to further explore possible gender differences in chest x-rays among TB patients, and also their relation to sputum smear and culture positivity would be to perform a longitudinal, if possible population-based, study among individuals with TB-suggestive symptoms.

Study IV

The aim of this study was to analyse data from a gender perspective. There are other methods of data analysis, e.g. discourse analysis, which would perhaps have been better suited to identify power systems and gender inequities. However, this would have required a closer analysis of the exact language used by the respondents. None of the Swedish researchers speak Vietnamese, and so the data material had to be translated, which made it less suitable for analysis by any method, based on a literal interpretation of wording. Content analysis was thus the method chosen to reflect the data in a most valid way (Barnard 1991).

To explore further possible gender bias during the TB patient-doctor encounter, other methods for data collection, like non-/participant observation, could be used and both quantitative and qualitative methods could be applied for analyses of this kind of data.

Conclusions

So far, the WHO recommended DOTS strategy based on self-referral has prevailed in Vietnam. The under-detection of women found in Bavi highlights a need for a discussion on gender equity aspects of the internationally recommended DOTS strategy. Gender equity should be the guiding principle for the TB patient-doctor encounter, and interventions seem urgently to be needed in order to increase the gender sensitivity of all aspects of the health care seeking chain leading to TB diagnosis. In addition the need for collaboration between the private sector and the NTP to facilitate diagnosing, treatment and reporting of TB within the private sector in Vietnam, should be recognised as a gender issue, where women are the ones most in need of further actions.

Case detection within an established well-functioning TB programme in relation to WHO set goals has rarely been investigated before; this is an area, where this thesis supplies new information. The study results are applicable to a Vietnamese rural population, but could be discussed also in relation to other low- and middle- income settings with a similar gender structure.

We have identified several factors determining the possibilities of finding adequate care within the diversified health care system of Vietnam. Gender interacts with poverty and creates a situation in which women more often than men face important barriers towards adequate health care. An increased understanding of the socio-cultural or biological factors in Vietnam, influencing the woman or man with TB should not be regarded as the goal in itself, but rather as a way of identifying processes, leading to the 'structural violence', that actually creates inequities detrimental to health.

Future research recommendations

- Population-based studies are needed globally to establish TB prevalence, incidence and case detection among women and men, and consequently to improve global TB control strategies.

- Research into the health-care seeking chain in different settings, in order to identify and quantify the specific steps, where TB diagnosis of men and women may be delayed.

- Longitudinal studies in order to evaluate gender differences in clinical presentation, including CXR, sputum smear conversion and sputum culturing among TB suspects are needed.

- Interventions targeted both at increasing the gender sensitivity of the Vietnamese NTP, as well as increasing gender sensitive collaboration between private providers and the NTP, should be evaluated

- Possibilities to involve a gender-sensitive ‘broker’ system as suggested by Johansson, or a lay health-worker system should be evaluated for increasing case detection of TB, especially in rural and remote areas.

Acknowledgements

I'm privileged to have had the possibility to work with this research in Vietnam, and I'm most grateful to the people in Bavi district, Quanh Ninh province and at TB units in Vietnam who took part in these studies.

My sincere thanks to Dr N T K Chuc for accepting me as a research student within the Health System Research programme, and to her and others within Filabavi, at HSPI and Hanoi Medical School who have helped me practically and administratively. Credit and recognition should go to Dr N P Hoa, my PhD-student companion and friend, for good collaboration with the Filabavi studies.

I've had the opportunity to have as supervisors, Vinod Diwan, Karolinska Institutet and Peter Allebeck, Göteborgs Universitet.

Vinod, thank you for taking me on as a PhD student, for your kind support, optimistic attitude and willingness to listen and discuss. Peter, thank you for providing friendly support and valuable advice, and for quickly supplying distinct answers to sometimes vague questions.

Many people at **IHCAR** and the **Nordic School of Public Health** have assisted and supported me in various ways during this work. I would especially like to thank:

Hans Rosling, for continued support and for finding time to share his knowledge in various aspects of international health.

Staffan Bergström, for a very welcome and well-timed introduction to IHCAR, and for encouragement during the PhD process.

Eva Johansson, for introducing me to Uong Bi and providing friendly supervision during the qualitative study, in addition to being a good research group leader at IHCAR.

Mattias Larsson, D T T Mai and her family, for welcoming me to the home of Mai's family and for sharing various aspects of life in Hanoi with me.

Bo Eriksson and Max Petzold, for valuable guidance to the world of statistics.

Cecilia Ekéus, for reading and supplying constructive comments on the cover story.

Asli Kulane, for carefully reading the final version.

N H Long and Knut Lönnroth, in the TB research group, for helpful hints and good collaboration as well as good company in Sweden and Vietnam.

Rose Wesley-Lindahl and Birgitta Linnanheimo, for excellent administrative assistance.

David Finer, for helpful language revisions.

Lars Hedlund and Peter Hedebro, for efficient computer support.

I'm also deeply grateful to this thesis and to IHCAR. Some unique persons I would never have met without them. There would, probably, still have been a thesis even if I hadn't met you; but writing it had been much less of a thrill.

In addition I would like to express my sincere gratitude to:

Anna Winkvist, for her detailed and valuable comments provided during my pre-dissertation.

Liv Ahlborg, for superior company during our initial contacts with international public health and for continuing exchanges about diverse features of research.

Lars Olof Larsson, for generously sharing his time and expertise in clinical aspects of TB and chest x-rays.

The **Infectious disease clinic, Karolinska Hospital**, for allowing me to concentrate my work to research during this time, while still welcoming me back to clinical work.

Karolin Tengstam, for understanding advice and specific help with the design.

Boris Kan, for concrete remarks during the last minutes of writing.

Sida/SAREC who contributed financially to the project.

My final thanks to:

Friends. Your presence lightened the load.

Eva, Staffan, Mats, Johan and my grandfather Sixten. We are family. Quite phenomenal!

References:

AbouZahr, C., C. Vlassoff, et al. (1996). "Quality health care for women: a global challenge." Health Care Women Int **17**(5): 449-67.

Agar M, J. M. (1995). "Focus Groups and Ethnography." Human Organization **54**(1): 78-86.

Bacakoglu, F., O. O. Basoglu, et al. (2001). "Pulmonary tuberculosis in patients with diabetes mellitus." Respiration **68**(6): 595-600.

Baily, G. V. (1980). "Tuberculosis prevention Trial, Madras." Indian J Med Res **72 Suppl**: 1-74.

Barnard, P. (1991). "A method of analysing interview transcripts in qualitative research." New Education today 11: 461-466.

Barrett M, A. P. (1992). Introduction. Destabilizing theory Contemporary feminist debates. A. P. M Barrett. Cambridge, Polity Press.

Barry, K., Ed. (1996). Vietnamese women in transition. International political economy Series. London, MacMillan Press.

Begum, V., P. de Colombani, et al. (2001). "Tuberculosis and patient gender in Bangladesh: sex differences in diagnosis and treatment outcome." Int J Tuberc Lung Dis **5**(7): 604-10.

Björk, N. (1996). Under det rosa täcket (Under the pink cover), Wahlström&Widstrand.

Blower, S. M., P. M. Small, et al. (1996). "Control strategies for tuberculosis epidemics: new models for old problems." Science **273**(5274): 497-500.

Boeree, M. J., A. D. Harries, et al. (2000). "Gender differences in relation to sputum submission and smear-positive pulmonary tuberculosis in Malawi." Int J Tuberc Lung Dis **4**(9): 882-4.

Borgdorff, M. (2002). "Annual risk of tuberculosis infection-time for an update?" Bull World Health Organ **80**(6): 501-502.

Borgdorff, M. W., N. J. Nagelkerke, et al. (2001). "Transmission of Mycobacterium tuberculosis depending on the age and sex of source cases." Am J Epidemiol **154**(10): 934-43.

Borgdorff, M. W., N. J. Nagelkerke, et al. (2000). "Gender and tuberculosis: a comparison of prevalence surveys with notification data to explore sex differences in case detection." Int J Tuberc Lung Dis **4**(2): 123-32.

Bothamley, G. (1998). Sex and Gender in the pathogenesis of Infectious Tuberculosis: A perspective from Immunology, Microbiology and Human Genetics. Gender and Tuberculosis. T. A. Diwan V, Winkvist A. Göteborg.

Butler, J. (1990). Gender trouble: Feminism and the subversion of identity. New York, Routledge.

Byass P,(In press). "Patterns of mortality in Bavi, Vietnam, 1999-2001." Scandinavian journal of Public Health.

Cassels, A., E. Heineman, et al. (1982). "Tuberculosis case-finding in Eastern Nepal." Tubercle **63**(3): 175-85.

Cauthen, G. M., A. Pio, et al. (2002). "Annual risk of tuberculous infection. 1988." Bull World Health Organ **80**(6): 503-11; discussion 501-2.

Chakraborty, A. K., H. V. Suryanarayana, et al. (1995). "Prevalence of tuberculosis in a rural area by an alternative survey method without prior radiographic screening of the population." Tuber Lung Dis **76**(1): 20-4.

Chalker, J. (1995). "Viet Nam: profit and loss in health care." World Health Forum **16**(2): 194-5.

Chalker, J., N. T. Chuc, et al. (2000). "STD management by private pharmacies in Hanoi: practice and knowledge of drug sellers." Sex Transm Infect **76**(4): 299-302.

Chrisman, N. J. (1977). "The health seeking process: an approach to the natural history of illness." Cult Med Psychiatry **1**(4): 351-77.

Chuc N T, Diwan V. (In press). "Introduction: FilaBavi a demographic surveillance site." Scandinavian Journal of Public Health.

Chuc, N. T, M. Larsson, et al. (2001). "Management of childhood acute respiratory infections at private pharmacies in Vietnam." Ann Pharmacother **35**(10): 1283-8.

Clarke. M Cape Town (2003). TB lay-health worker project. P. communication.

Crofton J, N. H., F Miller (1992). Clinical Tuberculosis. London, McMillan.

Daniel, T. M. (1989). "Rapid diagnosis of tuberculosis: laboratory techniques applicable in developing countries." Rev Infect Dis **11 Suppl 2**: S471-8.

Danielsson, M. (2002). "Jämställdhet och mäns medellivslängd (Gender equity and male life expectancy)." Kvinnovetenskaplig tidskrift **23**(2-3): 19-44.

Davis, A. (2000). A Historical perspective on TB and its control. Tuberculosis A comprehensive international approach. H. E. Reichman L. New York, Marcel Dekker INc.

Dick, J., M. Clarke, et al. (1997). "Combating tuberculosis--lessons learnt from a rural community project in the Klein Drakenstein area of the Western Cape." S Afr Med J **87**(8 Suppl): 1042-7.

Diwan V, T. A., Winkvist A, Ed. (1998). Gender and Tuberculosis. NHV report. Göteborg, The Nordic School of Public Health.

Diwan, V. K. and A. Thorson (1999). "Sex, gender, and tuberculosis." Lancet **353**(9157): 1000-1.

Dolin, P. (1998). Tuberculosis epidemiology from a gender perspective. Gender and Tuberculosis. T. A. Diwan V, Winkvist A. Göteborg, NHV. **NHV report 1998:3**.

Doyal, L. (1995). What makes women sick Gender and the political economy of health. London, Macmillan.

Doyal, L. (2000). "Gender equity in health: debates and dilemmas." Soc Sci Med **51**(6): 931-9.

Doyal, L. (2001). "Sex, gender, and health: the need for a new approach." Bmj **323**(7320): 1061-3.

Drobniewski F, A. M. C., A Gibsona and D Young (2003). "Modern laboratory diagnosis of tuberculosis." The Lancet Infectious Diseases **3**(3): 141-147.

Dr Hanh, Deputy director., Bavi District Hospital (2002). HIV prevalence in Bavi. P. communication.

Dr N P Hoa, National institute of Tuberculosis and Lung Disease, Hanoi (2002). Prevalence of environmental Mycobacteria in Vietnam. P. communication.

Dye, C., M. A. Espinal, et al. (2002). "Worldwide incidence of multidrug-resistant tuberculosis." J Infect Dis **185**(8): 1197-202.

Dye, C., G. P. Garnett, et al. (1998). "Prospects for worldwide tuberculosis control under the WHO DOTS strategy. Directly observed short-course therapy." Lancet **352**(9144): 1886-91.

Dye, C., S. Scheele, et al. (1999). "Consensus statement. Global burden of tuberculosis: estimated incidence, prevalence, and mortality by country. WHO Global Surveillance and Monitoring Project." Jama **282**(7): 677-86.

Dye, C., C. J. Watt, et al. (2002). "Low access to a highly effective therapy: a challenge for international tuberculosis control." Bull World Health Organ **80**(6): 437-44.

Falkenberg, T., T. B. Nguyen, et al. (2000). "Pharmaceutical sector in transition--a cross sectional study in Vietnam." Southeast Asian J Trop Med Public Health **31**(3): 590-7.

Farmer, P. (1996). "Social inequalities and emerging infectious diseases." Emerg Infect Dis **2**(4): 259-69.

Farmer, P. (1997). "Social scientists and the new tuberculosis." Soc Sci Med **44**(3): 347-58.

Farmer, P. (2001a). "DOTS and DOTS-plus: not the only answer." Ann N Y Acad Sci **953**: 165-84.

Farmer, P. (2001b). "The major infectious diseases in the world--to treat or not to treat?" N Engl J Med **345**(3): 208-10.

Finer, D., T. Thuren, et al. (1998). "Tet offensive: winning hearts and minds for prevention. Discourse and ideology in Vietnam's "Health" Newspaper." Soc Sci Med **47**(1): 133-45.

Flax, J. (1990). Thinking fragments: Psychoanalysis, Feminism and Postmodernism in the Contemporary west. Berkeley, University of California Press, 1990.

Frieden, T. R., P. I. Fujiwara, et al. (1995). "Tuberculosis in New York City--turning the tide." N Engl J Med **333**(4): 229-33.

Gammeltoft, T. (1999). Women's bodies, Women's worries. Health and Family Planning in a Vietnamese Rural community. Richmond, Curzon Press.

Godfrey-Faussett, P., H. Kaunda, et al. (2002). "Why do patients with a cough delay seeking care at Lusaka urban health centres? A health systems research approach." Int J Tuberc Lung Dis **6**(9): 796-805.

Gothi GD, A. C., SS Nair, KT Ganapathy, GC Banerjee (1979). "Prevalence of Tuberculosis in a south Indian district-twelve years after initial survey." Ind J Tub **XXVI**(3): 121-135.

Gothlin, E. (1999). Kön eller genus? Könsperspektiv i forskning och undervisning, Göteborg, Nationella sekretariatet för genusforskning.

Graham, S., G. K. Das, et al. (2002). "Chest radiograph abnormalities associated with tuberculosis: reproducibility and yield of active cases." Int J Tuberc Lung Dis **6**(2): 137-42.

Grange, J. (1999). The global burden of tuberculosis. Tuberculosis-an interdisciplinary perspective. J. G. J Porter. London, Imperial college press.

Grange, J. M., M. Gandy, et al. (2001). "Historical declines in tuberculosis: nature, nurture and the biosocial model." Int J Tuberc Lung Dis **5**(3): 208-12.

Gupta, R., J. Y. Kim, et al. (2001). "Public health. Responding to market failures in tuberculosis control." Science **293**(5532): 1049-51.

Haas, D. (2000). Mycobacterial diseases. Principles and practice of infectious diseases. J. B. G Mandell, R Dolin. Philadelphia, Churchill Livingstone. **2:** 2576-2607.

Harding, S. (1986). The science question in feminism. Ithaca, Cornell University Press.

Harding, S. (1991). Whose science? Whose knowledge? Thinking from women's lives. Milton Keynes, Open University Press.

Haughton, J. and D. Haughton (1995). "Son preference in Vietnam." Stud Fam Plann **26**(6): 325-7.

Holmes, C. B., H. Hausler, et al. (1998). "A review of sex differences in the epidemiology of tuberculosis." Int J Tuberc Lung Dis **2**(2): 96-104.

Hopewell P, R. C., Ed. (2000). Tuberculosis and HIV. Tuberculosis-A comprehensive International approach. New York, Marcel Dekker.

Hurtig, A. K., J. D. Porter, et al. (1999). "Tuberculosis control and directly observed therapy from the public health/human rights perspective." Int J Tuberc Lung Dis **3**(7): 553-60.

Jaggar, A. (1997). Human biology in feminist theory: Sexual equality reconsidered. Key concepts in critical theory: Gender. C. Gould. New jersey, Humanities Press.

Johansson, A., H. T. Hoa, et al. (1996). "Family planning in Vietnam--women's experiences and dilemma: a community study from the Red River Delta." J Psychosom Obstet Gynaecol **17**(1): 59-67.

Johansson, E. (2000). Emerging perspectives on tuberculosis and gender in Vietnam. Epidemiology, Dep of Pulic Health and clinical medicine. Umeå, Umeå University.

Johansson, E., N. H. Long, et al. (2000). "Gender and tuberculosis control: perspectives on health seeking behaviour among men and women in Vietnam." Health Policy **52**(1): 33-51.

Johansson E, W. A. (2002). "Trust and transparency in human encounters in tuberculosis control: Lessons learned from Vietnam." Qualitative health research **12**(4): 473-491.

Kandrack, M. A., K. R. Grant, et al. (1991). "Gender differences in health related behaviour: some unanswered questions." Soc Sci Med **32**(5): 579-90.

Khan, A., J. Walley, et al. (2000). "Tuberculosis in Pakistan: socio-cultural constraints and opportunities in treatment." Soc Sci Med **50**(2): 247-54.

Khe N D, B. E., DN Phuong, B Höjer, VK Diwan (In press). "Faces of poverty: sensitivity and specificity of economic classification in rural Vietnam." Scandinavian Journal of Public Health.

Khe, N. D., N. V. Toan, et al. (2002). "Primary health concept revisited: where do people seek health care in a rural area of Vietnam?" Health Policy **61**(1): 95-109.

Larsson, M., G. Kronvall, et al. (2000). "Antibiotic medication and bacterial resistance to antibiotics: a survey of children in a Vietnamese community." Trop Med Int Health **5**(10): 711-21.

Lawn, S. D., B. Afful, et al. (1998). "Pulmonary tuberculosis: diagnostic delay in Ghanaian adults." Int J Tuberc Lung Dis **2**(8): 635-40.

Lobue P, S. P., A Catanzaro (2000). Diagnosis of Tuberculosis. Tuberculosis-A comprehensive international approach. H. E. Reichman L. New York, Marcel dekker.

Long, N. H. (2000). Gender specific epidemiology of Tuberculosis in Vietnam. Division of International Health. Stockholm, Karolinska Institutet.

Long, N. H., V. K. Diwan, et al. (2002). "Difference in symptoms suggesting pulmonary tuberculosis among men and women." J Clin Epidemiol **55**(2): 115-20.

Long, N. H., E. Johansson, et al. (1999a). "Different tuberculosis in men and women: beliefs from focus groups in Vietnam." Soc Sci Med **49**(6): 815-22.

Long, N. H., E. Johansson, et al. (1999b). "Longer delays in tuberculosis diagnosis among women in Vietnam." Int J Tuberc Lung Dis **3**(5): 388-93.

Lonnroth, K., K. Lambregts, et al. (2000). "Private pharmacies and tuberculosis control: a survey of case detection skills and reported anti-tuberculosis drug dispensing in private pharmacies in Ho Chi Minh City, Vietnam." Int J Tuberc Lung Dis **4**(11): 1052-9.

Lonnroth, K., L. M. Thuong, et al. (1999). "Delay and discontinuity--a survey of TB patients' search of a diagnosis in a diversified health care system." Int J Tuberc Lung Dis **3**(11): 992-1000.

Lonnroth, K., L. M. Thuong, et al. (2001). "Utilization of private and public health-care providers for tuberculosis symptoms in Ho Chi Minh City, Vietnam." Health Policy Plan **16**(1): 47-54.

Lönnroth, K. (2000). Public Health in Private Hands; Private health in public hands Studies on private and public tuberculosis care in Ho Chi Minh City, Vietnam. Social medicine. Göteborg, Göteborg University.

Malterud, K. (2002). "Feministisk teori kan utmana medicinsk kunskap (Feministic theory can challenge medical knowledge)." Kvinnovetenskaplig tidskrift **23**(2-3): 5-18.

Mc Adams H P, E. J., Winter J A (1995). "Radiologic manifestations of pulmonary tuberculosis." Radiologic clinics of North America **33**(4): 655-678.

Miller, L. G., S. M. Asch, et al. (2000). "A population-based survey of tuberculosis symptoms: how atypical are atypical presentations?" Clin Infect Dis **30**(2): 293-9.

Miller T. W., M. T. W. J. (1993). "Tuberculosis in the normal host: Radiological findings." Seminars in Roentgenology **XXVIII**(2): 109-118.

Ministry of Health, M. (2000). Health statistical yearbook.

Morgan, D. (1996). "Focus groups." Annu. rev sociol. **22**: 129-152.

Murray, C. J. and J. A. Salomon (1998). "Modeling the impact of global tuberculosis control strategies." Proc Natl Acad Sci U S A **95**(23): 13881-6.

Nakajima, H. (1993). "Tuberculosis: A global emergency. (editorial)." World Health. **46**: 3.

Narain R, A. G., MV Jambunathan, M Subramanian (1963). "Some aspects of a tuberculosis prevalence survey in a south Indian district." Bull World Health Organ **29**: 641-664.

Nathanson, C. A. (1977). "Sex, illness, and medical care. A review of data, theory, and method." Soc Sci Med **11**(1): 13-25.

Needham, D. M., S. D. Foster, et al. (2001). "Socio-economic, gender and health services factors affecting diagnostic delay for tuberculosis patients in urban Zambia." Trop Med Int Health **6**(4): 256-9.

Ngamvithayapong, J., H. Yanai, et al. (2001). "Health seeking behaviour and diagnosis for pulmonary tuberculosis in an HIV-epidemic mountainous area of Thailand." Int J Tuberc Lung Dis **5**(11): 1013-20.

Ngamvithayapong-Yanai, J. (2003). Challenges and opportunities for TB prevention and care in an HIV epidemic area, Chiang Rai, Thailand. IHCAR. Stockholm, Karolinska Institutet.

Nguyen, T. N., C. D. Wells, et al. (1999). "The importance of quality control of sputum smear microscopy: the effect of reading errors on treatment decisions and outcomes." Int J Tuberc Lung Dis **3**(6): 483-7.

Oakley, A. (1998). "Gender, methodology and people's way of knowing: some problems with feminism and the paradigm debate in social science." Sociology **32**(4): 707-731.

Ogden, J., S. Rangan, et al. (1999). "Shifting the paradigm in tuberculosis control: illustrations from India." Int J Tuberc Lung Dis **3**(10): 855-61.

Paolisso, M. and J. Leslie (1995). "Meeting the changing health needs of women in developing countries." Soc Sci Med **40**(1): 55-65.

Perez-Guzman C, V. M., Torres-Cruz A, Perez-Padilla JR, Furuya MEY (2003). "Diabetes modifies the male:female ratio in pulmonary tuberculosis." Int J Tuberc Lung Dis **7**(4): 354-358.

Popay, J., A. Rogers, et al. (1998). "Rationale and standards for the systematic review of qualitative literature in health services research." Qual Health Res **8**(3): 341-51.

Porter, J. D. and J. A. Ogden (2001). "Missed opportunities? Coercion or commitment: policies of prevention." Ann N Y Acad Sci **953**: 224-32.

Pradep, K. P. (1997). "Female headship, poverty and child welfare." Economic and Political weekly: WS73-WS82.

Pronyk, P. M., B. Joshi, et al. (2001). "Active case finding: understanding the burden of tuberculosis in rural South Africa." Int J Tuberc Lung Dis **5**(7): 611-8.

Pronyk, R. M., M. B. Makhubele, et al. (2001). "Assessing health seeking behaviour among tuberculosis patients in rural South Africa." Int J Tuberc Lung Dis **5**(7): 619-27.

Puentes-Markides, C. (1992). "Women and access to health care." Soc Sci Med **35**(4): 619-26.

Quan, V. M., A. Chung, et al. (2000). "HIV in Vietnam: the evolving epidemic and the prevention response, 1996 through 1999." J Acquir Immune Defic Syndr **25**(4): 360-9.

Que TT, V. U., NT Bang (1999). Gender basic concepts and gender issues in Vietnam. Hanoi, Statistical Publishing House.

Quy, H. T., D. T. Nhien, et al. (2002). "Steep increase in HIV prevalence among tuberculosis patients in Ho Chi Minh City." Aids **16**(6): 931-2.

Rangan S, U. M. (1998). Gender perspectives of Access to Health and Tuberculosis Care. Gender and Tuberculosis. T. A. Diwan V, Winkvist A. Göteborg, The Nordic School of Public Health. **3**.

Rathgeber, E. M. and C. Vlassoff (1993). "Gender and tropical diseases: a new research focus." Soc Sci Med **37**(4): 513-20.

Ray, D. and R. Abel (1995). "Incidence of smear-positive pulmonary tuberculosis from 1981-83 in a rural area under an active health care programme in south India." Tuber Lung Dis **76**(3): 190-5.

Reichman L, H. E., Ed. (2000). Tuberculosis a comprehensive international approach. Lung Biology in Health and Disease. N.Y, Marcel Dekker Inc.

Rieder, H. (1999). Epidemiologic basis of Tuberculosis control, International union against tuberculosis and lung disease.

Rieder, H. (2000). Case finding in high and low prevalence countries. Tuberculosis: A comprehensive international approach. H. E. Reichman L. New York, Marcel Dekker**:** 323-339.

Rossner, S. (1994). Gender bias in clinical research: the difference it makes. Reframing women's health: Multidisciplinary research and practice. A. Dan. London, Sage publications.

Rubin, G. (1975). The traffic in Women: Notes on the political economy of sex. New York.

Rydström, H. (1998). Embodying Morality. Girls' socialization in a North Vietnamese Commune. Linköping studies in arts and science. Linköping, Linköping University**:** 290.

Sandelowski, M. (1986). "The problem of rigor in qualitative research." ANS Adv Nurs Sci **8**(3): 27-37.

Segall M, G. T., H Lucas, TV Dung, NT Tam, DX Vinh, DL Huong (2000). Health care seeking by the poor in transitional economies: the case of Vietnam. Brighton, Institute of development studies, Sussex.

Sen G, A. G., Östlin P (2002). Engendering health equity. Engendering International Health. A. G. Sen G, Östlin P. London, Bradford.

Singh, V., A. Jaiswal, et al. (2002). "TB control, poverty, and vulnerability in Delhi, India." Trop Med Int Health **7**(8): 693-700.

Smiley, M. (2000). Political theory creates a subject or How not to generalise about women**:** 35.

Spence, D. P., J. Hotchkiss, et al. (1993). "Tuberculosis and poverty." BMJ **307**(6907): 759-61.

Standing, H. (2002). Frameworks for understanding health sector reform. Engendering international health. A. G. G Sen, P Östlin. London, The MIT press.

Styblo, K., D. Dankova, et al. (1967). "Epidemiological and clinical study of tuberculosis in the district of Kolin, Czechoslovakia. Report for the first 4 years of the study (1961-64)." Bull World Health Organ **37**(6): 819-74.

Thi, L. (1996). Women, marriage, family and gender equality. Vietnamese women in transition. K. Barry. London, Macmillan Press.

Thorson, A. and V. K. Diwan (2001). "Gender inequalities in tuberculosis: aspects of infection, notification rates, and compliance." Curr Opin Pulm Med **7**(3): 165-9.

Toan, N. V. (2001). Utilisation of health services in a transitional society: studies in Vietnam 1991-1999. IHCAR. Stockholm, Karolinska Institutet.

Toman, K. (1979). Tuberculosis case finding and chemotherapy Questions and answers. Geneva, World Health Organisation.

Uplekar, M. W., S. Rangan, et al. (2001). "Attention to gender issues in tuberculosis control." Int J Tuberc Lung Dis **5**(3): 220-4.

Van Deun, A. and F. Portaels (1998). "Limitations and requirements for quality control of sputum smear microscopy for acid-fast bacilli." Int J Tuberc Lung Dis **2**(9): 756-65.

Van Duong D, B. C., Van Le T (1997). "Availability of antibiotic as over-the-counter drugs in pharmacies: a threat to public health in Vietnam." Trop Med Int Health **2**: 1133-1139.

Verbrugge, L. M. (1989). "The twain meet: empirical explanations of sex differences in health and mortality." J Health Soc Behav **30**(3): 282-304.

Vlassoff, C. (1994). "Gender inequalities in health in the Third World: uncharted ground." Soc Sci Med **39**(9): 1249-59.

Vlassoff, C. and E. Bonilla (1994). "Gender-related differences in the impact of tropical diseases on women: what do we know?" J Biosoc Sci **26**(1): 37-53.

VNTP, V. N. T. P. (1999). Meeting on 1996-2000 TB control middle-term review and orientation for the coming period (in Vietnamese). Hanoi, Vietnam National TB Control Programme.

Volmink, J. and P. Garner (1997). "Directly observed therapy." Lancet **349**(9062): 1399-400.

Volmink, J. and P. Garner (2003). "Directly observed therapy for treating tuberculosis (Cochrane Review)." Cochrane Database Syst Rev(1): CD003343.

Volmink, J., P. Matchaba, et al. (2000). "Directly observed therapy and treatment adherence." Lancet **355**(9212): 1345-50.

Walley, J. D., M. A. Khan, et al. (2001). "Effectiveness of the direct observation component of DOTS for tuberculosis: a randomised controlled trial in Pakistan." Lancet **357**(9257): 664-9.

Walt, G. (1999). The politics of tuberculosis: The role of process and power. Tuberculosis-an interdisciplinary perspective. J. P. a. J. Grange. London, Imperial College Press.

Walton, D. and P. Farmer (2000). "MSJAMA: the new white plague." Jama **284**(21): 2789.

Wenneras, C. and A. Wold (1997). "Nepotism and sexism in peer-review." Nature **387**(6631): 341-3.

WHO (1997). Treatment of Tuberculosis: Guidelines for national programmes. Geneva, World Health Organization.

WHO (1999). What is DOTS? A guide to understanding the WHO-recommended TB control strategy known as DOTS. Geneva, World Health Organization.

WHO (2000). Fifty-third World Health Assembly.Stop TB Initiative, report by the Director General. Geneva.

WHO (2002a). Global Tuberculosis Control: Surveillance, Planning, Financing. Geneva, Switzerland, World Health Organisation.

WHO (2002b). The world health report 2002. Reducing risks, promoting healthy life. Geneva, WHO.

Woodring J H, V. H., Fried AM, Dillon ML, Williams TD, Melvin IG. (1986). "Update: the radiographic features of pulmonary tuberculosis." Am j Roentgenol **146**: 497-506.

World Bank (2003a). GenderStats database of gender statistics, World Bank.

World Bank (2003b). World Development Indicators Database, The World Bank Group. **2003**.

Yamasaki-Nakagawa, M., K. Ozasa, et al. (2001). "Gender difference in delays to diagnosis and health care seeking behaviour in a rural area of Nepal." Int J Tuberc Lung Dis **5**(1): 24-31.

Zwarenstrin M, S. J., Vundule C, Lombard C, Tatley M (1998). "Randomised controlled trial of self supervised and directly observed treatment of tuberculosis." Lancet **352**: 1340-43.

Appendix:

English version of the questionnaire study I

(Please use one form for each adult (>15 yrs) with cough for three weeks or more)

BACKGROUND INFORMATION:

Person's name: ..... Age: ..... yrs Sex: 1=Male; 2=Female
Household ID:.....Cluster Number: .....

Interviewer's name: .....
Date of interview: ...../...../1999

1. In addition to cough, what other symptoms do/did you suffer from?
(not prompt the symptoms, tick if mentioned)

[ ] Sore-throat	[ ] Fever	[ ] Tiredness
[ ] Chest pain	[ ] Blood cough	[ ] Running nose
[ ] Weight loss	[ ] Yellow Sputum	[ ] Difficult breathing
[ ] Nightly sweating		

Other symptoms *(specify in the below space)*
.....

2. For how long have you coughed? ..... (weeks)
3. Do you have a health insurance?
1 = Yes 2 = No

3. Do you currently smoke? 1 = Yes 2 = No
If **YES**: ¤ <10 times/day ¤ 10-20 times/day ¤ >20 times/day
If **NO**: Did you smoke previously? ¤ Yes ¤ No
4. Since the onset of the first symptoms, have you ever sought health care from any providers or got any treatment for the symptoms, including self medication?

1= Yes ➔ Skip to Question 6 (page 2)
2= No ➔ Continue the interview and end after question 5

5. If **NO**,

a. Do you think health care providers are too far away?
1 = Yes 2 = No

b. Are you too busy to go for health care?
1 = Yes 2 = No

c.Do you think health care is too expensive?

1 = Yes 2 = No

d. Do you fear a diagnosis of a severe disease, if seeking health care?

1 = Yes 2 = No

If the interviewed has not sought health care from any providers, end the interview here!

*If **YES**, please ask the following questions for each visit to a health provider, including self-medication-pharmacy.*

	Questions =====> Visits	**1**	**2**	**3**	**4**	**5**
6.	Where did you go for health care seeking?					
7.	What symptoms, or other reason, made you seek health care from this provider? *(for each visit)*					
	- Cough, dry	[ ]	[ ]	[ ]	[ ]	[ ]
	- Sore throat	[ ]	[ ]	[ ]	[ ]	[ ]
	- Fever	[ ]	[ ]	[ ]	[ ]	[ ]
	- Chest pain	[ ]	[ ]	[ ]	[ ]	[ ]
	- Coughing blood	[ ]	[ ]	[ ]	[ ]	[ ]
	- Running nose	[ ]	[ ]	[ ]	[ ]	[ ]
	- Weight loss	[ ]	[ ]	[ ]	[ ]	[ ]
	- Sputum	[ ]	[ ]	[ ]	[ ]	[ ]
	- Difficult breathing	[ ]	[ ]	[ ]	[ ]	[ ]
	- Nightly sweating	[ ]	[ ]	[ ]	[ ]	[ ]
	- Other symptoms	[ ]	[ ]	[ ]	[ ]	[ ]
	- Not cured by previous treatment	[ ]	[ ]	[ ]	[ ]	[ ]
	- Decided/suggested by others	[ ]	[ ]	[ ]	[ ]	[ ]
	- Other, specify below:	[ ]	[ ]	[ ]	[ ]	[ ]
8.	Why did you choose that specific provider?					
	- Close to home	[ ]	[ ]	[ ]	[ ]	[ ]
	- Cheap prices	[ ]	[ ]	[ ]	[ ]	[ ]
	- Qualified provider	[ ]	[ ]	[ ]	[ ]	[ ]
	- High availability of drugs	[ ]	[ ]	[ ]	[ ]	[ ]
	- Acquaintance with provider Decided/suggested by others	[ ]	[ ]	[ ]	[ ]	[ ]
	- Others *(specify)*	[ ]	[ ]	[ ]	[ ]	[ ]

9.	What did you get to know about the diagnosis? *(tick if mentioned)*					
	- Sore throat	[ ]	[ ]	[ ]	[ ]	[ ]

	- Bronchitis/Pneumonia	[ ]	[ ]	[ ]	[ ]	[ ]
	- Tuberculosis	[ ]	[ ]	[ ]	[ ]	[ ]
	- Obstructive disease/asthma	[ ]	[ ]	[ ]	[ ]	[ ]
	- Unknown cough	[ ]	[ ]	[ ]	[ ]	[ ]
	- Did not tell the diagnosis	[ ]	[ ]	[ ]	[ ]	[ ]
	- Other (specify)	[ ]	[ ]	[ ]	[ ]	[ ]
10.	What treatment did you get?					
	- Antibiotics	[ ]	[ ]	[ ]	[ ]	[ ]
	- Anti-TB drugs	[ ]	[ ]	[ ]	[ ]	[ ]
	- Cough medicine	[ ]	[ ]	[ ]	[ ]	[ ]
	- Vitamins/tonics	[ ]	[ ]	[ ]	[ ]	[ ]
	- Traditional/herbal medicine	[ ]	[ ]	[ ]	[ ]	[ ]
	- Other medicines	[ ]	[ ]	[ ]	[ ]	[ ]
	- Unknown drugs	[ ]	[ ]	[ ]	[ ]	[ ]
	- No treatment	[ ]	[ ]	[ ]	[ ]	[ ]
	Did you get any injections? 1 = Yes 2 = No					
11.	How long was the treatment period? *(in days)*					
12.						
13.	a. Can you please estimate the cost for health care from this provider, including examination and drug? *(Please write in Dong)*_____					
14.	Were you satisfied with the care given? 1= Yes; 2 = No. *Write in the next column* ==>					
	If NO, why?					
	- Not cured	[ ]	[ ]	[ ]	[ ]	[ ]
	- Poor quality of care	[ ]	[ ]	[ ]	[ ]	[ ]
	- Expensive	[ ]	[ ]	[ ]	[ ]	[ ]
	- Not enough explanation/Info	[ ]	[ ]	[ ]	[ ]	[ ]
	- Bad staff attitude	[ ]	[ ]	[ ]	[ ]	[ ]
	- Long waiting time	[ ]	[ ]	[ ]	[ ]	[ ]
	- Others *(specify)*	[ ]	[ ]	[ ]	[ ]	[ ]

Guide used for the development of the questionnaire in studies II and III

Date: Ques id.:
Cluster: House:
Date: Person id:
Sex: Age:

1. Number of persons in household: adults children
2. Occupation:
3. Education:
4. Income: (poor, medium, rich)
5. Marital status:
6. Common mean of transportation
7. Health insurance: yes/no
8. Smoking: yes/no if yes: duration (years) if no: stopped smoking yes/no
9. Distance to health post: (near, far, average, do not know)
10. Distance to hospital: (near, far, average, do not know)
11. Distance to TB unit: (near, far, average, do not know)
12. Have you previously been diagnosed with TB?
13. If yes: when? where were you treated?
14. Has anyone in your family had TB? If yes: Who? When?
    Where were he/she treated?
15. Symptoms: (for all) when did it start? does it still exist?
    - Cough
    - Cough with sputum
    - Fever
    - Tiredness
    - Weight loss
    - Chest pain
    - Laboured breathing
    - Other
16. What do you think causes TB?
    (Several answers possible: Bacteria, Hard work, Heriditary, God, Other, Don't know)
17. Do you think TB is contagious?
    If yes, how is it transmitted: (Several answers possible: contact/droplets, environment, eating, other, don't know)
18. Do you think TB can be cured?
19. Do you know any TB symptoms?
20. Where did you learn about TB?
21. Did you take any health care action because of your current cough?
    If not, why?
22. How many health care actions did you take during your current symptom period?

Health care action 1 Where did you go? Examinations performed? (smear, chest x-ray, other) Diagnosis: (pneumonia, TB, other, unknown)
Treatment: (Antibiotics, TB drugs, other, unknown) Treatment duration:
Result: (Cured, better, worse)

Health care action 2 Where did you go? Examinations performed? (smear, chest x-ray, other) Diagnosis: (pneumonia, TB, other, unknown)
Treatment: (Antibiotics, TB drugs, other, unknown) Treatment duration:
Result: (Cured, better, worse)
Health care action 3 Where did you go? Examinations performed? (smear, chest x-ray, other) Diagnosis: (pneumonia, TB, other, unknown)
Treatment: (Antibiotics, TB drugs, other, unknown) Treatment duration:
Result: (Cured, better, worse)
Health care action 4 Where did you go? Examinations performed? (smear, chest x-ray, other) Diagnosis: (pneumonia, TB, other, unknown)
Treatment: (Antibiotics, TB drugs, other, unknown) Treatment duration:
Result: (Cured, better, worse)
Health care action 5 Where did you go? Examinations performed? (smear, chest x-ray, other) Diagnosis: (pneumonia, TB, other, unknown)
Treatment: (Antibiotics, TB drugs, other, unknown) Treatment duration:
Result: (Cured, better, worse)

23. Do you have sputum production?
    How many sputum samples have you provided for this study?
    Date of providing first sputum
    Sputum 1 yes/no date received: (mucous, blood stained, watery)
    Sputum 2 yes/no date received: (mucous, blood stained, watery)
    Sputum 3 yes/no date received: (mucous, blood stained, watery)
    Reasons for not providing sputum
    Result from sputum 1 2 3
24. Treatment start if diagnosed TB: date
25. Chest x-ray done y/n Result TB doctor: suggestive of TB/no sign of TB

Questionnaire for evaluation of chest x-ray forms in study V

Blinded reading

Reader: Patient's ID

	Right lung: y/n	Left lung: y/n
Mediastinal adenopathy seen		
Hilar adenopathy seen		
Non-cavity infiltrate y/n		
Number of infiltrates in upper lobe		
Cavity seen y/n		
Number of cavities in upper lobe		
Fibrosis y/n		
Fibrosis upper lobe		
Calcification y/n		
Calcification upper lobe		

Non-blinded reading

Reader: Patient's ID

	Right lung: y/n	Left lung: y/n
Mediastinal adenopathy seen		
Hilar adenopathy seen		
Non-cavity infiltrate y/n		
Number of infiltrates in each lobe	u/m/l	u/l
Area of whole lung with non-cavity infiltrate	< ¼ , ¼, ½, > ½,	< ¼ , ¼, ½, > ½,
Cavity seen y/n		
Number of cavities in each lobe	u/m/l	u/l
Total nr of cavities		
Size of biggest cavity		
Fibrosis y/n		
Fibrosis location	u/m/l	u/l
Level of fibrosis whole lung		
Calcification y/n		
Calcification location	u/m/l	u/l
Pleural effusion y/n		
Level of pleural effusion		
Miliary shadowing y/n		

Miliary shadowing location u/m/l u/l

Site of lesions (right, left, both)

Characterisation of lesion: (active lesion, extensive lesion with cavity, inactive lesion, healed lesion etc)

Size of each lesion:

Other notes

Chest x-ray hardness (hard, good, soft)

Overall quality of film (good, ok, bad)