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On Poverty and Health: An Interventionist Perspective;

A Study of Women Microcredit Groups in Kerala, India

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Abstract

This dissertation focuses on how participation in microcredit, a poverty alleviation strategy, can influence women's health in low-income countries. Microcredit programs aim to provide the poor – especially poor women – with access to credit, thereby improving their opportunities to engage in productive activities. Microcredit does not *a priori* seek to improve the health of its members; therefore, any eventual health benefits can be considered as an unintended benefit.

We begin by developing a theoretical framework linking women's microcredit participation and their health, drawing upon three theoretical corpuses: Amartya Sen's capability approach, Michael Grossman's health production theory, and models of the determinants and pathways of population health. We explore how women's health capabilities (i.e., opportunities to achieve good health), and ultimately their health functionings (e.g. being healthy), can be expanded via key determinants of population health, such as access to resources and autonomy.

We then conduct an empirical analysis in a rural community of the Indian state of Kerala using special survey data. Due to a lack of detailed and disaggregated information on health in this region, we first examine women's health and its distribution in the study area, thus helping to link health needs of women with development interventions. In a second empirical investigation we examine the potential health externalities of women participating in a microcredit program in India, known as self help groups (SHGs).

The findings of our first enquiry indicates that there are socioeconomic and caste inequalities in women's health. Socioeconomic position and caste are two interrelated sources of inequality that can reinforce each other: being from an upper caste can buffer women from the poor health effects related to low socioeconomic status, whereas being from a lower caste can magnify these effects. These results confirm our hypotheses and they suggest that implementing interventions that concomitantly address social

stratification and socioeconomic conditions will likely lead greater benefits for women than targeting either one of these parameters in isolation.

Our second enquiry provides supportive evidence of our theoretical framework and suggests that microcredit participation can expand women's health capabilities. The primary finding is that SHG participation appears to offer protection against exclusion from health care among poor women. The results also highlight the mechanism leading to unintended health benefits: women use SHG loans to help cover their health expenditures. SHGs are operating as a coping strategy, helping women to overcome financial barriers and budgetary constraints, as opposed to contributing to women's health by increasing income and improving living conditions.

A second finding suggest that women's participation may contribute to the promotion of their mental health. This likely operates via the reduction of emotional stress and improvement of life satisfaction.

Alleviating poverty encompasses a panoply of instruments. The benefits of microcredit go above and beyond the economic sphere and its original intention of promoting income-generation activities, microcredit also helps expand women's health capabilities. We conclude by calling for more systematic investigations of the potential unintended health consequences of participating in poverty alleviation strategies that fall outside the purview of the health sector, thereby expanding our arsenal for breaking the cycle of poverty and ill health. We argue that this endeavour can be inspired by the capability approach.

Keywords : poverty, women's health, poverty alleviation strategies, microcredit, capability approach, Kerala, India

Résumé

Cette thèse se centre sur l'influence de la participation au microcrédit, une stratégie de réduction de la pauvreté, sur la santé des femmes dans les pays en développement. Le microcrédit vise à offrir aux pauvres, en particulier aux femmes, un accès au crédit et conséquemment, à accroître leurs possibilités de s'engager dans des activités génératrices de revenu. Le microcrédit n'est pas a priori destiné à améliorer la condition de santé de ceux qui en bénéficient; son éventuel effet sur la santé est donc à considérer comme une forme de bénéfice non attendu.

Nous proposons dans un premier temps, un cadre de référence théorique reliant la participation au microcrédit et la santé qui s'inspire de trois corpus théoriques : la théorie des capabilités d'A. Sen, le modèle dit de production de santé de M. Grossman, et les modèles dits de déterminants de santé communément rencontrés en santé publique. Nous nous attachons plus particulièrement aux processus par lesquels certains déterminants clé de santé tels que l'accès aux ressources ou l'autonomie des femmes, conditionnent leurs possibilités d'être en bonne santé et ultimement, leur santé, soit, ce que dans une terminologie senienne, il est convenu d'appeler leurs capabilités et leurs réalisations.

Nous présentons ensuite, nos travaux de recherche dans une communauté rurale de l'État du Kerala, en Inde. En se basant sur les données d'une enquête dans les ménages, nous analysons les facteurs qui déterminent les conditions de santé des femmes puis les effets attribuables à la participation des femmes à des groupes de microcrédit connus localement sous le nom de groupes d'entraide.

Nos travaux montrent que la position socioéconomique des femmes et leur caste d'appartenance sont sources d'inégalité de santé. Ces deux composantes sont inter-reliées et agissent en interaction: appartenir à une caste élevée a un effet tampon protecteur, venant réduire les effets potentiellement négatifs de la pauvreté sur la santé. En revanche, les effets

négatifs de la pauvreté sur la santé sont exacerbés lorsque les femmes appartiennent à une caste inférieure. Les résultats obtenus confirment nos hypothèses de départ et suggèrent que les femmes tireraient un plus grand bénéfice d'interventions ciblant à la fois les conditions socioéconomiques et la stratification sociale que des interventions centrées sur un seul de ces paramètres.

Les résultats de notre second travail corroborent les prédictions du modèle théorique développé et suggèrent que la participation à des activités de microcrédit pourrait accroître les capabilités de santé des femmes. Ils montrent également que cette participation contribue à lever les barrières financières que rencontrent les femmes pauvres et à les protéger contre les risques d'exclusion. Ils rendent compte également des mécanismes par lesquels le microcrédit présente des externalités de santé. Les femmes utilisent le microcrédit comme source d'emprunt pour les aider à couvrir leurs dépenses de santé. Le microcrédit opère donc comme une stratégie d'adaptation permettant de lever les contraintes budgétaires que rencontrent les femmes plutôt que comme un mécanisme qui contribuerait à la santé des femmes via l'amélioration de leurs conditions de vie.

La contribution du microcrédit à la promotion du bien être psychologique des femmes constitue un second résultat de notre travail. Cette contribution s'opère via des mécanismes impliquant possiblement une réduction du stress et l'amélioration de la satisfaction de vivre.

Les stratégies de réduction de la pauvreté comprennent une panoplie d'instruments. Les retombées du microcrédit vont au-delà de la sphère économique stricto sensu. S'il vise initialement à promouvoir des activités de génération de revenu, il contribue aussi à développer l'espace des capabilités de santé des femmes. Pour mieux appréhender les dynamiques qui associent la pauvreté et la maladie et contribuer au développement d'interventions visant à briser le cercle vicieux qui les unit, la recherche en santé publique

pourrait comprendre une exploration plus systématique des effets externes sur la santé, des stratégies de réduction de la pauvreté. Nous pensons qu'une telle démarche peut s'inspirer avec profit, de l'approche des capabilités qu' développée Amartya Sen.

Mots-clés : pauvreté, santé des femmes, stratégies de réduction de la pauvreté, microcrédit, l'approche des capabilités, Kerala, Inde

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List of Abbreviations

ADL	Activities in Daily Living
BPL	Below Poverty Line
BRAC	Bangladesh Rural Advancement Committee
CBHI	Community Based Health Insurance
DALY	Disability-Adjusted Life Year
HIV/AIDS	Human Immunodeficiency Virus/Acquired ImmunoDeficiency Syndrome
ESP	Essential Services Package
ICDDBR,B	International Centre for Diarrhoeal Disease Research, Bangladesh
MDGs	Millennium Development Goals
NFHS	National Family Health Survey
NGO	Non Governmental Organisation
OBC	Other Backward Caste
PAS	Poverty Alleviation Strategy
SC	Scheduled Caste
SHG	Self Help Group
ST	Scheduled Tribe
TB	Tuberculosis
UNDP	United Nations Development Programme
WHO	World Health Organization

For grandmother (in loving memory) and the other women of my father's land.

In memory of Professor David Fish – the first to encourage me to do research in India

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This dissertation, this humble thesis, is both the product of scholarly efforts and a personal journey in which I was able to immerse myself in my Indian culture and roots. Neither my journey nor the completion of this dissertation would have been possible without the unconditional support of my parents.

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The dissertation: origins and statement of contribution

We in public health often attempt to devise *new* interventions that contribute to the improvement of population health and the reduction of health inequalities. This dissertation is not about that. Instead, I make a modest attempt to assess health benefits accrued by women of an existing, local initiative. This dissertation is situated within a collaborative action research project between the Université de Montréal and the Centre for Development Studies (CDS), Kerala. The principle investigators of the initiative are my supervisor, Slim Haddad, and a professor from the CDS, D. Narayana. I have been involved with all aspects of the project since its inception in 2001. We are working with a community to develop two community based initiatives with the ultimate goal of improving population health and reducing inequalities in health. One of our key partners are local female microcredit groups, known as self help groups. During my initial field visit as a member of the project in 2002, I observed that compared to other women, members of self help groups appeared to carry themselves with higher levels of self confidence, displayed greater social mobility, and tended to be more vocal at local political and community events. This led me to ponder whether this intervention, already in place, was yielding health benefits before we, the so-called experts, arrived. Could being a member of a self help group increase women's opportunities for better health via underlying determinants of health? I returned to the field in 2003 for 2 months after obtaining a grant from the chair *inégalités de santé et approches communautaires*, to work solely on developing my research question. During this time, I met and conducted interviews with self help group members, both individually and as groups. This led me to identify key factors and mechanisms in which self help group participation may lead to better health, which ultimately became the four pathways detailed in my theoretical framework. I also used the information I gathered during my mission to develop two modules of a household questionnaire that was implemented by the project and subsequently used for the empirical component of the dissertation. I have both benefited from and (I hope) contributed to this action research project by producing this dissertation.

There are other identities also. A doctor could well ask what kind of commitments she may have in a collectivity of doctors and patients, when the parties involved need not necessarily belong to the same nation. (It is well to remember that the Hippocratic Oath was not mediated – explicitly or by implication – by any national contract.) Similarly, a feminist activist could well consider commitments should be to address the special deprivation of women in general – not necessarily only those in her own country when an Italian feminist is involved in a movement for more gender justice in Sudan, she is acting not primarily as an Italian, but as a feminist.

Amartya Sen, Reason Before Identity

Those great wars which the body wages with the mind a slave to it, in the solitude of the bedroom against the assault of fever or the oncome of melancholia, are neglected. Nor is the reason far to seek. To look these things squarely in the face would need the courage of a lion tamer; a robust philosophy; a reason rooted in the bowels of the earth.

Virginia Woolf, On Being Ill

CHAPTER 1

INTRODUCTION

1.0 Points of departure

Public health pioneers, such as Rudolf Virchow, have demonstrated the critical link between health and social conditions since the nineteenth century. In the postcolonial era, progressive development economists, such as Amartya Sen, have vigilantly advocated that the inter-linkages between poverty and health, among other dimensions of well-being, be integrated into the development discourse. What is new is a revival of an explicit and focused attention towards the relationship between poverty and ill health within the international development community.

This attention to the poverty health nexus can be attributed to a broadening conceptualisation of poverty, accompanying a renewed commitment to poverty alleviation (World Bank, 1990; 2000). The narrow pursuit of economic growth that has characterized development approaches since the 1950s has waned, in its place a paradigm of human development is emerging (UNDP, 1990). Poverty is now viewed as multidimensional, embodying more than material deprivation. Levels of and risks for health are key dimensions of poverty, the implications are not negligible: raising living standards may not be sufficient to combat poverty if the health of the poor does not also improve (Wagstaff, 2001). The Millennium Development Goals (MDGs), a set of quantitative targets endorsed by the leading international agencies, reflect the importance that health is assuming in development; three of the eight goals are specific health targets[1](United Nations, 2004). The latest international development policy instrument, Poverty Reduction Strategy Papers – operational documents outlining a country's development priorities and objectives of and strategies for poverty reduction – are supposed to be designed with explicit health objectives integrated with macroeconomic goals (World Bank, 2001). The view that

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[1] The MDGs specific for health are: to reduce infant and child mortality rates by two-thirds by 2015, to reduce maternal mortality ratios by three-quarters by 2015, and to provide access for all who need reproductive health service by 2015.

development does not occur without improvements in population health is displacing (or at least minimizing) the dominant paradigm of equating development with pure economic growth.

Viewing poverty as a dimension of health has an important advocacy role by drawing attention to and instilling a political commitment for health in development. But this is not the only conceptualization of poverty and ill health. There is another school of thought, within the public health tradition, which views poverty as distinct from health. Poverty is considered to be a fundamental cause of ill health (Link & Phelan, 1995). This means that poverty can be traced back as the underlying cause of most cases of ill health unrelated to genetic predispositions. In turn, ill health can also cause or exacerbate impoverishment by diminishing potential productive capacities and acquiring financial burdens incurred through health care expenditures. This bi-directional relationship is generally referred to as the 'cycle of poverty and ill health'. To me, this conceptualization is especially relevant for those who are first and foremost concerned about the health of populations and it will be the perspective that I adopt in this dissertation.

2.0 Overview of the problem

There is undisputable evidence that the poor (especially poor women) suffer more from ill health than the non-poor[2]. The greater burden of ill health among the poor has been flagged as inequitable and an important issue of social justice (Gwatkin, 2000; Haddad & Mohindra, 2002). The deep connections between poverty and health continue to be the

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[2] This evidence has been documented by a wide range of research and donor institutions and public health researchers, including epidemiologists, economists, and anthropologists (Bloom & Lucas, 2000; Farmer, 1999; Gwatkin & Guillot, 2000; Narayan, 2000; Nguyen & Peschard, 2003; Sachs, 2001; Whitehead, Dahlgren & Evans, 2001; Wagstaff, 2000; WHO, 1995; World Bank, 1993). Better data sources and increasingly sophisticated approaches to the measurement of health have yielded more precise estimates of the burden of disease and the distribution of health and its determinants (Gwatkin et al., 2000; Murray & Lopez, 1996; Wagstaff, Paci & Van Doorslaer, 1991; World Bank, 1993).

source of intensive investigations in the twenty-first century[3], especially in low and middle-income countries where the burden of illness is the heaviest. Reducing social inequalities in health in general and the burden of ill health among the poor in particular are currently driving many global health research and activist agendas. Less clear is how we should improve the health of the poor and promote health equity.

Illness and disease are generally addressed by implementing sectoral programs. In 1993, the World Bank's influential report, *Investing in Health*, promoted a "limited package of public health measures and essential clinical interventions" guided by the Disability Adjusted Life Years (DALY) measure of the burden of disease (World Bank, 1993, p. 8). More recently, an international panel of experts espoused that improving the health of the poor requires the implementation of a selected number of effective interventions that address diseases that disproportionately affect the poor (Jha et al., 2002). These interventions include both prevention and promotion (immunization, insecticide treated nets, anti-smoking consumer information) and treatment (e.g. antiretroviral therapy, directly observable treatment, short-term or DOTS). Targeting selected medical and public health interventions have been criticized for inadequately addressing the multi-factorial and social nature of health production and failing to promote the type of inter-sectoral collaboration, and broader socioeconomic development needed for health gains among the poor (Banerji, 2003; Gilson, 1998; WHO, 1978; 1986). Public health interventions may be necessary, but are not sufficient for improving the health of the poor.

An alternative approach to improve the health of the poor is to assess an intervention in another sector (Lipson, 1998). Due to the strong linkages between poverty and health, poverty alleviation schemes (PAS) are a particularly attractive option to explore, yet

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[3] See especially the work of two WHO-funded large scale commissions, the Commission on Macroeconomics and Health (http://www.cmhealth.org/) and the recently launched Commission on Social Determinants of Health (Marmot, 2005), which will produce its final findings in 2008.

relatively little is known about the health effects of PAS that fall outside the purview of the health sector. In this dissertation, I argue that in order to break the cycle of poverty and ill health, as a counterpart to delivering adequate access to health programs and services for the poor, we need to promote pro-health PAS that are identified on the basis of a firm evidence base.

3.0 Selecting a poverty alleviation strategy for investigation

There is a broad range of PAS, from macro level (e.g. macroeconomic policies) to micro level interventions (e.g. local income generation programs). In this dissertation, I examine whether health benefits may be linked to participation in a particular PAS, microcredit. Microcredit is becoming an increasingly popular way to mobilize poor communities by the provision of loans through specialized financial institutions (Mosely & Hulme, 1998). The general principle of microcredit is to provide the poor access to credit to improve their opportunities to engage in productive activities. While microcredit is generally associated with the Grameen Bank in Bangladesh (Yunus, 1999), there are numerous schemes sprouting up in Asia, Africa, and Latin America. In India, particularly in the South of the country, a microcredit movement known as self help groups (SHGs) is gathering force. Promoted by national and state government, and non-governmental organisations (NGOs), SHGs are voluntary groups of women engaged in collective saving and thrift activities for the purpose of securing credit, valuing personal interactions and mutual aid (Sundram, 2001). The thrust of the movement has been to promote all women groups, designed not only as a strategy for poverty alleviation, but also to increase women's access to resources and their power in household decision-making.

Selecting a poverty alleviation intervention to assess potential health benefits may be based on various criteria (Lipson, 1998); my rational for choosing microcredit was two-fold. First, microcredit has been rapidly spreading across India and other low-income countries. Moreover, microcredit has especially targeted poor women as their clients, avoiding errors of previous anti-poverty schemes, which marginalized women. Second, microcredit corresponds with activities that will help build up a woman's health capital, notably through her access to resources, and better capacity to use health inputs (e.g. autonomy). Microcredit, thus, offers measures that tend to especially improve the health of poor and vulnerable women.

4.0 Objectives of the dissertation

The overarching concern of this dissertation is to address how microcredit can be considered a pro-health poverty alleviation strategy for women. I begin by developing a theoretical proposal for the links between female microcredit participation and health. As we have already grasped a firm knowledge of the social determinants of women's health (cf. Moss, 2000), I focus rather on how these determinants operate together to improve women's health within the realm of a specific intervention. This exercise aims to delve into the explicit processes and mechanisms involved, that have been rarely detailed in previous work on this topic. In Chapter Three, I show that most of the evidence linking microcredit participation and health lacks a firm theoretical foundation. More generally, Frohlich, Mykhalovskiy, Miller & Daniel (2004) argue that population health research is driven largely by "the methodological orthodoxy of epidemiology", and call for explicit, a priori use of social theory in advancing public health research. This call that has been asserted by other prominent public health researchers (cf. Krieger, 2001; Potvin, Gendron, Bilodeau & Chabot, 2006). I support this perspective, but also advocate the use of theories from economics and political philosophy. I draw especially on Amartya Sen's capability

approach (Sen, 1992a), which proposes a new 'space' for evaluating and formulating normative judgements meant to capture a woman's real opportunities in life.

Guided by my theoretical framework, I empirically test microcredit health linkages of a SHG program in a rural and relatively disadvantaged community in India's southern state of Kerala. Due to a lack of detailed and disaggregated information on health in this region, I first examine women's health and its distribution in the study area, thus helping to link health needs of women with development interventions. I then examine specific associations between SHG participation and health that are relevant in the study context.

The three-fold objectives of this study can be summarized as follows:

- To develop a theoretical framework linking microcredit participation and women's health.
- To produce a portrait of women's health in a relatively poor community.
- To assess the potential health externalities of participating in a self help group in rural India.

5.0 Organisation of the dissertation

The following two chapters are literature reviews. Chapter 2 reviews women's health in India, including the sociocultural context of women's health, health needs, and interventions for women. Chapter 3 provides some background on microcredit programs and reviews the existing literature on microcredit and health. I provide an overview of Sen's capability approach in Chapter 4 and follow this with the first article, which provides the theoretical foundation of this dissertation. Chapter 5 presents the research objectives and methodology and is followed by two empirical articles. The first empirical article presents a portrait of women's health in the study site. The paper documents the distribution of health among women and examines the interaction between health, socioeconomics position and caste. This paper feeds the second empirical article, which

attempts to assess how women's participation in microcredit groups influences their health, especially among the poorest and socially vulnerable groups of women. Chapter 6 is the discussion and I offer concluding remarks in Chapter 7.

CHAPTER 2

REVIEW OF LITERATURE (I): WOMEN'S HEALTH IN INDIA

Chapter Two at a glance

Issues	Evidence
The women's health paradigm has shifted from traditional target-based fertility reduction to a broader view of women's reproductive choice and rights and non-reproductive health needs, across a woman's life span. This new paradigm calls for a concomitant shift in research and intervention priorities.	Little evidence is available documenting women's health beyond fertility regulation and maternal health. The limited available evidence indicates that women – especially poor and socially disadvantaged women – face innumerable reproductive and non-reproductive health problems, but this evidence is sparse and sporadic. There is a dearth of evaluative studies of women's health interventions, especially interventions that address non-reproductive health needs and do not use a vertical approach.
Research gaps	
There is a need to better document the full breadth of women's health needs, across various contexts. More systematic research is needed on assessing social inequalities in women's health, and the distribution of health among women with respect to socioeconomic position and caste. Greater attention should be paid to investigating interventions that may be effective in improving multiple dimensions of women's health and enhance women's capacities to improve their own health	

This chapter is divided into two main sections. In the first section I briefly discuss the Indian sociocultural context in which women's health needs to be understood. The second section provides a more in-depth although not exhaustive examination of the literature on women's health in India.

1.0 The sociocultural context of women's health in India

Poverty is a major threat to the health of the Indian population. Women are further disadvantaged by their low status in society and the caste system. In what follows, I briefly discuss each of these sources of disadvantage and their interrelations.

1.1 Poverty in India

I provide a cursory discussion on poverty in India, an in-depth discussion is beyond the scope of this dissertation – I leave this project to the poverty experts[4]. Instead, I provide some background information relevant to the dissertation: how is poverty conceptualized and how are the poor typically identified in low-income countries in general and in India in particular.

There are three main schools of thought with respect to poverty: welfarist, basic needs, and capability; although these schools diverge in various ways there is a common thread. It is this: each school proposes that there is some 'thing' that does not meet a reasonable minimum (Asselin & Dauphin, 2000).

These schools of thought have emerged during different periods of time. The welfarist school dominated the early days of development economics – a subdiscipline aiming to raise the living standards of the newly independent countries, which emerged following the Second World War (Deneulin, 2004). Welfarism is concerned with well-being in

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[4] See especially Dasgupta, 1993; Datt & Ravallion, 1998; Deaton, 2003; Deaton & Drèze, 2002; Drèze & Sen, 2002, Gaiha, 1991; and for discussions specific to Kerala see Kannan, 1995; 1999.

terms of utility, a psychological feeling (e.g. happiness, desire) generated by consumption of commodities and is generally measured as a minimum level of income or consumption expenditure in order to leave room for peoples' preferences (Asselin & Dauphin, 2000). Often labelled as income poverty, measurements typically involve the use of a poverty line representing a minimum per capita income (or expenditure). This enables an assessment of three kinds of indicators of poverty: (i) the proportion of the population that fall below the poverty line (poverty incidence); (ii) the shortfall between expenditure and the poverty line (intensity of poverty or poverty gap), and (iii) the inequality in expenditures among poor people (severity of poverty). The income approach led to poverty alleviation becoming synonymous with economic growth.

By the 1970s it was becoming increasingly clear that economic growth alone was insufficient for improving the living standards of everyone. Income was viewed as too narrow a concept, it was only useful as a means to help meet needs, a perspective that eventually led to the emergence of the basic needs approach (Streeten, Burki, Haq, Hicks, & Stewart, 1981). Basic needs focussed on a minimal decent life, including health, nutrition, and literacy. Alleviating poverty shifted from improving aggregate levels of living standards to more concrete measures for vulnerable groups and the public provision of basic services, such as primary health care and primary education (Streeten, 1984).

The capability approach arose during the 1980s with Amartya Sen as its primary proponent. Following Rawls' criticism, Sen argued against welfarism, advocating that policies should be judged in how they can enhance people's capabilities, that is what people can do and be, rather than on utility, or the availability of resources or public services as it is argued in the Rawlsian primary goods perspective (resources may be available but as Sen's analysis of the causes of famines has demonstrated, people may not take advantage of existing resources and convert them into capabilities) (Sen, 1981). According to Sen, poverty can be judged as a lack of capabilities, such as being free from hunger and avoidable morbidity, to be able to participate in public life, to be able to appear in public with dignity, and so on.

Sabina Alkire (2002) compared the basic needs approach and the capability approach and found that although there are similarities between the two approaches, she concluded that the capability approach is superior because of its theoretical foundation (see Chapter 4 for an overview of the theoretical foundations of the capability approach) and because it places a greater emphasis on freedom and participation. The capability approach has since been used to inform the human development paradigm promoted by the UNDP, which is proposed as an alternative to an exclusive focus on economic growth:

> Poverty can mean more than a lack of what is necessary for material well-being. It can also mean the denial of opportunities and choices most basic to human development – to lead a long, healthy, creative life and to enjoy a decent standard of living, freedom, dignity, self-esteem and the respect of others (UNDP, 1997, p. 5).

In India, all three schools of thought are drawn upon in conceptualizing and measuring poverty (Datt & Ravallion; Deaton, 2003; Deaton & Drèze, 2002; Drèze & Sen; 2002; Gaiha, 1991). India has also adopted another approach to identify the poor in rural areas that uses the poverty line in a non-utilitarian way, to a certain extent it integrates the basic needs and capability approaches. The Indian government has constructed a poverty line based on several income and non-income indicators, including education, presence of disability, social group affiliation, dwelling type, land and livestock owned, formal training for skill development of household members, and consumption expenditure[5]. All households in rural areas are surveyed and classified as either below poverty line (BPL) or above poverty line (APL). This classification is important because it is used for

[5] The items considered in defining the poverty line and the approach to scoring varies across BPL surveys. These indicators are specific for the 1997 BPL census, which was how households were defined at the time of my study. A commission of experts from various states revised the methodology for the 2002 BPL census, in this case there were 13 parameters: operational holding of land, housing, clothing, food security, sanitation, ownership of consumer durables, literacy, labour force, means of livelihood, status of children, type of indebtedness, migration and nature of assistance preferred for assessing the poverty level of each rural household. Each household was ranked according to the total score obtained for classification into poor and non-poor (Bhatanagar, 2003).

targeting the poor; BPL households are entitled to certain benefits and are the target of various anti-poverty schemes.

Poverty is widespread in India – regardless of how it is measured. One in three people fall below the poverty line. Forty percent of households are considered to be asset poor. The majority of adult women are unable to read and write. The incidence of child undernourishment is over 50% and anaemia among pregnant women has been estimated as high as 88%. Within India, the incidence of poverty varies enormously across the 28 states. Kerala is one of the success stories among the states, which has shown a rapid decline in poverty over the last 20 years. During the past 20 years, there was a decline in the proportion of poor (official Indian poverty line) in Kerala by about 27 percentage points. Literacy and health achievements are superior to other states (see Chapter 5 and the section on women's health in this chapter). Despite these achievements, poverty persists. Estimates for income poverty indicate that about 13% of households in Kerala fell below the national poverty line during the period 1999-2000. Using the more comprehensive BPL approach to poverty, 37% of households in this state were classified as BPL based on a survey conducted in 1997.

1.2 Status of women in India

Gender inequalities are present in all societies, but are especially apparent in India. The low status of women has been well documented across the lifecycle (Fikree & Pasha, 2004). Relative to males, females are disadvantaged with respect to a range of opportunities from fulfilling their aspirations and developing their talents to meeting their basic needs (e.g. nutrition). One of the most striking indications of gender discrimination in India is the female to male ratio (Drèze & Sen, 2002). In most societies females outnumber males, due to biological reasons, the average ratio in Europe and North America is 1.05. In several west Asian and north African countries, where gender discrimination is pervasive, the female to male ratio is below unity; India has one of the lowest ratios, 0.93. Amartya Sen demonstrated the magnitude of the problem by calculating the number of "missing women", which was done by comparing sex ratios in

India to what would theoretically exist without gender discrimination[6]. In India, a whopping 37 million missing women were estimated for 1986[7] (Sen, 1992b).

The roots of women's low position are attributed to India's patriarchal society and can be traced back to many ancient and religious texts. Women's proper role and place in society are peppered throughout the extensive text known as *Manusmriti*, or Manu, which has greatly influenced Hindu traditions and practices. In the Manu, we find a prescription for women's dependence on and subordination to men throughout her life:

> (a) girl, a young woman, or even an old woman should not do anything independently, even in (her own) house. In childhood a woman should be under her father's control, in youth under her husband's, and when her husband is dead, under her sons. She should not have independence. (Manu 5: 147-49, cited in Chen, 2000, p. 317).

Men control almost all economic resources and are the major decision-makers in the household. Child rearing, caring for the family, domestic activities, or unpaid assistance in productive activities (e.g. helping out in their husbands fields) are generally not recognized or considered to be valuable contributions. Men are also the decision-makers on key matters, such as intra-household allocation of resources and contraceptive practices. Das Gupta & Chen (1995) further argue that although women are the *biological* reproducers, men control *social* reproduction, that is, it is through males that children form their identity as members of society. In sum, while males have a clearly defined role in their family and in society, females are viewed in relation to their subordination to males, consequently female well-being often takes a backseat to male well-being.

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[6] Sen used societies in which gender discrimination was not as prevalent as benchmarks (e.g. Europe, sub Saharan Africa).

[7] Other authors' calculations have yielded different estimates (cf. Klasen & Wink, 2005).

In India, there is a broad north south divide with respect to women's status. In the northern states, gender discrimination is pervasive, signalled by the continued practice of female seclusion, large gaps in literacy rates, strong preferences for the boy child and neglect of the girl child, and large restrictions on female property rights and control over major assets. In southern India, gender discrimination is less apparent and women have relatively greater autonomy. These geographical differences have been attributed to varying kinship patterns and sociocultural differences (Dyson & Moore, 1983). In the north, marriage is exogamic and often employed as a means for inter-group alliances; women generally have little choice in the matter. Dowry is the main marriage transaction. Women will leave their natal homes to reside with her husband and his family. In the south, cross-cousin marriages and unions among persons in familiar households, living near to a woman's natal home, are generally preferred. Women in the south have greater social mobility and interact more with their natal kin. Kerala is particularly renown for the elevated status of women, due to a history of sustained commitment to female literacy and traditional matrilineal societies[8] (Arun, 1999; Kabir & Krishnan, 1996).

1.3 The caste system

The caste system is a Hindu social status hierarchy in which people are born into[9]. Caste is a "hereditary, endogamous, usually localised group, having a traditional association

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[8] Kerala was formed in 1956 by joining the erstwhile princely states of Travancore and Cochin with the British region of Malabar. Indigenous rulers in Tranvacore and Cochin followed different policy initiatives compared to British India, including encouraging female education (Kabir & Krishnan, 1996). Education of girls was further promoted by missionaries, who instigated the government to open an all-girl school in 1859. Positive attitudes towards women was also facilitated by the upper caste Nairs, whose matrilineal system involved property inheritance through women (Arun, 1999). The norms and practices of the Nairs were not only important within their own families but they also influenced women's status among other communities in Kerala (Drèze & Sen, 2002). Since 1956, commitment to literacy and education of girls and women has been further advanced by progressive policies pursued by the communist and congress governments.

[9] There is some controversy with respect to whether or not caste exists among non-Hindus (Srinivas, 1996). The influential work of the French anthropologist, Louis Dumont, on structural inequalities and the caste system advanced the idea that caste is specifically a Hindu conception. Critics pointed out that caste exists among other groups, especially Christians (e.g. Syrian Christians that arrived in Kerala in the sixteenth century integrated into Hindu society and enjoyed high caste status). Social stratification is also observed among Muslims in India. Although the caste system may permeate other non-Hindu groups in India, it is fundamentally rooted in Hinduism.

with an occupation, and a particular position in the hierarchy of castes" (Srinivas, 1962, cited in Karanth, 1996, p. 88). Castes are ranked and fall into a specific position in a hierarchy. The original Hindu classification distinguished castes into four groups (Dumont, 1980). At the top of the hierarchy were the Brahmins (priests), followed by the Kshatriyas (rulers and warriors) and Vaishyas (traders and farmers). These three groups were considered to be pure and held the power in society. The fourth group, Shudras (servants) were considered to be impure, these groups were powerless and were at the bottom of the caste hierarchy. A fifth group fell outside of the caste hierarchy, these were the Untouchables (now known as *Dalits*) and tribal groups (*Adivasis).* Low castes and tribes were severely discriminated against and exploited by upper castes.

In order to correct this historical oppression, the Government of India has adopted a policy of positive discrimination. The government has classified castes and those that fall outside of the caste system (i.e. tribal groups and non-Hindus) into three main groups: at the bottom of the hierarchy are the Scheduled Castes and Scheduled Tribes (SC/ST). This is followed by a residual category of low castes, known as Other Backward Castes (OBC), castes previously classified as Shudras. At the top of the hierarchy are the forward castes, which includes Brahmins, Kshatriyas, and Vaishyas. The government has implemented policies to advance the education and employment opportunities of low castes, especially SC/ST. However, despite reductions in caste discrimination, lower castes continue to have fewer employment opportunities, face social discrimination, and are often excluded from development programs (Deshpande, 2000; Kabeer, 2002).

There are a vast number of castes across India and caste rankings vary across states and communities. The influence of caste is also different from region to region. In the past, Kerala's caste system was the most complex and rigid in India, inflicting such severe restrictions[10] upon the lower castes that Swami Vivekananda, a social reformer of the 19th century, was compelled to refer to Kerala as a 'madhouse of caste'. The social reform

[10] Examples include not being able to wear clothes above the waist, forbidden to come physically within a prescribed distance of higher caste members, and being excluded from Hindu temples and other social institutions and public places.

movement in Kerala helped to reduce caste discrimination, and redistributive policies have succeeded in reducing socioeconomic disparities, resulting in lower caste disparity in Kerala compared to other areas in India (Franke & Chasin, 1992; Kabir & Krishnan, 1996).

1.4 The interlinkages: caste, poverty, and women's status

Caste, poverty, and women's status are interlinked. As in other societies, women are more likely to be poor than men, women have less access to resources, lower employment opportunities, and face greater restrictions in accessing credit (Arun, 1999). Caste further impinges on women's lives, intersecting with poverty and their autonomy (Desphande, 2002; Dube, 1996). On the one hand, women with low caste or tribal affiliations are more likely to be poor. On the other hand, women from higher castes face more restrictions in their life than women from lower castes. Upper caste women, especially in northern India, are more likely to be secluded, have lower decision-making agency, and less social mobility. There appears to be a trade-off: lower caste women are vulnerable due to their lower socioeconomic status and social exclusion, whereas high caste women have lower autonomy and less control over their lives. The implications of this trade-off has not, to my knowledge, been studied with respect to women's health.

2.0 Women's health

2.1 Introduction

Indian health policy has paid special attention to women's health since the 1950s, although the focus has been constrained to the domain of maternal health (Mukhopadhyay, 1998). India's five-year health plans since independence illustrates a persistent focus on population control and family planning. Programs were target-driven, often using incentives – and in extreme situations – state coercion. At the height of this alarming trend was India's campaign during the "Emergency" years (1975-1977), involving the mass compulsory sterilization of women and men. The preoccupation with

family planning can be largely attributed to fears of overpopulation among political leaders, policy makers, and health administrators (Drèze & Sen, 2002). This vision, which has been referred to as "a ferocious bull in the China shop of the health services" (Banerji, 1997), led to the neglect of many other women's health issues in India.

A progressive shift in policy occurred in 1996, spurred by the Women's Health Movement and the 1994 International Conference on Population Development (ICPD), which moved away from a target-based approach to reducing fertility to an emphasis on women's individual reproductive choices and rights over her body (Mukhopadhyay, 1998). In addition, a lifecycle approach to health that considers the specific and cumulative effects of poor health and nutrition across a woman's lifecycle – from birth to old age – including reproductive and non-reproductive dimensions of health is being promoted as the new women's health paradigm (Das Gupta & Chen, 1995; World Bank, 1997).

2.2 Approach to literature review

Adopting this wider lens of women's health, the present chapter seeks to review recent literature on women's health in India, with a particular focus on Kerala. Evidence for this chapter comes from three sources: (1) published databases of international organizations (World Bank, WHO, United Nations; UNIFEM) made available in Annual Reports and their organizations' websites (World Bank, United Nations, WHO), (2) Indian government surveys (2001 census, the second National Family Health Survey, 1998-1999 or NFHS-2) and associated reports, and (3) special studies and review papers that address women's health from a population health perspective. Searches for documents were conducted on Pubmed, using the following search words: "women's health" and "India". The following search limitations were put in place: "All Adult: 19+ years", "Adolescent: 13-18 years", "English", "French", "published in the last 10 years", and "journal article". I then excluded those articles that did not specifically examine the health of women in India (e.g. non residential Indians). This exercise aims to provide a glimpse into the major themes being addressed in the literature on women's health and is

not meant to be an exhaustive review. This search yielded 63 articles. I reviewed these abstracts to assess the main women's health research issues over the past 10 years. Then, I selected a sample of the empirical articles that represented the various dimensions of women's health. Key monographs and reports on women's health in India published since 1996 were also included[11].

2.3 Findings

The review of published papers led to the identification of 63 papers, 41 empirical studies, and 22 reviews or advocacy papers (Table 1 on the following page). Forty-six studies examined health needs, which I categorized as reproductive and maternal health (n=23), non-reproductive health (n=17), and HIV/AIDS (n=6). There were also studies on women's access to health care (n=6), social determinants of women's health (n=5), domestic violence (n=3), and women's health interventions (n=3). Previously understudied issues received some attention, including reproductive cancers (n=5) and mental health (n=5). Papers on HIV/AIDS tended towards advocacy, only 2 empirical papers were identified.

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[11] I included Meera Chatterjee's excellent review *Indian Women, Health, and Productivity*, although it was published in 1990 because I have not found any comparable document published more recently.

Table 1 Women's health issues addressed in empirical and review/advocacy journal articles, 1996-2006

	Empirical	Review/advocacy	Total
Health needs			
Reproductive and maternal health			
Family planning/maternal health	5	4	9
Reproductive morbidity	6	0	6
Reproductive rights and needs	4	1	5
Menopause	2	1	3
Total	*17*	*6*	*23*
Non-reproductive health			
Cancer	4	1	5
Mental health	3	2	5
Nutrition/oral health	3	1	4
Infectious/parasitic diseases	0	2	2
Perceived morbidity	1	0	1
Total	*11*	*6*	*17*
HIV/AIDS	*2*	*4*	*6*
Total health needs	*30*	*16*	*46*
Access to care	*5*	*1*	*6*
Social determinants of health	*2*	*3*	*5*
Domestic violence	*2*	*1*	*3*
Interventions	*2*	*1*	*3*
Total	41	22	63

In the sections that follow, I do not attempt an exhaustive review of women's health, nor do I review all 63 papers identified in the review. Instead I provide a synthesis of what we know about women's diseases and health issues, access to health care, major risks to women's health, and available health interventions for women. This approach is meant to provide background information for women's health in India, to situate my own study within the current literature, and identify key knowledge gaps. I draw upon all sources of information described in section 2.2.

2.4.1 Maternal and reproductive health

Burden of disease estimates indicate that maternal and perinatal conditions continue to account for a large albeit declining proportion of the burden of disease in India. In 1990, maternal and perinatal conditions accounted for 13% of India's burden of disease, in 2002 this figure was 8% (WHO, 1998; 2004).

In 1998, the maternal mortality was estimated to be 407 per 100,000 by the NFHS-2, although rates are lower in the south (195 per 100,000 in Kerala; 79 per 100, 000 in Tamil Nadu). Information on maternal morbidity is sparse, what we do know comes from a few studies conducted during the 1970s (World Bank, 1996). Factors that contribute to the persistently high maternal mortality and morbidity includes chronic malnutrition, poor access to antenatal care and other health care services, high levels of illiteracy, and fertility rates (Gupte, Ramachandran & Mutatkar, 2001).

The total fertility rate in India has come down from 5.1 during the early 1980s to 2.9, although there is a range across states from a high of 4.9 in Uttar Pradesh to below replacement levels in Kerala and other states (Gupte, Ramachandran & Mutatkar, 2001; RGI, 1999). Despite reduction in fertility rates, women remain limited in their reproductive choices and control over their bodies (Mukhopadhyay, 1998). Temporary methods of contraception are not widespread. In Kerala, the NFHS-2 found that over 50% of currently married women were sterilized.

The little evidence available suggests that reproductive morbidity is prevalent among women of reproductive age. A prospective study of 421 young married women in Karnataka found that reproductive ill-health accounted for almost half of reported episodes of illness and for 31% of total curative health expenditure (Bhatia & Cleland, 2001a).

2.4.2 Infectious diseases

Studies on infectious and parasitic diseases among women in India are limited, but the general picture is one of high morbidity (World Bank, 1996). Tuberculosis (TB) is the most important communicable disease among adult women and men (Chatterjee, 1990); the overall prevalence according to the NFHS-2 is 544 per 100,000. The prevalence of TB is comparable in Kerala, 435 per 100,000 among females and 623 per 100,000 among males. Diseases, such as malaria, leprosy, and filaria are endemic in certain areas but not others. In Kerala, the prevalence of infectious and parasitic diseases is low, for example only 56 per 100,000 population suffered from malaria, which is considerably lower than the national rate 3,697 per 100,000 population.

2.4.3 Malnutrition

Due to a pervasive preference for the male child in India, girls have been found to be deprived of food and necessary care leading to higher levels of malnutrition among girls (Chatterjee, 1990). Women, especially during pregnancies, have been found to suffer from high levels of anaemia and nutrition deficiencies, leading them to give birth to low birth-weight babies. Low birth-weight baby girls, in turn, are more likely to be undernourished as children, adolescents, and women. Data from the NFHS-2 indicate that malnourishment is prevalent among Indian women and to a lesser extent among women in Kerala: estimates for mild, moderate, and severe anaemia[12] among women 15-49 years were found to be 35%, 15%, and 2%, respectively for Indian women and 20%, 3%, and 0.5% for women in Kerala. In addition, 36% of women age 15-49 had chronic energy deficiency (measured by a Body Mass Index less than 18.5) in India and 19% among women in Kerala.

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[12] The severity of anaemia is categorised as follows: mild (10.0-10.9 grams/decilitre for pregnant women and 10.0-11.9 g/dl for non-pregnant women), moderate (7.0-9.9 grams/decilitre), and severe (less than 7.0 g/dl).

2.4.4 HIV/AIDS

The prevalence of HIV/AIDS is estimated to be 0.9% (WHO, 2006), this translates to almost 10 million persons living with the virus. The 2001 Global Burden of Disease study found that compared to 1990 estimates, HIV/AIDS now accounts for 12% more of the burden of communicable diseases, maternal and perinatal conditions and nutritional deficiencies (Lopez, Mathers, Ezzati, Jamison & Murray, 2006). The profile of HIV/AIDS varies across India. In some areas, it is contained within high risk populations, such as drug-injecting women in urban Manipur (Panda et al., 2001), whereas in other areas the major HIV risk factor for women was single partner heterosexual sex with their husband (Newman et al., 2000). HIV/AIDS is increasing, yet Indian women still have little knowledge of the disease and its transmission, although levels of awareness varies across regions and social groups. A study using NFHS-2, 1998-1999 data, examined rural women's awareness of HIV/AIDS in two states: in Maharashtra 47% of women were aware of HIV/AIDS, but only 28% knew how to prevent the disease, and 16% had correct knowledge of its transmission, in Tamil Nadu, rates of awareness were higher: 82%, 71%, and 31%, respectively (Pallikadavath, Sanneh, Mcwhirter & Stones, 2005). HIV/AIDS awareness was correlated with socioeconomic status and caste in both states; low levels of awareness were higher among women who were illiterate, poor, agricultural labourers, and had tribal affiliations.

2.4.5 Chronic disease

After the age of 45 years, chronic illness becomes the major cause of death among Indian women (World Bank, 1996). Data on women's chronic illness is sparse, which can be largely attributed to a lack of data on women's health beyond the reproductive age. Reddy, Shah, Varghese & Ramadoss (2005) recently reviewed the growing burden of chronic diseases, although sex-disaggregated data are not provided. The burden of coronary heart disease is estimated to be 3-4% in rural areas and 8-10% in urban areas. Diabetes has increased from less than 3% in 1970 to 12% in 2000. The leading cancer sites among women are those related to smoking (oral cavity, oesophagus, lungs) and

cervix, breast, and ovarian cancer. Institutional studies have found that reproductive cancers are associated with low socioeconomic status. In rural Maharashtra, 72% of women with gynaecological malignancies were from lower socioeconomic classes (Chhabra, Sonak, Prem & Sharma, 2002).

A couple of studies have examined preventative programs to reduce cervical cancer. A study of an oncogenic human papillomavirus (HPV)-based cervical screening among rural women of reproductive age found that the highest prevalence of HPV was among women under 23 years; not performing HPV tests among this group will potentially miss 76% of high-risk HPV infected women at risk for developing cervical cancer (Duttagupta et al., 2002). A cluster randomized control trial in south India identified a number of determinants of participation in a cervical cancer screening program, including education and socioeconomic position (Sankaranarayanan, et al., 2003).

2.4.6 Mental health

There is growing recognition that mental health issues are important worldwide (WHO, 2001). By 2020, the second leading cause of the global disability burden is predicted to be unipolar or major depression. In particular, researchers have begun to focus on common mental disorders (CMD), which are nonpsychotic mental disorders, such as depression, anxiety, and somatic complaints (Patel, Araya, de Lima, Ludermir & Todd, 1999). In India and other low-income countries, CMDs were about twice as high among the poor than the non-poor and there is a higher prevalence of these disorders among women, especially women with lower levels of autonomy (Patel et al., 1999). Patel and his colleagues recently examined women's mental health in the state of Goa. In a community study of 3,000 women aged 18 to 50 years, chronic fatigue (symptoms are experienced for at least 6 months) was found among 12% of the sample (Patel et al., 2005). Chronic fatigue was associated with poor mental health, gender disadvantage, and poor socioeconomic conditions. In a second study, 7 % of a sample of 2,494 women were diagnosed with a CMD, the majority were diagnosed with mixed anxiety-depressive disorder (Patel et al., 2006). CMD was found to be associated with a number of factors,

including economic difficulties, limited decision-making agency, and low levels of family support.

2.4.7 Self perceived health and self assessed morbidity

Self perceived health has not been systematically assessed in low-income countries, although this is changing with the recent administration of the World Health Survey that was conducted in 70 countries. There is, however, some literature examining self reported morbidity. In particular there has been considerable debate regarding Kerala on a specific issue (cf. Kumar, 1993; Murray, 1996). The issue is this: Kerala reports the lowest *mortality* rates of all the Indian states yet reports the highest *morbidity* rates. Authors have debated whether or not the reported morbidity is 1) a statistical artefact related to problems with data, 2) "higher level of health ideals" (Murray, 1996, p. 137) in Kerala attributed to the state's higher literacy rates and greater contact rates with health care professionals; therefore, individuals are better able to assess and consequently report their health problems, or 3) at least in part, there is a real morbidity burden in Kerala (Kumar, 1993). The evidence appears to lean towards the second explanation, but this debate is based on outdated data and to my knowledge no one has simultaneously examined both reported morbidity and clinical data, providing a definitive explanation. Murray does, however, convincingly argue that self assessed health measures may be inappropriate to use when comparing populations in which there are large cultural and socioeconomic differences.

2.4.8 Access to health care

A lack of a national health insurance program in India leaves the poor vulnerable to high health expenditures when faced with illness, which can lead poor or near-poor households to destitution (Krishnan, 1999). Escalating health care costs are increasing financial stress among those households where a family member falls ill. In Karnataka, 14% of a sample of 421 young Indian mothers spent 4% of their annual household income on health

(Bhatia & Cleland, 2001b). In Kerala, over 15% of non-poor individuals who were hospitalised, became poor because of their medical costs (Peters, Yazbeck, Sharma, Pritchet & Wagstaff, 2002).

Lack of decision-making powers may also reduce women's access to health care; the NFHS-2 found that only 28% of women of reproductive age can decide to seek their own health care. In a city in the northern state of Uttar Pradesh, a woman's greater freedom of movement was associated with higher levels of use of antenatal care (Bloom, Wypij & Das Gupta, 2001).

2.4.9 Environmental and domestic risks

Little research is available on women's exposure to health hazards in their home environment, where women spend a large proportion of time engaged in child and family care, domestic work, and home-based income generation activities. Cooking with crude stoves has been identified as one activity with potential health risks. Poor ventilation increases women's risk to smoke pollution and the use of biomass fuels for cooking substantially increases the risk for active tuberculosis and blindness (Mishra, Retherford, & Smith, 1997; 1999). Exposure to cooking fumes was estimated to be equivalent to smoking twenty packs of cigarettes a day (Smykes, 1991, cited in World Bank, 1996).

There is also little evidence on working conditions of women engaged in paid employment outside of the home. Poor women generally assume the least favoured jobs, often facing higher risks of exposure to pollutants and hard labour practices (Doyal, 1995). In India, poor rural women who work as agricultural labourers are exposed to health risks, such as long periods of time standing in water while weeding and transplanting rice, which can lead to a variety of water-borne illnesses, back pain and osteoarthritic complaints (World Bank, 1996). There are also specific health risks associated with industries, such as bidi factories, cashew nut processing, and garment industries (Chaterjee, 1990), but recent data is rare.

2.4.10 Domestic violence

Domestic violence can be viewed as a health problem, but it is better seen as a health risk (Garcia-Moreno, 2002). Although physical injuries and death may occur it is not necessarily the primary outcome. A number of negative health consequences may arise, such as sexually transmitted infections, unwanted pregnancy, depression and other mental health problems. The activism of Indian and international women's organizations over the past few decades has succeeded in bringing domestic violence into the public realm and onto global agendas. International organisations, including the World Bank and the WHO, have come to recognize domestic violence as a major public health problem (Heise, 1994; WHO, 1997). Increasingly, countries are gathering data on violence against women, however, these efforts are largely ad hoc and have not yet been routinely collected in national statistics offices.

Recent studies indicate that domestic violence is prevalent in India. A national survey of 9,938 women found 45% of women reported being physically assaulted by an intimate male partner in their lifetime (INCLEN, 2000, cited in Garcia-Moreno, 2002). A cross-sectional survey of ever-married women (15-49 years) undertaken in Thiruvananthapuram district of Kerala found 41% of rural and 27% of urban women reported at least one incidence of physical violence after marriage (Panda & Agarwal, 2005). A cross-sectional survey of 397 married women in Karnataka found 29% of women reported ever being hit by their husbands and 12% reported to have had forced sex (Krishnan, 2005). These findings are particularly striking because it illustrates that domestic violence is prevalent in southern states despite women's relatively higher status.

2..4.11 Tobacco and alcohol consumption

There is an increasing burden of chronic illness and accompanying risks factors in low-income countries (WHO, 2002). Rising utilization of tobacco products and alcohol has been recently observed in India, predominantly among poor and lower caste men (Neufeld, Peters, Rani, Bonu, & Brooner, 2005). While women are less likely to smoke

or drink alcohol, male consumption of these products can have negative consequences on women's health by reducing household expenditures for other health promoting goods and services. Male alcohol abuse is also associated with a higher prevalence of domestic violence (Krishnan, 2005; Garcia-Moreno, 2002).

2.5 Health interventions for women

The 1993 World Bank Report, called for an investment in cost-effective interventions in low-income countries. This call was echoed in the World Banks's 1996 report, *Improving Women's Health in India*. Female health problems to be targeted for intervention was based on estimates of the burden of health using the DALY approach and on available cost-effective interventions to address those health needs. The World Bank's 1997 report, *A New Agenda for Women's Health and Nutrition*, specified the essential interventions for women's health and behavioural change in low-income countries (See Annex A), these interventions target fertility and a limited number of diseases, especially HIV/AIDS and other sexually transmitted diseases. The health interventions identified by the World Bank continue to view women primarily as reproductive agents, adopting a vertical approach. These interventions also fall into the view women as passive recipients (Das Gupta & Chen, 1995). I only identified 2 empirical studies evaluating an intervention in my review of the published literature. Both studies examined cervical screening programs, which address a specific disease.

2.6 Gaps in knowledge

This literature review highlights three main gaps in knowledge. First, although reproductive and maternal health issues continue to account for an important burden of ill health among women, especially in the northern states, maternal and reproductive issues tend to receive most of the attention not only by policy makers but also by researchers (Table 1). Our knowledge base continues to be shaped by routine surveillance and databases that tend to measure indicators, such as fertility rates and contraception prevalence rates. Other dimensions of women's health are being documented in

independent studies. This body of research, thus far, is sparse and is being advanced in an ad hoc fashion, due in part to the heterogeneity across India. There is a need to better document the totality of women's health needs. Due to large socioeconomic and cultural differences in the country, it is also appropriate to distinguish between women's health patterns at state and regional levels.

Second, there are few studies that explicitly examine the distribution of women's health across socioeconomic and caste groups. Some studies controlled for these variables in their analysis, but did not explicitly examine the relationships involved. Due to the extent of gender discrimination in India, researchers generally focus on inequalities in health between men and women. However, disparities among women are also of importance in order to better address the needs of vulnerable women.

Third, recent investigations on health interventions for women are few. Cost-effective interventions that address maternal health issues and selected diseases have been identified. There is a paucity of information, however, exploring the effectiveness of interventions that will improve women's mental health, reduce domestic violence, address various environmental risks, etc. – or an intervention that may simultaneously improve multiple dimensions of women's health. Moreover, there are few enquiries into interventions that promote women's capacities to improve their own health. In the following chapter I review the evidence on potential health benefits for women of microcredit – an intervention that is not considered to be an essential service for women's health.

CHAPTER 3

REVIEW OF LITERATURE (II): MICROCREDIT PARTICIPATION AND HEALTH

Chapter Three at a glance

Issues	Evidence
Relationship between microcredit participation and women's health.	Pieces of evidence link participation in microcredit and better health outcomes, but the evidence is limited in its scope with respect to dimensions of women's health (focus is on family planning and child health). The bulk of evidence comes from a couple of well known programs in Bangladesh that incorporate health related activities. Health effects are associated with duration of participation, there can be spill-over effects to non-members living in the program area. Women's autonomy/ empowerment is identified as an important mechanism linking participation and health.
Theoretical foundations	Few studies are based on a theoretical framework.
Confidence in studies	There are a limited number of studies. Evidence is derived predominantly from cross-sectional surveys; attempts to address selection bias varies. Some studies have shown strong associations, but the demonstration of cause and effect is lacking.
Generalizability	Most studies examined a couple of programs in one country, Bangladesh
Research gaps	
Pieces of evidence suggest that microcredit interventions are promising; there is a need to adopt more rigorous research designs to assess cause and effect relationships. The research evidence is fragmented and needs to be brought under a broader framework, which is theoretically grounded, and specifies the interconnections between microcredit and various health outcomes. We need to expand our knowledge of microcredit-health linkages by investigating a greater range of schemes (especially models without any formal health programs) and contexts, and a broader range of health effects.	

This chapter is organized into three sections. I begin by briefly providing the context for poverty alleviation in India and the emergence of microcredit as a poverty alleviation strategy. This is followed by a description of the main challenges associated with developing an evidence base on microcredit and health and some ways in which to improve the quality of studies. In the third and main section of the chapter I review the literature on microcredit and health.

1.0 Poverty alleviation strategies (PAS)

1.1 Overview

The fathers of India, Mahatama Ghandi and Jawaharlal Nehru (India's first prime minister), agreed that poverty was the main challenge facing independent India, although they had diverging opinions on how the nation should be lifted out of poverty (Kothari, 1993). Poverty alleviation was deemed to be a project of the central government – not a matter to be handed over to bureaucrats – and was enshrined in the country's constitution[13]. The States' objectives are primarily pursued through the Planning Commission, which was set up in 1950 to promote the standard of living of its citizens. The Planning Commission formulates India's Five Year Plans and is currently pursuing the tenth 5 Year Plan (2002-2007), which has given special importance to the empowerment of women in poverty alleviation.

There are a panoply of poverty alleviation strategies (PAS). Guhan (1994) provides a useful framework for categorising PAS based on three broad categories of measures: 1) promotional, which are concerned with promoting real incomes and consumption, endowments, and entitlements, 2) preventive, which aim to directly avert deprivation in specific ways, and 3) protective or safety nets, which are specific measures guaranteeing relief from deprivation.

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[13]Jawaharlal Nehru, gave a speech 'tryst with destiny' on the eve of the country's independence on August 14, 1947, where he outlined the tasks ahead, which included "the ending of poverty and ignorance and disease and inequality of opportunity" (cited in Drèze & Sen, 1996, p.5).

These categories are not meant to be exclusive, but rather can be viewed as moving from wider to narrower domains of specificity. The outer and largest circle, encompasses promotive measures and risk prevention, including macro and meso-level approaches (e.g. primary health care). These measures are oriented towards the poor, but may also benefit the general population. In the middle, preventive measures and risk mitigation are direct anti-poverty measures (e.g. employment creation). The smallest, inner circle, includes specific measures providing relief or protection for groups that did not benefit from the other measures and risk coping – the last resort. PAS can be further distinguished as being either targeted, which seek to directly help the poor, or non-targeted, which include the entire population. Targeting aims to ensure that benefits of social returns are higher for the poor than the non poor, but not-targeted programs can also have significant benefits for the poor.

Different types of PAS have emerged to address the needs of the poor. A recent trend has arisen in which the poor are increasingly turning to self-employed activities to generate income. However, in doing so the poor face challenges in acquiring credit to take loans to engage in productive activities because they lack the necessary collateral (e.g. land) required by formal lending institutions. This highlighted an important need among the poor and one in which was found to be unjust considering the ease in which the rich can access credit: "In both rich and poor countries alike, credit institutions have favoured the rich and in so doing have pronounced a death sentence on the poor" (Yunus, 1999, p.150).

1.2 Microcredit

Microcredit, which can be considered as a preventative measure, emerged to help address the "credit gap" between the poor and the better off by offering an alternative for the poor to acquire loans: small groups are formed and loans are allocated to members based on group solidarity instead of formal collateral (Montgomery, 1996). This strategy appeals both to those on the political left for it is based on redistribution principles and to those on the right

for it promotes self-sufficiency and independence of the poor through capitalist activities (Mosely & Hulme, 1998). Promoted by governments, development agencies, and non-governmental organisations (NGOs), microcredit programs aim to provide the poor with access to credit, thereby improving their opportunities to engage in productive activities. Montgomery provides a succinct description of how microcredit programs work:

> Solidarity group lending schemes involve the formation of groups in which some or all members in the group are jointly liable for each individual's loans, thereby creating an alternative to conventional loan requirements (which poor people can rarely fulfil). From the lenders' perspective such joint liability lending enables a transfer of default risks from the institution to the borrower, and can reduce the transaction costs of providing a larger number of small loans (by concentrating clientele in groups, at regular village based meetings, rather than dealing with individual borrowers at different times) (Montgomery, 1996, p. 290).

There are a range of programs, which vary in their models of microcredit, underlying philosophies, and target groups (Berger, 1989). For example some programs use village banks, while other programs are organized by NGOs that link with commercial banks. Microcredit programs may also formally link with health programs to provide a more comprehensive set of services (Rodriguez-Garcia, Macinko & Waters, 2001).

2.0 Microcredit-health linkages: building an evidence base

2.1 The challenges

Building an evidence base on potential health benefits of microcredit participation is not an easy task, in this section I highlight four main challenges.

The first challenge is related to the nature of the microcredit program: programs cover a large proportion of the population, consequently it is difficult to find control groups that have not been exposed to the intervention either before or during the study. It is possible

to configure control groups, but the choice is limited and it is difficult to have controls that have not been contaminated to some extent. There are two main options. First, controls may be selected within the study site, individuals who are not members, either because they did not join the program or because they were not eligible to join. The second option is to select controls from another area where there is no program in place, but in which populations are comparable – given what we know about heterogeneity across societies and even among different rural communities this is not a straightforward task. These controls raise comparability issues, which are related to the next challenge.

The second challenge is that women self-select themselves into the microcredit program, women choose voluntarily whether or not they wish to participate. These women are not necessarily representative of all the women in the surrounding; they may possess individual characteristics (e.g. education, socioeconomic position, etc.) or particular preferences, which independently of being exposed to an exogenous program, such as microcredit, are characteristics that determine outcomes (health, prosperity, access to public resources, etc.). Therefore, we are confronted by a typical situation in which studies contain both selection bias (women who participate do not have the same characteristics as the reference population) and endogeneity (participation in an intervention is not independent of the outcome), which are important threats to internal validity in non-experimental designs (Shadish, Cook & Campbell, 2002). The main problem here arises when the association observed between being exposed to a program and the outcome of interest is spurious. In this situation it becomes necessary to control *a posteriori* the statistical confusion engendered by the causal association between participation in microcredit and the outcome of interest.

Selection bias may also arise if there is non-random placement of microcredit programs (Pitt, Khandker, McKernan & Latif, 1999). This occurs when a program is intentionally placed where there is a stronger likelihood for success or is implemented in a particularly impoverished area, which can influence the outcomes unrelated to the program. Comparing a program village with a control villages needs to address potential heterogeneity between the two areas.

Closely linked with selection bias is the potential for reverse causality, that is, women's health may influence participation (Dowd & Town, 2002). If ill health limits a woman's capacity to fulfill program activities, such as attending regular meetings and training programs, healthier participants may merely be a reflection of the exclusion of ill women.

The third challenge is related to health production, which is a complex process determined by multiple factors. It is difficult, therefore; to isolate the effects of an intervention from the effects of other endogenous events, such as droughts or competing interventions. A *time lag* between an intervention and final health outcome also presents a challenge (Anand & Chen, 1996). A study might fail to detect an association because insufficient time has passed and not due to the lack of an effect.

Finally, microcredit programs are context-dependent. These programs are influenced by factors, such as literacy rates, levels of interpersonal trust, and cultural values. A microcredit program that is effective in one area may not succeed elsewhere because the context is not conducive to ensuring the program is effective in meeting program objectives, including reaching a target population, extending access to loans, and helping participants to engage in income-generating activities. And if the program is not effective, then we cannot expect the theorized health benefits to occur.

The potential health impacts of microcredit will also depend on the context. An effect identified in a certain context may not transfer to another context. For example, improving women's access to health care may lead to health benefits where quality health care is offered, whereas increasing access in a setting where health care services are of poor quality will not yield equivalent health outcomes. We need to conduct studies in different contexts and examine the potential health benefits associated with microcredit in relation to the particular context.

2.2 Improving quality of studies

These challenges are difficult to overcome. There are, however, ways to improve the quality of studies. As an initial – but often neglected – first step, the quality of a study can be improved by a strong theoretical foundation (Carpiano & Daley, 2006; Frohlich et al., 2004; Krieger, 2001). Theory provides a lens, guiding studies from the conception of research questions to the interpretation of findings and recommendations for future research. Without an explicit use of theory, "research results can be interpreted in any fashion, full of the influence of biases, proclivities, ideologies, and possibly even ignorance" (Carpiano & Daley, 2006, p. 567).

The next way to improve the quality of studies is to take steps to minimize key threats to internal validity. In the absence of randomization, reducing selection bias is best addressed by using *a priori* strategies that will improve the design (Shadish, Cook & Campbell, 2002). Examples include adopting a robust quasi experimental designs (e.g. control groups with pre-test), restricting samples to more homogenous subgroups to reduce heterogeneity and consequently statistical confusion, and explicitly identifying potential confounders, which can subsequently be used to control *a priori* the consequences of endogeneity. Selection bias can also be minimized by adopting post-hoc strategies. Examples include pursuing statistical techniques (e.g. instrumental variables) and using progressive model building approaches, enabling the modelling of sequences of cause and effects, thereby isolating the effects of confounders from the effects of the variables of interest (Dowd & Town, 2002; Schuler & Hashemi, 1994). To assess the potential of reverse causality, reasons for nonparticipation in microcredit may be scrutinized and members may be classified according to their duration of participation to assess potential dose response relationships (Amin, Ahmed, Chowdhury & Ahmed, 1994; Evans, Adams, Mohammed, & Norris, 1999).

Finally, there are a few steps that can be taken to help untangle the multitude of influences on health and address time lags between an intervention and health outcomes (Haddad et al., forthcoming). First, we can look at the intensity of changes by considering

the duration or participation and to assess if an effect is detectable among those who have participated for a longer time. Second, we can model the sequence of relationships from participation to final outcomes. In the absence of a change in the final outcome due to a time lag, we may still detect changes among intermediate variables. Finally, an in-depth understanding of the context and an assessment of exogenous factors (e.g. drought, political instability) that affect final outcomes will help to judge the possibility that factors other than the intervention are causing the effect.

3.0 Review of literature

3.1 Questions

Two sets of questions guide this literature review. The first set of questions relates to the quality of the studies: (1) what is the strength of the design, (2) to what extent can we generalize results, and (3) to what extent do I have confidence in the results? The second set of questions relate to content, what do we know about: (1) the health effects (in terms of nature and magnitude) of participation in microcredit; (2) the mechanisms involved linking microcredit participation and health, and (3) the distribution of any health benefits across different groups of women.

3.2 Search strategy

The literature review includes only peer-reviewed articles. Searches of the English literature were conducted on the following electronic databases; Pubmed, Citation Index for Nursing and Allied Health Literature (Cinhal), and Science Direct[14]. Databases were searched using the keywords related to microcredit programs ("microcredit", "credit", "microfinance") in combination with general health and illness terminology ("health",

[14] In addition to Pubmed, a conventional search tool in public health, I employed additional electronic databases in order to find all possible articles available on what can be currently labelled as an "emerging" topic. Moreover, as microcredit is a poverty alleviation strategy, I wanted to ensure that journals specialized in international development were included in my searches (covered by Science Direct).

"illness", "ill-health" "determinants of health" "health inputs") and specific health outcomes and determinants ("nutrition", "health care", "violence", "fertility", "HIV/AIDS", "health behavior").

The literature on microcredit and health is relatively new and emerging; therefore, a relatively broad scope was adopted. Articles that addressed the relationship between microcredit participation and health were reviewed. All regions in the global south and all types of microcredit programs were included. There is a large body of work examining the impact of microcredit on poverty and women's empowerment. These two streams of literature examine the intended impacts of microcredit. Although poverty and women's empowerment are critical issues to health, these bodies of literature do not explicitly link with health and are beyond the scope of this chapter. Other authors have reviewed this literature (see especially El Sohl, 1999; Kabeer, 2000; Matin, Hulme & Rutherford, 2002).

3.3 Findings

Twenty-one studies were identified (Table 2), published between 1994-2005. In this section I discuss the quality of the studies. I begin by examining whether authors used a theoretical framework to guide their studies and explain their findings. I then examine study designs and steps used by researchers to improve the strength of their studies. This is followed by a review of the sampling used and the countries and programs included in the studies.

Table 2 Review of studies on microcredit and health: country, scheme, design, sample, and outcomes

Ref	Country	Scheme	Design	Group comparisons	Approaches to improve design	Sample	Outcomes
Schuler et al., 1994	Bangladesh	GB*, BRAC*	Cross-sectional	GB member BRAC member- Non-member Non program	-control village close to program site -samples were densely covered by program -multivariate analysis	1,305 married women <50 yrs	-contraceptive use
Amin et al, 1994	Bangladesh	GB*, BRAC*, BRDB*	Cross-sectional	Member Non member	-multivariate analysis -membership duration	3,453 women 14-49 yrs	-contraceptive use & desired children
Amin et al., 1996	Bangladesh	5 NGOs*†	Cross-sectional	Member Non-member Non program	-control village close to study site - multivariate analysis - prior contraceptive use	3,564 married women <50 yrs	-contraceptive use & desired children
Schuler et al., 1996	Bangladesh	GB*, BRAC*	Mixed: Cross-sectional & ethno-graphic	GB member BRAC member - Non-member Non program	-multivariate analysis of survey data	1,305 married women <50 yrs	-domestic violence

Table 2 (cont.)

Ref	Country	Scheme	Design	Group comparisons	Approaches to improve design	Sample	Outcomes
Schuler et al., 1997	Bangladesh	GB*, BRAC*, BRDB*	Cross-sectional	GB member BRAC member Non-member Non program	-control village close to study site -prior contraceptive use -membership duration -multivariate analysis	1,305 married women <50 yrs	-contraceptive use
Amin et al., 1997	Bangladesh	5 NGOs*†	Cross-sectional	Member Non member Non program	-control matched to program areas -sampled densely populated areas -multivariate analysis	3,564 married women < 50 years	-child immunization & survival
Schuler et al., 1998	Bangladesh	GB*, BRAC*	Ethnographic			Details not provided.	-domestic violence
Pitt et al., 1999	Bangladesh	GB*, BRAC* , BRDB*	Cross-sectional	Member Non member Non-eligible Non program	-instrumental variable -village fixed effects - multivariate analysis	1,798 hhs women, men	-contraceptive use and fertility

Table 2 (cont.)

Ref	Country	Scheme	Design	Group comparisons	Approaches to improve design	Sample	Outcomes
Nanda, 1999	Bangladesh	GB*	Cross-sectional	Member Non member Non-eligible Non program	-instrumental variable -village fixed effects -multivariate analysis	1,798 hhs women, men	-demand for formal health care
Ahmed et al., 2000	Bangladesh	BRAC/ICDDR,B* 2	Cross-sectional	Member Non member Non-eligible	-multiple comparison groups -multivariate analysis	3,817 hhs women, men	-reported morbidity -health seeking behavior
Ahmed et al., 2001	Bangladesh	BRAC*	Cross-sectional	Member Non member Non-eligible	-multivariate analysis	3,624 women 15-55 yrs	-emotional stress
Amin et al., 2001	Bangladesh	Palli Mangal*1	2 cross-sectional	Proximate area Remote area Control area	-multivariate analysis	4,482 women 15-50 yrs	-contraceptive use & fertility -awareness/ use essential services
Hadi, 2001	Bangladesh	BRAC*	Surveillance system	Member <5 yrs Member 5 yrs+; Non-member Non-eligible	-multivariate analysis	500 women with child <5 years	-maternal health knowledge

Table 2 (cont.)

Ref	Country	Scheme	Design	Group comparisons	Approaches to improve design	Sample	Outcomes
Ahmed et al., 2002	Bangladesh	BRAC*	Cross-sectional	Member Non member Non-eligible		561 married couples	-health related quality of life
Bhuiya et al., 2002	Bangladesh	BRAC/ICDDR,B* 2	Cross-sectional Surveillance data	Member Non member Non-eligible	-longitudinal data -multivariate analysis	13,549 children	-infant mortality
Smith, 2002	Ecuador, Honduras	Project Hope 3	Cross-sectional	Member of credit-only bank Member of health bank Non-member	-compared village characteristics -multivariate analysis -fixed village effects	HO=981 EC=963 women 15-49 yrs	-household expenditures -incidence of child diarrhoea -breast-feeding & cancer screening
Ahmed et al., 2003	Bangladesh	BRAC/ICDDR,B* 2	2 cross-sectional: 1995,1999	Member Non member Non-eligible	-multivariate analysis -common sampling frame	4,081 women, men	-health seeking behaviour

Table 2 (cont.)

Ref	Country	Scheme	Design	Group comparisons	Approaches to improve design	Sample	Outcomes
Khatun et al., 2004	Bangladesh	BRAC/ICDDR,B* 2	Cross-sectional: 3 rounds	Member Non member Non-eligible	-multivariate analysis	576 6-72 mths	-child nutritional status
Dohn et al., 2004	Dominican Republic	Esperanza Internacional 4	Cross-sectional: 2 rounds, 3 areas	MC member HP member MC+HP member	-multivariate analysis	81 hhs Women	-women's health knowledge & health-seeking behaviour -household health habits -child illnesses
Sherer et al., 2004	Guatemala, Malawi, Thailand	Project Hope*	SES profiles, health surveys	New member Established member (>1 yr)		503 women	-knowledge of HIV and STDs -health care seeking for HIV/ STDs
Doocy et al., 2005	Ethiopia	WISDOM	Cross-sectional: 2 sites	Incoming client Established client Non-client		819 hhs women, men, 6-59 mths	-women & child nutritional status -household coping capacity

Legend: * indicates that a health program is formally attached, GB=Grameen Bank, BRAC=Bangladesh Rural Advancement Committee, BRDB=Bangladesh Rural Development Board, ICDDBR,B=International Centre for Diarrhoeal Disease Research, Bangladesh, †The 5 NGOs are: Association for Social Advancement, Rangpur Dinajpur Rural Service, Development Center International, Community Development Association, and Village Education Resource Centre

[1] Palli Mangal was initiated in 1992, 2 phase pilot project: phase 1 program was microcredit with minimum Essential Services Package (ESP), then in phase 2 expanded the ESP, funded by USAID and supported by Morgan State University.

[2] BRAC, which is an integrated model, works in collaboration with ICDDR, B, a program that delivers maternal and child health services, thus together I refer to this as a partnership model.

[3] Project Hope has both minimalist and integrated models, this study compares participation in both types.

[4] Esperanza Internacional began as a credit only program, health promotion programs were added in some areas. The study compares the microcredit program with and without a health promotion program.

3.4 Theoretical framework

Most studies lacked a theoretical basis. One study presented a conceptual framework which was not theoretically rooted (Doocy, Teferra, Norell & Burnham, 2005) and only 2 studies explicitly developed theoretical foundations to guide their study and interpretation of findings. Nanda (1999) employed a modified version of Grossman's health production theory, accounting for a non-unified household preference approach, while Pitt and his colleagues (1999) drew on classic economic theory, treating the credit program as an "exogenous endowment of specific capital", based on an efficiency argument (Pitt et al., 1999, p 4). Both studies developed frameworks that addressed only their respective health outcomes of interest (demand for health care and contraceptive use) and focused exclusively on production and efficiency.

3.5 Study design

The studies relied almost exclusively on cross-sectional surveys. This is understandable due to the necessary resources (financial, human) and time required for collecting longitudinal data in low-income countries. A few studies complemented the cross-sectional surveys with other approaches, including data from surveillance systems (n=1) and ethnographic research (n=3). One study exclusively employed ethnographic methods. Two studies used prospective designs. The first prospective study used longitudinal data, implementing 3 rounds of a survey over a 1 year period (Khatun, Stenlund & Hörnell, 2004). However, the study encountered technical problems during surveying, and data for less than 50% of the original sample was available from the final round for analysis. The second prospective design combined a baseline survey with a Demographic Surveillance System and membership records (Bhuiya & Chowdhury, 2002).

To improve the study design and address selection bias, researchers generally used multiple comparison groups (N=18) adopting one of the following four approaches:

The first approach considered eligibility criteria of microcredit programs. Eligibility criteria is often used by microcredit programs, such as BRAC and the Grameen Bank, in order to target the poor. Eligibility criteria is typically based on easily observable characteristics, such as the size of landholdings or employment status of the head of the household. Authors generally adopt a 3 cell comparison: poor member, poor non-member, non-eligible. This approach is especially vulnerable to selection bias, but an instrumental variable can be constructed based on the eligibility criteria (a variable that affects woman's participation but has no direct effect on women's health), thereby improving the chances of finding a true program effect. Instrumental variables were used in only 2 studies (Nanda, 1999; Pitt et al., 1999).

The second approach used a village control, comparing members and non-members with individuals living in a village with no program. This approach helps to address the potential for contamination, but village heterogeneity and potential non-random program placement need to be addressed, by matching program villages with control villages (Amin & Li, 1997; Schuler & Hashemi, 1994), or using fixed effects in data analysis (Nanda, 1999; Pitt et al., 1999). Some authors did not address this issue, thereby reducing the internal validity of their studies (Amin, St. Pierre, Ahmed & Haq, 2001; Dohn, Chavez, Dohn, Saturria & Pimentel, 2004).

The third approach considers duration of participation, non-members are compared with members who have participated for varying periods of time. Doocy and her colleagues (2005) distinguished between incoming clients (clients who completed one loan cycle or less and participated less than 10 months) and established clients. Alternatively, authors also used duration of participation as an explanatory variable in their statistical models

(Amin et al., 1994; Schuler, Hashemi & Riley, 1997). The illustration of a duration effect can strengthen the confidence that the program is producing the effect, although there may still be differences between earlier and later adopters of the program.

The fourth approach was used to answer the following question: do microcredit programs aligned with health programs (hereafter referred to as tie-ins) yield greater health benefits than programs without any formal health program? To address this research question, Smith (1999) compared nonparticipants, members of credit only programs, and members of a tie-in. Members of the credit only program were treated in this case as a control group. Similarly, Dohn and her colleagues (2004) compared three communities with different program set ups: a program with only credit, a health promotion program only, and a tie-in program. Because these studies are comparing different communities with each type of program, community heterogeneity and potential non-random program placement need to be addressed, as done by Smith.

3.6 Sampling

The sample populations were predominantly non-elderly females and their children (Table 3.1). Six studies included both men and women. Studies focussed on the mean effect of participation, except for gender comparisons that were made among the studies that had included men. Studies generally employed adequate sample sizes, only one study had a sample size below 500 (Dohn et al., 2004). Studies that employed cross-sectional surveys tended to have larger sample sizes.

3.7 Country and type of programs

The majority of studies were conducted in Bangladesh (n=17), focusing on the two most popular programs: the Greameen Bank and the Bangladesh Rural Advancement Committee

(BRAC), which have health programs formally attached to their credit programs (Table 2). There were only 3 studies that examined microcredit without any formal health program attached, WISDOM in Ethiopia, Esperanza Internacional in the Dominican Republic, and Project Hope in Ecuador and Honduras. Two studies assessed microcredit programs in multiple countries: Ecuador and Honduras, and Guatemala, Thailand, and Mali.

3.8 Outcomes

Nine studies examined health outcomes exclusively related to reproductive and maternal health, especially family planning and child health, 3 additional studies examined reproductive and maternal health with other health outcomes (Table 3.1). Other health outcomes included: domestic violence (n=2), health care (n=3), self perceived health (n=1), HIV and STDs (n=1), and emotional stress (n=1).

3.9 Summary

In sum, the evidence base lacks the type of rigorous studies required to infer causation between microcredit participation and health. Notably, there have been no pre-test post-test studies and only 2 prospective studies, one of which was not rigorous. Steps taken by some authors to minimize selection bias greatly strengthen study designs, while other studies are less than convincing. A lack of diversity of programs and contexts explored has limited generalizability. Moreover, only 2 studies examined microcredit unattached to any health program; therefore, most studies were unable to isolate the effects of the credit and savings component, except when credit only programs were used as comparison groups (Smith, 1999; Dohn et al., 2003).

I now review the specific content of the studies, taking into consideration the strength of design of individual studies.

3.10 Evidence on content

3.10.1 Contraceptive use

Studies of both small and large microcredit programs indicate that participation was positively and significantly associated with contraceptive use. A cross-sectional assessment of 5 small and medium sized non-governmental organizations (NGOs) compared female members and non-members living in a program area (Amin, Li & Ahmed, 1996). The authors found that participants were one and a half times more likely to use contraceptives than women who did not participate, although it is not clear the extent that selection bias may have affected this result. Schuler & Hashemi (1994) found contraceptive use was significantly higher among members of the Grameen Bank, but not among members of BRAC. The authors argued that the Grameen Bank places greater emphasis on credit and strengthening women's economic roles members compared to BRAC. Also, the Grameen Bank followed a regimented approach, including the requirement of members to memorize and recite "sixteen decisions", including keeping one's family small, which may influence participants desire for more children. Schuler, Hashemi, & Riley (1997) later demonstrated that differences in the use of contraception between Grameen Bank and BRAC members disappeared once prior contraception use and duration of participation were controlled for (Schuler, Hashemi & Riley, 1997).

Another interesting finding was that non-members living in Grameen Bank villages were found to be more likely to use contraception than women living in villages without a program, contraceptive use was found to be 11% higher in villages that had a credit program (Schuler & Hashemi, 1994). The authors reasoned that there was a diffusion effect of reproductive norms from members to non-members; this is supported by the work of Amin, Li & Ahmed (1996).

Three of the aforementioned studies examined women's empowerment as a potential mechanism linking microcredit participation and contraceptive use (Amin, Li & Ahmed, 1996; Schuler & Hashemi, 1994; Schuler, Hashemi & Riley, 1997). It was hypothesized that participating in microcredit would help to strengthen economic roles, while empowering women, which would indirectly influence their contraceptive use by strengthening women's bargaining power and increasing their decision-making powers and control over their fertility. To test their assertions, the authors constructed empowerment indexes. In two studies (Amin, Li & Ahmed, 1996; Schuler & Hashemi, 1994), the authors' measured three dimensions of empowerment: decision-making agency, control of household resources, and social mobility, which was aggregated into a single index. In both studies, microcredit participation was associated with contraceptive use, mediated through empowerment[15].

Contrary to the above findings, Pitt and his colleagues (1999) found no association between women's participation and contraceptive use, but that men who participated were more likely to use contraception. The authors' explanation was that women's self employment activities undertaken with the microcredit program, unlike labour market opportunities, do not significantly increase the "shadow cost of a child", therefore fertility behaviour is not altered. The effect on men was attributed to heightened awareness and information from the programs that men are less exposed to than women, although this has yet to be empirically tested. The authors also argue that their approach was more rigorous in controlling selection bias by using instrumental variables and fixed village effects, which helped minimize unobservable heterogeneity. The authors did not, however, provide their results with and without controlling for selection bias, therefore; we do not know to what extent bias may have influenced the direction of results. Also, it is difficult to ascertain why the authors

[15] The authors' adopted a sequential modelling approach entering control variables and microcredit participation in model 1 and, subsequently adding the empowerment index in model 2.

obtained diverging results from other studies since their methodology varied from the previous studies.

3.10.2 Child and maternal health

Amin & Li (1997) found that infant and child mortality rates were significantly lower among households where the mother participated in a microcredit program. Bhuiya & Chowdhury (2002) found that the odds of an infant dying was 1.3 times lower if the mother was a member of a program than if the mother did not participate. Using longitudinal data, participation of mothers was associated with better nutritional status of children, especially girl children (Khatun, Stenlund & Hörnell, 2004). These findings should be interpreted with caution, however, due to the extent of technical problems encountered by the authors leading to the exclusion more than half of the original sample surveyed. Smith's (2002) examination of Project HOPE programs found differences between the two study sites: Ecuador (in a rural village program) and Honduras (in an urban slum program). In Honduras, participation in the integrated program was associated with a lower incidence of child diarrhoea, but this effect was not found among participants of credit only programs, whereas in Ecuador, a lower incidence of child diarrhoea was found among children in both types of programs.

The mechanisms identified in improving the health of children were generally vague or unspecified with two exceptions. Amin & Li (1997) demonstrated that lower mortality rates of children among participating mothers were linked to the greater immunization rates of their children. In another study, Hadi (2001) found higher levels of awareness of pre and post-natal health care among female participants – even after controlling for exposure to the media – and that this knowledge increased with duration of a mothers' participation. Hadi did not assess whether higher levels of mothers' awareness, in turn, led to health improvements for their infants.

3.10.3 Nutrition

One recent study examined microcredit participation and household security and nutrition in Ethiopia (Doocy et al., 2005). Participation was examined in two rural sites, the primary site was especially drought-affected and food insecure. Globally, the authors did not find significant differences between incoming clients, established clients and controls for any of the indicators. However, when examining the primary site (the more deprived area), there were significant differences in diet, food security, and nutrition. The odds of female controls being malnourished compared to established female clients was 3.2. For household food security, female client households were superior to male client households and controls (female and male clients) on a number of indicators, and female clients were less likely to be recipients of food aid. No significant differences were found in the second site, which was the lesser deprived area. These results highlight the potential of improving nutrition and food security in vulnerable areas among female clients and their household, but that not all participants necessarily benefit to the same extent.

3.10.4 HIV/AIDS

Project Hope's Village Health Bank (VHB) combines microcredit and health education[16] for women and recently began targeting people living with HIV/AIDS and families caring for AIDS orphans. Program collected data of members were examined for Guatemala, Malawi, and Thailand, countries with high HIV prevalence (Sherer, Bronson, Teter & Wykoff, 2004). Information is gathered when a woman joins the program and the profile is updated about one year later. These surveys assessed self-reported health knowledge, attitudes, and beliefs related to HIV/AIDS and other sexually transmitted diseases. The

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[16] The health education component consists of a one hour educational session biweekly on various topics, such as sexual health and sexually transmitted diseases, recognizing severe childhood illnesses, prevention activities (e.g. breast examination, cervical cancer screening). Women have also requested specific topics, such as domestic violence.

authors compared new members with members who had participated at least one year. Significant (small) gains were consistently observed for a variety of health knowledge indicators. This study highlights a potential role of microcredit in breaking the poverty ill-health cycle in HIV affected areas, but the methodological weaknesses (no steps were taken to address threats to internal validity) make it difficult to draw any conclusions.

3.10.5 Self- perceived health

One study using an adapted SF-36 in the Bangladeshi context, found that members perceived themselves in better general and mental health than non-members. The authors presented percentages by age and sex, but did not control for these characteristics simultaneously. Nor did the authors address selection bias. Therefore, results are difficult to interpret.

3.10.6 Emotional stress

I identified one study assessing women's microcredit participation and their emotional well-being (Ahmed, Chowdhury & Bhuiya, 2001). The authors found no association between participation and emotional stress. The authors argued that improvements in socioeconomic conditions does not necessarily lead to improved emotional well-being. Compared to non-members, BRAC women were more likely to cope with their emotional stress by adopting a "fatalistic or resigned attitude". The authors concluded that there was an initial period of emotional stress after joining BRAC due to their "breaking the barriers of traditional norms and behaviors ascribed to women by patriarchal society, micro-credit may generate anxiety and tension among its recipients" (p. 1964). But the authors did not assess the duration of participation in their study. After an initial period of emotional stress, women's emotional health may improve to levels superior to what they were before joining

the program, an effect that may have been hidden by aggregating participants into a single group.

3.10.7 Domestic violence

Schuler, Hashemi, Riley & Akhter (1996) examined microcredit participation and men's violence against women using a structured survey and ethnographic approaches (participant observation and in-depth interviews). Based on the survey data, regression models showed that women belonging to either Grameen Bank or BRAC were less likely to be beaten by their husbands than women living in villages without programs. Non-members who live in villages with a program were also less likely to be beaten than controls. The authors, however, did not control for possible non random program placement, although the ethnographic findings supported a program effect. Women described that their husbands' beatings declined after their husbands witnessed the benefits of their contribution to the household, especially if their husbands directly benefited. It was not the additional income *per se*, but rather the perceived contribution of women to the household. The authors concluded that participation in the programs lessened violence by making women's lives more public through the formation of solidarity groups.

Schuler and her colleagues later re-examined their survey findings described above in unpublished work, this time including duration of participation in their analysis (cited in Schuler, Hashemi & Badal, 1998). The authors found that participation was associated with lower risk of domestic violence, but that the prevalence of domestic violence did not diminish over time, suggesting the presence of a selection bias and not a true program effect. Ethnographic findings presented earlier (Schuler et al., 1997) were further discussed in a second paper (Schuler, Hashemi & Badal, 1998). Although much of the material is the same, the authors' evidence was contradictory: violence declined with duration of participation among some members, but not others. The authors do not explain these results

in comparison to their previous work, and why they provide a more nuanced view. It seems likely that the authors' were simply reframing their work in light of their recent survey analysis that did not support a duration effect.

3.10.8 Health habits

Smith's (2001) examination of women's participation in Project HOPE programs in Ecuador and Honduras found a higher rate of breastfeeding and cancer screening among members of the tie-in program (with a health promotion component) compared to the minimalist program. Dohn and her colleagues (2004) found positive changes in health knowledge and health behaviours after participating in either a health promotion program or a microcredit program, but that these changes were significantly higher in the community where a tie-in program was in place. However, due to a small sample size and inadequate attention to potential heterogeneity across communities, these findings are less than convincing.

3.10.9 Health care

Three studies examined health care seeking behaviour in Bangladesh. Priya Nanda examined women's and men's participation in microcredit on their demand for formal health care – individuals who consulted government facilities or private doctors and clinics (Nanda, 1999). She found participation was associated with a greater demand for formal health care among women but not among men. Nanda attributed this gender difference to the unique empowerment effect of microcredit for women, specifically through a greater control of household resources. Nanda operationalized control over resources as "women's participation in programmes interacted with their household income" (p. 417). It is not clear how this measures women's economic autonomy. Nanda also performed a simulation comparing a woman's demand for formal health care using two different scenarios. A

female who participated in a credit program was not only more likely to increase her demand for health care (3.7%), but this increase was larger than if her village set up another health clinic (3.4%).

Health-seeking behaviour was examined in two other studies conducted in the subdistict of Malab, as part of a collaborative effort between BRAC and the International Centre for Diarrhoeal Disease Research (ICDDR, B). The ICDDR, B, which has been in operation since 1993, maintains a Demographic Surveillance System (DSS) and provides various community health services, such as maternal child health care and family planning. In the first study, cross-sectional data collected in 1995 from the BRAC-ICDDR, B project was used to assess whether BRAC members were more likely to seek formal health care than poor non BRAC members (Ahmed, Adams, Chowdhury & Bhuiya, 2000). Contrary to their expectations, BRAC members who had fallen ill were *less* likely to seek formal health care than poor non-members, BRAC members were more likely to rely on home remedies, traditional care, and unqualified allopaths. This finding may be related to selection bias; BRAC members may have unobserved characteristics that increase the likelihood that they will not use formal health care. The authors offer an alternate explanation for these findings. Through their participation in BRAC, members are exposed to material and informational resources that lead to members being "better equipped to recognize and diagnose illness and to apply appropriate treatment actions without the consultation of health practioners" (p. 369), in other words to increase women's capacity for self-managing their illnesses. This is an interesting proposal and warrants empirical investigation.

The authors of the previous study (hereafter referred to as the 2000 study) tested the same hypothesis – BRAC members would increase their use of formal health care and move away from traditional care and informal providers – but used a second cross-sectional survey to explore trends over time (Ahmed, Adams, Chowdhury & Bhuiya, 2003). Curiously, the authors did not discuss their 2000 study in relation to this study (hereafter

referred to as 2003 study). The 2000 study was not even referenced! The 2003 study used both the 1995 survey used in the 2000 study and a second cross-sectional survey conducted in 1999. The same variables and comparison groups were used in both studies, but after scrutinizing the sample sizes and descriptive statistics of the 1995 survey in both papers, I found unexplained discrepancies. The 2003 study confirmed the authors' previous findings that self-treatment was elevated among microcredit participants compared to non-members and in addition, self-treatment was higher in 2000. The authors noted that rates of self-treatment increased among BRAC members and control groups, which the authors attributed to a flood in 1998. The authors reiterate their previous explanation that higher self-treatment among both BRAC members may be related to better self-management of illness. This 2003 study did not shed much new light on their previous findings.

Another study conducted in Bangladesh assessed participation in an integrated microcredit program and utilization of health services (Amin et al., 2001). A microcredit program for poor women with an essential services package (ESP) was initially developed in a first phase, and in a second phase, the initiative started its own NGO health clinic with two physicians, nurses and paramedics, and 50 community microcredit volunteers trained to spread ESP technologies and information to the community at large. A cross-sectional survey was implemented 6 months after the initiation of the expanded ESP. Controlling for key socioeconomic and demographic characteristics, the authors found that members were 2.4 times more likely to use the NGO's health clinic compared to non-members. However, non-members in this study were living in a control village, where the population had access to regular government services. Because the authors did not control for quality of health care services in the study, or other community level variation, we cannot ascertain the extent to which the microcredit program is associated with higher utilization rates rather than exogenous factors.

3.11 Gaps in knowledge

The evidence base is still in its infancy, and a number of issues identified in this review call for further study. First, the evidence predominantly comes from studies conducted in rural Bangladesh, especially the larger more widely known schemes of the Grameen Bank and BRAC. There is a need to examine other types of microcredit schemes, including smaller programs and government initiatives, because the approach adopted and the type of activities pursued may influence women's health in different ways. These programs are context-dependent; therefore, there is a need for studies to be conducted in other low-income settings in order to be able to generalize the potential health benefits of microcredit participation. We know little about the role of context in these types of studies and the conditions of implementation that may affect outcomes.

Second, the studies have focussed on the mean effect of participation based on the assumption that all participants may benefit equally from participation. There is some evidence to suggest that there are gender differences with respect to health benefits of microcredit. But we have yet to explore differential effects among women: do some women benefit more than others?

Third, most of the evidence examines contraceptive use and child health, there is a need to assess a greater range of women's health outcomes to determine if microcredit can influence women's health in its broader terms (as described in Chapter 2). We need to assess whether all women – not only mothers and their children – benefit.

Fourth, we know relatively little about *how* participation affects women's health. In general, studies focused on participation and final outcomes, the specific mechanisms and processes involved were generally vague or unspecified, except for a few studies examining

mechanisms in relation to a specific outcome (e.g. use of contraception). We have yet to develop a global picture of how microcredit can influence women's health.

This final point brings me to the first objective of the dissertation: developing a theoretical framework that explicitly details how microcredit participation is linked to various health outcomes. I begin this endeavour by outlining the theoretical foundations of the framework in the following chapter.

CHAPTER 4

THEORETICAL FOUNDATIONS

Few attempts have been made to conceptualize and theoretically link microcredit participation and health. The available frameworks are limited in their scope and draw exclusively on classic economic and production theory (see Chapter 3). To date, we are missing a generic framework that encompasses the multiple determinants, mechanisms, and pathways, from microcredit participation to better health, situating the production of women's health within a broader framework.

I attempt to develop such a framework in the first article of the dissertation (Article 1). I draw on Sen's capability approach, Michael Grossman's health production theory, and population health models of the determinants of health. Before presenting the theoretical framework I sketch some of the key elements of Sen's capability approach, which is not detailed in Article 1[17].

Capability approach

The theoretical foundation of the framework focuses on Amartya Sen's capability approach[18]. Sen proposes a new 'space' for evaluating and formulating normative judgements meant to capture an individual's *real* opportunities in life. The capability approach focuses not on resources or primary goods[19], but rather on what these resources can do for people (Sen, 1979). Sen distinguishes between the means of well-being, such as commodities, and the ends, labelled as *functionings* and *capabilities* (Sen, 1985; 1992a;

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[17] Article 1 was written especially for international development experts familiar with the capability approach.
[18] Philosopher, Martha Nussbaum, has also developed her own version of the capability approach (Nussbaum, 2000; 2003), which has both common and diverging elements with Sen's work (Robeyns, 2005). I focus on Sen's version, which is more amenable to the type of investigation I pursue, "while Nussbaum's approach is valuable at a political level, it is overdetermined for use in development at a microeconomic level" (Alkire, 2002, p. 32).
[19] Primary goods were defined by John Rawls as those goods that are rational to want, for which he includes rights, liberties, opportunities, income and wealth (Rawls, 1971). Rawls considers health to be a natural good, like intelligence or imagination.

1993). Functionings[20] are those "doings and beings" that a person values, ranging from basic functionings such as being in good health, to more elaborate functionings, such as social integration. Capabilities, in turn, are derived from functionings, and are "the various combinations of functionings that a person can achieve" (Sen, 1992a, p.40). While closely linked, these two concepts differ in that a functioning is an actual achievement, while a capability represents a freedom of achievement[21]. While commodities and other types of means that function as inputs are important, they are not the ultimate ends of well-being.

Accounting for human diversity is central to the capability approach (Sen, 1992a). Individuals may have access to the same amount of a commodity, such as income, yet their resulting functionings may differ from another individual. Sen attributes this to inter-personal differences in the *conversion* of resources into functionings. A resource is only useful if one can transform it into a useable format. Problems related to conversion may arise due to physical characteristics (e.g. metabolism, exposure to parasitic diseases), or more complex social issues (e.g. interactions with community) (Sen, 1992a). To take an example of Sen's, consider two individuals who have the same basket of food. One person is plagued by an intestinal parasite, while the other is parasite-free. The first individual does not achieve an adequate nutritional status, while the other person flourishes. The inability of the former to convert (food) resources into (nutritional) functionings presents a barrier to a person's capability, and ultimately her achievable health status. The capability approach explicitly addresses the relationship between commodities, that a person is entitled to, and her ability to convert them into functionings (Sen, 1985; 1992a).

In *Development as Freedom*, the freedom proposed by Sen is not only of capabilities, but also agency (Sen, 1999a). Sen argues against viewing women as mere patients of

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[20] Sabina Alkire (2002) writes that Sen's terminology is somewhat at odds with the intended meaning. Functioning tends to conjure up an image of a mechanical action, but Sen purposefully chose the term from Aristotle's work. Alkire suggests that the term flourishing may be more suited to reflecting 'human ends'.
[21] In Sen's later works he often replaces the word capability with freedom.

development. An agent is "someone who acts and brings about change, and whose achievements can be judged in terms of her own values and objectives, whether or not we assess them in terms of some external criteria as well" (Sen, 1999a, p. 19). Similar to well-being, agency can be distinguished in terms of achievement or freedom to achieve. The capability approach; therefore, distinguishes four different spaces: well-being achievement, well-being freedom, agency achievement, and agency freedom. Well-being and agency are often closely connected. For example fertility rates have been found to drop following positive changes in women's status and power, helping to remove the 'unfreedom' of the impact of high birth rates. Agency and well-being goals can also conflict. Sabina Alkire (2002) illustrates this with the following example. Imagine that while you are enjoying a riverside picnic, you have the chance to rescue a person from drowning, your agency freedom (and hopefully your agency achievement) increases because you have the opportunity to save this person's life, however, you are now cold, wet, and hungry, and consequently your well-being achievement has been lowered.

Robeyns (2000) argues that the capability approach in and of itself is insufficient as an evaluative tool because it is open and underspecified, requiring additional explanatory theories. I integrate relevant public health theories and models to specifically explore a woman's health capability and how it may be expanded by participating in microcredit, which I present next in Article 1. In this article I have also pulled some of the pieces of available evidence (discussed in Chapter 3) together to provide illustrative examples of the various components of the framework before using the theoretical framework as a guide for my own empirical study in Article 3. I did not address potential health benefits of participation in microcredit at the household or community levels, which involves additional levels of analysis and further complexities. By focusing at the individual level, I wished to first and foremost draw attention to the intrinsic value of improving women's own health. Hopefully, this initiative will spark further theorizing of microcredit and health linkages, extending to the broader social context.

ARTICLE 1

WOMEN'S INTERLACED FREEDOMS: A FRAMEWORK LINKING MICROCREDIT PARTICIPATION AND HEALTH

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*Women's Interlaced Freedoms: A Framework Linking Microcredit Participation and Health**

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Abstract Improving the health of poor women is a public health priority worldwide. In this paper, we focus on microcredit — an intervention not explicitly designed to have an impact on health. Microcredit programmes aim to provide the poor with access to credit, thereby improving their opportunities to engage in productive activities. This paper presents a conceptual framework, inspired by Sen's capability approach, Michael Grossman's health production theory, and models of the determinants and pathways of population health, to assess how participation in microcredit can lead to improvement in the health of poor women. We explore how women's health capabilities (i.e. opportunities to achieve good health), and ultimately their health functionings (e.g. being healthy), can be expanded via key determinants of population health, such as access to resources and autonomy.

Key words: Population health, Poor women, Capability approach, Health production, Microcredit

> These instrumental freedoms directly enhance the capabilities of people, but they also supplement one another, and can furthermore reinforce one another. These interlinkages are particularly important to seize in considering development policies. (Sen, 1999, p. 40)

Introduction

Improving the health of the poor is a public health priority worldwide. This is particularly true in low-income countries, where the burden of

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disease is heaviest (World Bank, 1993). Women, who experience greater rates and depths of poverty, are especially vulnerable to poor health (United Nations Development Programme, 1995; Bangser, 2002). In the South, there are continuing efforts to ameliorate population health through interventions aimed at breaking what is often labelled the 'cycle of poverty and ill-health'.

The relationship between poverty and ill-health has been characterized as synergistic and bidirectional (Das Gupta and Chen, 1996; Judge and Patterson, 2001; Wagstaff, 2001). Poverty limits the capacities to produce health, and ill-health leads to further impoverishment, diminishing the potential of individuals and households to improve their economic well-being (Over *et al.*, 1992; Krishnan, 1999; Judge and Patterson, 2001). This interconnectedness of poverty and health has led to the promotion of pro-poor health strategies, which focus on and provide benefits for the poor. Examples include targeting health resources to illnesses that disproportionately affect the poor, investing in health services used primarily by the poor, and providing mechanisms to protect poor households from health shocks (Bloom and Lucas, 2000).

Alternatively, poverty alleviation strategies (PASs), such as microcredit programmes, may lead to health benefits (Feurestein, 1997). There is increasing recognition that poor health is a dimension of poverty; therefore, one potential result of poverty reduction is improvement in the health of the poor (Wagstaff, 2001). PASs can adopt various forms. Debra Lipson's (1998) review of potentially pro-health PASs included community and micro-enterprise economic development, agriculture and food policies, education policies, macroeconomic policies, and environment or infrastructure investments to improve the supply of safe water and basic sanitation. In this paper, we focus on microcredit — an intervention not explicitly designed to have an impact on health.

This paper presents a conceptual framework, inspired by Sen's capability approach, to assess how participation in microcredit programmes can lead to improvement in the health of poor women. (It should be noted that the full breadth of the interactions between poverty and ill-health in terms of capability deprivations is beyond the scope of this paper.) In this paper, we adopt a woman-centred perspective, examining women's participation in microcredit programmes and their capacities to influence their own health (Doyal, 1995). A gender perspective, which is beyond the scope of this paper, would also be illuminating at both the household level (analysing the impact of women's microcredit participation on their relationships with male and other female household members) and the community level (in communities where there are both female and male microcredit groups). We explore how women's health capabilities (i.e. opportunities to achieve good health), and ultimately their health functionings (e.g. being healthy), can be expanded via key determinants of population health, such as access to resources and enhanced autonomy in areas such as decision-making, social mobility, and

this is novel.

control over finances. Significant health externalities, or unintended benefits, produced through participation in a PAS would support the notion that "freedoms of different kinds tend to help the enhancement and consolidation of one another" (Drèze and Sen, 2002, p. 3).

Why explore microcredit participation and health?

Microcredit programmes, with their antecedents in nineteenth-century Europe, acquired popularity in the developing world with the success of programmes implemented in the 1970s such as the Badan Kredit Kecamatan in Indonesia, the Self-Employed Women's Association in India, and the Grameen Bank in Bangladesh (Hollis and Sweetman, 1998; Berger, 1989). Modern microcredit programmes arose to address challenges faced by the poor in acquiring credit without the necessary collateral, usually land, required by formal lending institutions. Promoted by governments, development agencies, and non-governmental organizations, microcredit programmes aim to provide the poor with access to credit, thereby improving their opportunities to engage in productive activities. Montgomery provides a succinct description of how microcredit programmes work:

> Solidarity group lending schemes involve the formation of groups in which some or all members in the group are jointly liable for each individual's loans, thereby creating an alternative to conventional loan requirements (which poor people can rarely fulfil). From the lenders' perspective such joint liability lending enables a transfer of default risks from the institution to the borrower, and can reduce the transaction costs of providing a larger number of small loans (by concentrating clientele in groups, at regular village based meetings, rather than dealing with individual borrowers at different times). (Montgomery, 1996, p. 290)

Microcredit has been called "the" significant intervention in the fight against poverty for the twenty-first century (Rahman, 1998, p. 80). This is reflected in the growing prevalence of microcredit programmes, with numerous schemes sprouting up in Asia, Africa, Latin America and the Caribbean, and the Middle East (see Table 1). The thrust of the movement has been especially to engage poor women, not only to alleviate poverty, but also to increase their access to resources and enhance their power in household decision-making (Sundram, 2001). By the year 2000, among those programmes reporting to the Microcredit Summit, 44% of their participants were classified as being among the poorest women (see Table 1).

Microcredit programmes share a common objective — to reduce poverty through access to credit — and shared principles, such as group solidarity, yet vary in their design according to their particular context

Table 1. Microcredit programmes, and number of clients self-reported for the developing world, 1999

Region	Number of programmes reporting	Number of clients reported	% of total clients reported as 'poorest'[a]	% of total clients reported as 'poorest' women[a]
Africa	455	3 833 565	68	40
Asia	352	18 427 125	57	45
Latin America and Caribbean	152	1 109 708	48	32
Middle East	16	46 925	61	33
Developing world total	975	23 417 323	58	44

Data source: 2000 Micro-credit Summit Campaign Report.
[a]Author's calculations.

(Morduch, 2000).[1] In India, for example, self-help groups were launched by the National Bank for Agriculture and Rural Development, with the support of non-governmental organizations, as an alternative to previous supply-led, top-down PASs. The self-help group movement in India adopted the position that the poor were agents, and that group members themselves should decide loaning criteria and identify their own projects and activities (Cagatay, 1998).

Among those studying the various PASs, there has been particular interest in measuring the potential health impacts of microcredit (Feurestein, 1997; Fisher *et al.*, 2001), supported by fragments of empirical evidence (Amin and Li, 1997; Mushtaque *et al.*, 2001). The interest in microcredit can be attributed to its importance as a PAS in numerous countries, and to its disproportionate impact on factors that can improve the health of the poor, such as access to food and better living conditions (Lipson, 1998). To properly assess these health impacts, we need to understand the explicit processes and mechanisms involved, using a solid theoretical foundation.

This paper begins with an outline of our conceptual foundations: the capability approach, health production theory, and models of the determinants and pathways of population health. In the following section, we describe several pathways linking microcredit participation and health. We then present the components and processes of the framework, integrating health capabilities, health production theory, and the pathways to health. Illustrative examples are drawn from the literature. Following this, we explore how duration of participation can influence health outcomes, we discuss some considerations and caveats related to the framework, and we offer our concluding remarks.

Linking microcredit and health production

The capability approach

The capability approach has broad implications, and can be used for a plurality of purposes across disciplines (Sen, 1993, p. 49). Robeyns writes

that the capability approach should be "a mode of thinking instead of a fixed formula", and that the lack of specificity of Sen's framework requires additional theorizing, with respect to choice, within a subdiscipline (Robeyns, 2000, p.19).

A capability approach to health was first mentioned by Sen (2002a), and then discussed in greater depth by Jennifer Prah Ruger (1998, 2004a,b). Both Sen and Ruger underscore the importance of health as a human capability. Martha Nussbaum[2] also considers health to be a valuable capability; she includes "bodily health" in her list of central human capabilities (Nussbaum, 2000). A capability approach distinguishes between health functionings and the capacity to achieve good health. Health functionings are what Sen refers to as the "beings" and "doings", such as being free from malaria or other avoidable illnesses (Sen, 1992). Health capability is "an individual's opportunity to achieve good health and thus to be free from escapable morbidity and preventable mortality" (Ruger, 2004a, p. 1076). Capabilities are freedoms, or the real opportunities of individuals to lead the lives that they value (Sen, 1992, 1999). Sen differentiates achievements in well-being from achievements related to agency. Agency, a woman's ability to define and pursue her own valued goals, is also relevant in the context of health. "Enabling individuals to exercise their agency — both individually and collectively — enables them to prioritise and decide which health domains they value most (eg, to trade-off quality and quantity of life) and to choose what health services they would like to consume (eg, making choices among treatment options)" (Ruger, 2004a, p. 1076).

The capability approach allows for an evaluation of capabilities, functionings, or both, although functionings are easier to measure than capabilities (Robeyns, 2000). Robeyns further writes that "there are cases and situations where it makes more sense to investigate people's achieved functionings directly, instead of evaluating their capabilities" (Robeyns, 2005, p. 101). In the case of health, Sen considers a health achievement to be suggestive of a person's capability because "in most situations, health achievement tends to be a good guide to the underlying capabilities, since we tend to give priority to good health when we have the real opportunity to choose" (Sen, 2002a, p. 660). To strengthen this notion that when a woman has the choice she will choose *greater* levels of health, we turn to a theory that specifically addresses the production of health.

Health production theory

Modelling health production is most often associated with the work of Michael Grossman; to understand the demand for health, he based his model on the theory of human capital (Grossman, 1972).[3] This theory is based on a health production function, which "shows how much health can be obtained for a given quantity of health input, given technical knowledge" (McGuire *et al.*, 1988, p. 130). According to Grossman, health

is a 'stock', and a woman will attempt to maximize her health stock by exploiting opportunities to transform inputs into health, given the constraints in her life, such as budgetary limitations. Over time, this stock will depreciate, especially during certain periods of the lifecycle. A person can, however, choose to increase her health stock, through investing in inputs that include time, medical care, diet, housing, education, and so on.

Grossman (1972) views health as a consumption good as well as an investment good. The former suggests there is a demand for health *per se* — in other words, it is desirable because it makes people feel better — while the latter indicates that health is sought after for its capacity to contribute to other desirable functions, such as being able to work to earn money, or to participate in enjoyable activities. In reviewing Grossman's model, Leibowitz (2004) concluded that because he emphasized health as an investment good, his model goes beyond addressing the demand for medical care, to examining how individuals could produce health through investing time and non-medical goods to improve their health stock. Grossman's work focused on a few health inputs, notably education and income. These factors, while important, do not fully explain variations in population health. Therefore, we turn our attention to the larger body of work on the determinants of health.

Determinants and pathways

There are diverse models of the determinants of population health. One common thread among them is a focus on how multiple factors interact and influence health through various mechanisms. The *Lalonde Report*, a watershed publication in the field of public health, identified four main categories of determinants: environment, human biology, lifestyle, and health care organization (Lalonde, 1974). Building on this report, authors such as Robert Evans and Greg Stoddard (1994), Julio Frenk *et al.* (1991), and Nancy Moss (2002) have devised frameworks depicting these multiple factors and interrelated determinations.

The framework developed by Frenk *et al.* (1991) specifies three broad levels of determinants: basic (population, environment, social organization, biological risks), structural (level of wealth, social stratification, occupational structure, redistributive mechanisms), and proximate (working conditions, living conditions, lifestyles, access to health care). This latter category, equivalent to Grossman's health inputs, is of particular interest from an interventionist perspective. Proximate determinants directly influence individual health outcomes, and are, in turn, influenced by underlying or socioeconomic determinants of health, such as access to resources, or women's power in decision-making (Wagstaff, 2001). Finally, there are psychosocial determinants of health, such as social networks and psychological coping skills (Marmot and Wilkinson, 1999). These factors improve individual health outcomes by "mediating the effects of social structural factors" (Martikainen *et al.*, 2002, p. 1091).

The influences of the various determinants of health can be integrated into causal sequences, or pathways. These pathways can help to elucidate why the poor have worse health or, alternatively, how the poor can escape ill health. We envision four main pathways that link microcredit participation and health: economic, social, psychological, and political. Each is composed of distinct mechanisms, described under their respective pathways. The mechanisms influence health via two channels, which we refer to as the 'production' channel and the 'conversion' channel.

The *production channel* affects those determinants of health that act as inputs into health production. These are: (i) diet and nutrition, (ii) environmental risks, (iii) health behaviours, (iv) psychological stress, and (v) health services. Diet and nutrition include dimensions of both quantity (energy intake) and quality (nutritional value); poor quality diet and nutrition can lead to malnourishment, obesity, or vitamin deficiencies. Environmental risks are of domestic (e.g. poor housing), occupational (e.g. pesticides), or external (e.g. smog) origin (Frenk *et al.*, 1991). Exposure to such risks can alter health status in different ways, but individuals are especially prone to infectious illnesses such as tuberculosis, chronic illnesses such as asthma or rheumatism, cancer, and other illnesses. Health-promoting and health-damaging behaviours are key influences on health outcomes. Health-promoting activities include good hygiene, healthy eating patterns, physical activity, and safe practices, such as the proper storage of poisons. Health-damaging practices include smoking, abuse of alcohol and other drugs, sedentary lifestyles, and engaging in unsafe sex.

There is an abundance of evidence linking psychological stress or, more precisely, the perception of stress, and ill health (O'Dea and Daniel, 2001). Without adequate coping resources to buffer stressful events, stress can have adverse effects on the body through neuro-endocrine mechanisms. Finally, utilization of preventive and curative health services will help protect or restore health. This requires that services be acceptable, accessible, affordable, and of good quality (Haddad and Mohindra, 2002). Poor quality services contribute to poor health both directly, through unsafe practices of health care workers (such as reusing syringes), and indirectly, by deterring people from using the services. Unsafe practices on the part of patients, such as purchasing medicines from an unlicensed seller, can also be harmful. In addition, insufficient sharing of information among health care users can prevent ill persons from seeking care or engaging in prevention programmes. Health care utilization can help to prevent or cure illness, reduce severity of various conditions, and improve survival rates.

The *conversion channel* acts upon health determinants that enable a woman to convert existing or available health inputs into good health. These include various abilities or skills: (i) autonomy, (ii) coping skills, (iii) awareness, (iv) self-management of illness, and (v) action space. Autonomy

is defined as the control women have over their own lives (Jejeebhoy and Sathar, 2001), and has several dimensions: social (social mobility), economic (control over finances), and political (decision-making powers). Autonomy has demonstrated impacts on a woman's health by, for example, enabling her to manage her own fertility or meet her own health care needs (Schuler and Hashemi, 1994; Nanda, 1999; Bloom *et al.*, 2001; Moss, 2002). Autonomy was selected in lieu of similar concepts because it is a relatively unambiguous and discrete concept, and is distinct from the central elements of the capability framework (i.e. opportunities, choice, agency).[4]

Adequate skills to cope with stress can protect a woman from adverse health consequences (O'Dea and Daniel, 2001). The specific skills utilized will vary across cultures and social groups. Awareness can lead to improved nutrition, increase the adoption of healthy habits, encourage proper health-seeking behaviour, and reduce exposure to health risks. A person's ability to self-manage illnesses with known causes and treatments, such as diabetes, can reduce the severity or progression of illness. Finally, there is the concept of action space that has been expanded by Joseph and Poyner (1982). A woman's action space includes her characteristics, such as age, income, and social mobility, as well as the extent of her knowledge and ability to attribute a value to a good or service (associated perceptual value). Enlarging a woman's action space would optimize information and encourage her to consider a greater array of possibilities that might benefit her health.

The economic pathway

The economic pathway is the most straightforward, due to the close link between wealth and health, and because the primary objective of microcredit is to reduce poverty. Key mechanisms include increased access to economic resources, better access to collective resources or public goods and services, and overall improvements in material conditions (Lynch *et al.*, 2000). These mechanisms can improve health via the production channel through two main actions: maintaining and protecting health, and restoring health.

More economic resources or access to a food distribution programme can increase the quantity and quality of food available. Greater income can support healthy food choices, making it possible to purchase non-staple foods, and to reduce consumption of those unhealthy foods, high in fat and refined sugar, which are often cheap and fast meals. Improvements in material conditions, access to safe drinking water, good sanitation, and adequate housing reduce exposure to health risks (Judge and Patterson, 2001; Deaton, 2002). With rising income, health-promoting and hygienic practices are increasingly adopted (Wagstaff, 2001; Deaton, 2002). Also, income is inversely related to health-damaging behaviours. An increase in economic resources can help reduce exposure to major sources of stress,

such as financial insecurity and associated household tensions. Higher income also reduces barriers to accessing quality health care (Wagstaff, 2001). In poor countries, where most of the population is uninsured, access to health care is constrained by households' ability to pay for services.

The mechanisms in the economic pathway can also enhance the determinants of health via the conversion channel, especially if mediated by education. Greater access to economic resources can enhance autonomy and awareness, and can help expand one's action space. More economic resources can also improve a woman's ability to manage her own illness by enabling her to purchase the necessary drugs and health technology. In practice, access to credit does not necessarily translate into greater access to resources through higher income or more financial assets. Some authors have pointed out that the poor are sometimes compelled to use credit for consumption purposes, and these authors have made suggestions for redesigning microcredit programmes to serve these needs (Montgomery, 1996; Mosley and Hulme, 1998).

The social pathway

The conceptual model linking social relationships (or networks) and health, developed by Berkman and Glass (2000), provides a useful guide for discussing the social pathway. Social networks can influence health through three main mechanisms: social support, social norms, and social engagement.[5] The social pathway operates by maintaining and protecting health.

First, social networks influence health by providing social support, which can take several forms: emotional support (love, caring, sympathy), instrumental support (assistance with tangible needs), appraisal (help in decision-making, giving appropriate feedback), or informational support (advice or particular information). Social support can have wide-ranging effects. Instrumental and informational support tends to influence determinants via the production channel (e.g. provision of extra food stocks during crisis, advice on a particular health problem), while emotional support and appraisal will tend to influence the conversion channel (e.g. emotional support following the death of a spouse).

The second mechanism involves changing norms and attitudes. Via the production channel, social norms can influence health-related behaviours. A change in norms, such as non-tolerance of wife-beating, can reduce the incidence of domestic violence. Via the conversion channel, social norms can enhance the autonomy of women through greater acceptance of their mobility. In general, norms may be influenced by making the lives of women more public.

This leads us to the third mechanism, increasing women's social engagement and social participation. Participating in social events can

increase "opportunities for companionship and sociability" and "define and reinforce meaningful social roles including parental, familial, occupational, and community roles, which in turn provide a sense of value, belonging, and attachment" (Berkman and Glass, 2000, p. 147). Social participation can affect the production channel by protecting against exclusion from public interventions and services, such as health care. Greater social participation can also increase autonomy and awareness, and enhance coping skills.

There are also possible negative social relationships, or unsupportive social ties, that would not be health promoting. Microcredit programmes sensitive to such issues can reduce social conflicts by, for example, engaging field staff to mediate group conflicts or, in more extreme situations, facilitating the transfer of a woman to another group.

The psychological pathway

Participation in a microcredit programme provides opportunities for women to engage in activities or gather information that may help them develop their 'self'. The psychological pathway includes two key mechanisms: Bandura's concept of *self-efficacy*, and Antonovsky's concept of a *sense of coherence*. Similar to the social pathway, the key action of the psychological pathway is through the promotion and maintenance of health.

Acquiring skills such as financial management or income-generation abilities can increase a woman's self-efficacy, which is her belief in her ability to produce a desired effect (Bandura, 1977, 1994). Individuals with a strong sense of self-efficacy tend to approach challenges from a point of view of mastery rather than fear; they set high goals and commit to them. Self-efficacy can be developed through effective performances, leading to experiences of mastery. Self-efficacy influences the production channel by increasing the adoption of healthier behaviours and reducing exposure to health risks. Self-efficacy can also increase a woman's coping skills and her abilities for self-management of illness.

Life experiences acquired through microcredit participation may contribute to the development of a woman's sense of coherence, a global concept that includes three components: (i) comprehensibility, the extent to which a woman can cognitively make sense of her external environment; (ii) manageability, the extent to which a woman perceives that her available resources can be used to control the demands of her environment; and (iii) meaningfulness, the extent to which a woman's life makes emotional sense (Antonovsky, 1987). A sense of coherence can be strengthened through generalized resistance resources, such as material possessions, knowledge, religion, and philosophy. Antonovsky's work with Israeli concentration camp survivors showed that it was not the exposure to external

events *per se*, but a weak sense of coherence to address these events that led to poorer health status. A more developed sense of coherence operates via the conversion channel by increasing the ability to cope with stress.

The political pathway

The key mechanism in the political pathway is 'voice', which can influence public policies and interventions that have an impact on women's health. Due to a persistent male bias in policy-making and in the shaping of health interventions, greater female voice in these processes could ensure more appropriate health care and health promotion programmes (Sen *et al.*, 2002). Acquiring a greater voice has been identified as an important route to gaining power and access to resources, and can be achieved via two main routes:

> In principle, this problem of voicelessness can be overcome in two distinct ways. One is *assertion* (or, more precisely, self assertion) of the underprivileged through political organization. The other is *solidarity* with the underprivileged on the part of other members of the society, whose interests and commitments are broadly linked, and who are often better placed to advance the cause of the disadvantaged by virtue of their own privileges. (Drèze and Sen, 2002, p. 29; original emphasis)

In a women-only microcredit programme, engaging in financial activities provides a unique space, in which female solidarity is created through promoting shared visions and goals and combining collective strengths. Group solidarity to achieve financial goals does not necessarily translate into social transformation (Mayoux, 1999; Rankin, 2002). There is a difference between solidarity used for instrumental purposes, such as guaranteeing loans, and solidarity that can lead to consciousness-raising and empowerment. The term solidarity therefore needs to be qualified. "Solidarity among women can, however, serve as a powerful tool for progressive social change, *as long as it fosters critiques of dominant cultural ideologies*" (Rankin, 2002, p. 18; emphasis added). For example, in India's state of Tamil Nadu, self-help groups organized themselves to champion the rights of the girl child by campaigning against infanticide (Kannan, 2004). Gender-progressive microcredit programmes require complementary services that specifically address gender issues and larger social mobilization efforts (Amin *et al.*, 1998; Mayoux, 1999). Martha Nussbaum's work supports the promotion of women's collectives as an important route to gaining political rights linked to central human capabilities (Nussbaum, 2000). Participation in groups that are exclusively female can promote activities for the benefit of women, as well as offer a secure base from which to participate in such activities.

Pulling it all together: capability, health production, and pathways

General process: production and conversion

The general process linking microcredit participation and women's health is situated within the realm of production. The mechanisms of the pathways described earlier are the outputs of microcredit participation (see Fig. 1). These mechanisms can lead to the proximate determinants of health via the production channel or the conversion channel. The proximate determinants may then be converted into health capability, and ultimately health functionings; this is a production function.

Among the determinants that could plausibly aid in the conversion process, autonomy has received the most attention in studies on microcredit. Microcredit participation is associated with higher scores on autonomy or empowerment indexes, and with the adoption of particular practices, such as women secretly saving their earnings, indicating greater levels of autonomy[6] (Schuler and Hashemi, 1994; Schuler *et al.*, 1996; Amin *et al.*, 1998; Kabeer, 2000). Autonomy leads to a transformative action, by increasing power and control over the use of resources. Autonomy can increase a woman's efficiency in producing health. The other determinants — awareness, ability to cope, self-management of illness, action space — can be expected to operate in a similar fashion.

Health capabilities operate at two levels: as outputs of the proximate determinants of health, and as inputs into health functionings (see Fig. 1). A health capability expands by increasing health inputs and enhancing the conversion factors. For example, the expansion of a woman's action space will enable her to envision a greater range of possibilities that would direct her efforts towards developing more hygienic practices or reduce potential

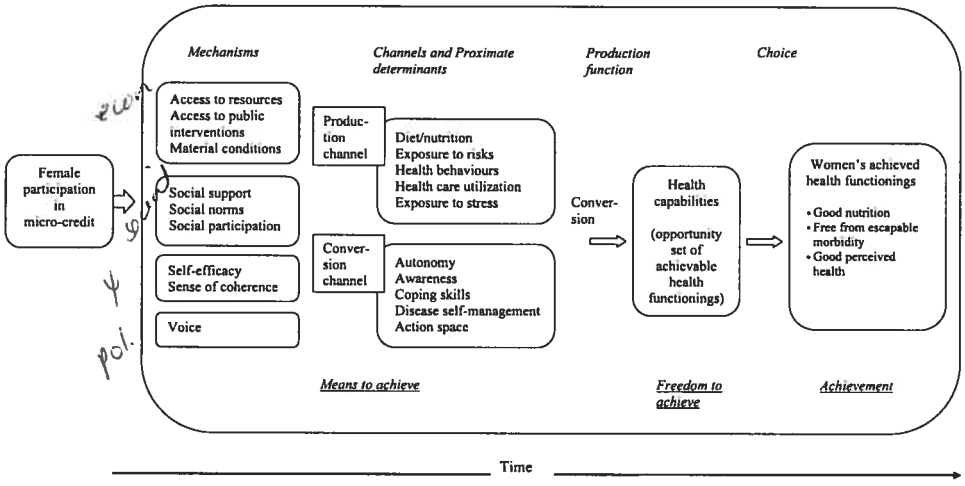

FIGURE 1. Conceptual framework adapted from Robeyns (2005).

health risks in her environment. Greater capacity in self-managing illnesses will improve a woman's efficiency in utilizing health care services. More awareness can ensure a woman's healthy food selections have optimal nutritional value, among other benefits.

Women will choose from their set of opportunities to achieve health according to their own values and ideas of living a good life. According to Sen (2002a), a woman will generally choose good health. The specific manner in which she chooses to achieve health, however, may vary (e.g. selecting ayurvedic or allopathic medicine). There may also be certain cases when a woman may not choose to pursue optimal health, an issue we examine next.

Achieved health functionings

Achieved health functionings, depicted in Figure 1, include expert-defined health functionings (e.g. absence of vitamin deficiency, absence of diagnosed morbidity) and self-assessed health functionings (e.g. perceived good health, absence of self-reported morbidity). There is some concern surrounding the use of self-assessed measures of health; a perception bias may arise among individuals who lack the informational base to assess their own health status, and therefore do not report existing health problems (Sen, 1994, 2002b). Self-assessed health status should not, however, be disregarded. Health is a multidimensional construct that can be viewed through multiple lenses. Self-assessed measures address one limited, but relevant, dimension of health. These measures recognize the social context in which humans live, and are "more concerned with the *consequences* of disease pathology than with their signs and symptoms *per se*" (Davies, 1996, p. 97; original emphasis). This self-assessment approach focuses on the person's inability to walk, earn a living, or engage in some social activity, instead of on the underlying pathology of a particular disease. Sen himself recognizes the need to adopt both expert-defined and self-assessed perspectives: "both perspectives are important, and it is a question of taking a broad enough approach to have an informationally adequate framework ... I am not advocating a return to exclusive reliance on 'expert judgement', ignoring the ideas and feelings of the person most directly involved, to wit, the patient" (Sen, 2002c, p. 70). A number of social factors to consider when measuring self-assessed health have been identified, such as income, education, access to public health facilities, and perceived social stigma (Davies, 1996; Sen, 2002c).

While studies have generally focused on the health achievements of the children of mothers who participate in microcredit, there are also a few studies that have examined women's health achievements. One recent study in Ethiopia examined the link between women's microcredit participation and the impact on their nutritional status (Doocy *et al.*, 2005). This study had three comparison groups: established clients (completed two or more loan cycles), incoming clients (completed one

loan cycle or less), and a control group (eligible to participate but did not). There were two study sites, one of which had been more affected by droughts and had higher levels of food insecurity. There were no significant findings for the site less affected by drought. The picture, however, is different for the more deprived site; a positive relationship was found between participation and nutritional status. Established clients were 3.2% less likely to be malnourished than the controls. The nutritional benefits were found among participants living in the more deprived area, emphasizing the importance of the local context. An important finding in this study is that participants who had completed two or more loan cycles achieved better nutritional levels, whereas new clients had not yet shown improvement compared with the controls. The duration of participation, therefore, appears to matter — an issue we explore in the following section.

There has been important work on domestic violence and women's participation in microcredit. Structured surveys and ethnographic research in Bangladesh found that participation in women's microcredit could help to reduce violence against women by making women's lives more public (Schuler *et al.*, 1996). Women's access to credit and income generation may create a positive role for women — if not by their income, then by the recognized contributions they make to household welfare. For example, one of the women responded after joining the Grameen Bank:

> In the past my father-in-law would never stop my husband from beating me. But after I joined Grameen Bank he said to my husband, "You had better stop beating and scolding your wife. Now she has contact with many people in society. She brings you loans from Grameen Bank. If you want to you can start a business with the money she brings!" (Schuler *et al.*, 1996, p. 1738)

This is not to say there is a linear relationship between participation in microcredit and reduced violence against women. The same study found that the village where women contributed the most to household earning also had the highest prevalence of beatings. Other researchers noted that women who join microcredit programmes might experience an initial period of heightened abuse when they join, but that violence is progressively reduced over time (Mushtaque *et al.*, 2001). Earning independent incomes, increased social mobility, and autonomy were seen as causes of conflicts. Why then would a woman continue to participate if her well-being was jeopardized? Agency is a separate yet overlapping aspect of women's well-being (Sen, 1999). Women with opportunities to make their own choices in the pursuit of their well-being may seek a better deal. Schuler and her colleagues noted that "The most empowered women typically emerge from a period of conflict with a new definition of their roles and status in the household" (Schuler *et al.*, 1996, p. 1739), which is illustrated by the following response:

> My husband used to beat me up and take my money. Now he can beat me a thousand times and I won't give him my money. I tell him, "you had better not beat me too much — I can live without you!" (Schuler *et al.*, 1996, p. 1738)

These findings illustrate the distinction between achievements in agency and in well-being. Some women exposed themselves to domestic violence through their continued participation in a programme, with potential negative health consequences. However, because the women *valued* participating in such a programme, their agency achievements were heightened. This is a critical point; traditionally, public health activity has tended to focus exclusively on improving health outcomes, disregarding agency and women's own interests.

Duration of participation: same inputs, more outputs

Duration of participation can influence the process of health production. The longer a woman has participated in microcredit, the greater her propensity to achieve good health. There are three possible processes.

First, health achievements will accumulate over time (Grossman, 1972). Anand and Chen (1996) described the accumulation process through a framework that considered health in terms of 'stocks', and health inputs as 'flows'. Depreciation of health stock may occur if there is a disruption of flows, such as during times of economic crisis. However, individuals can draw upon health stock reserves they have accumulated, delaying impacts on their health status. The authors further claimed that this process also functions in the opposite direction. "Just as it might take time to draw down an individual's health stock, *it takes time to build it up*" (Anand and Chen, 1996, p. 19; emphasis added). The time required to draw down a given quantity of health stock, however, will be relatively shorter than the time needed to build it up. Also, the time required for building up or drawing down a given quantity of health stock varies according to the person's health condition, age, and fragility.

Second, the longer a woman participates in microcredit, the greater her propensity to obtain different kinds of benefits. These benefits could be economic (more or larger loans), social (expansion of her social network), political (greater voice), or psychological (greater self-efficacy).

Third, increased duration of participation may provide time for the female participant and her household members to adjust to her participation, and for her to take better advantage of the opportunities of membership. When a woman engages in activities outside of the household, concerns and tensions sometimes arise that would reduce the potential benefits of her participation. These tensions, however, often dissipate after the husband, and other household members, witness the benefits of women's participation (Amin *et al.*, 1998).

The importance of the duration of participation is illustrated in a study in Bangladesh that examined women's participation in microcredit groups and their awareness regarding pre-natal and postnatal care (Hadi, 2001). The author observed that not only did participants of microcredit demonstrate a greater awareness of their reproductive health compared with women who did not participate, but women who participated for longer periods of time (five years or more) had developed a greater awareness compared with members who had participated for a shorter duration (less than five years) (see Table 2).

In summary, over time we would expect the health achievements of women participating in microcredit programmes to increase, although the specific inputs feeding into the health production process may remain constant.

Table 2. Adjusted odds ratios[a] for prenatal care knowledge among Bangladeshi women, by microcredit participation status

Membership status	Prenatal care		
	Tetanus vaccine[b]	Vitamin supplement[c]	Medical check-up[d]
Non-member	1.00	1.00	1.00
Member (less than five years)	2.15**	2.19***	2.59
Member (five years or more)	2.39**	3.79**	4.88***
Not eligible	1.86*	2.69*	2.28

Data source: Hadi (2001).

[a]Odds ratios were adjusted for women's age, education, exposure to mass media, husband's occupation, and ownership of land.

[b]Awareness about the need for tetanus vaccination during pregnancy.

[c]Knowledge about iron/vitamin supplementation.

[d]Ability to mention the need for routine prenatal health check-ups.

*$p<0.01$, **$p<0.05$, ***$p<0.10$.

Further considerations

There are two further considerations with respect to the framework developed in this paper. First, the microcredit programme should be effective. An effective programme begins with an appropriate design (efficacy), based on several criteria, including an adequate underlying theory, sufficient resources, and appropriate means to meeting its objectives (Contandriopoulos *et al.*, 1991). A good design is necessary but not sufficient; beyond its potential effectiveness, a programme must be effective in practice. The degree to which a microcredit programme is successfully implemented will influence the extent to which its intended outcomes are achieved, and ultimately, its effectiveness (Patton, 1997). Implementation is affected by a number of factors, such as the quantity and quality of programme staff. In addition, the environment and context in which the programme is being implemented can interact with the programme in various ways (Contandriopoulos *et al.*, 1991). The

importance of context was demonstrated in the results of the Ethiopia study described earlier, in which female microcredit participants who achieved better nutritional status than non-participants lived in the relatively more deprived area.

Undesired effects of microcredit programmes have been identified that can be attributed to poor design or inadequate implementation, such as abuse of male staff towards female participants, excessive work burdens of participants, stress related to peer pressure in repaying loans, and the male appropriation of loans (Goetz and Gupta, 1996; Montgomery, 1996; Rahman, 1998; Mayoux, 1999). Some authors have proposed improvements in the design of microcredit programmes, including adopting more flexible repayment schemes, increasing self-management of groups, and enlarging women's access to credit and income-generating activities relative to men (Montgomery, 1996; Agarwal, 1997; Mosley and Hulme, 1998).

Second, we did not address the household production of health (Berman *et al.*, 1994). Women's participation in microcredit can benefit the health of other household members; studies have demonstrated that a mother's participation has positive impacts on child health and survival (Amin and Li, 1997; Mushtaque *et al.*, 2001; Bhuiya and Chowdhury, 2002). In addition, women's participation can improve health at the community level, progressing on broader social goals, such as lowering fertility rates (Drèze and Sen, 2002). As a beneficiary of the programme, a woman might benefit not only *directly* from her participation as alluded to in this paper, but also *indirectly* through her contributions to the health of the household or the community.

Concluding remarks

We propose that assessing health impacts of poverty alleviation strategies is a useful approach to improving the health of the poor. As a first step, this paper offers a framework integrating Grossman's health production model into Sen's broader capability approach. Sen recognized the close connections between the accumulation of human capital and the expansion of human capability. "If a person can become more productive in making commodities through better education, better health and so on, it is not unnatural to expect that she can also directly achieve more — and have the freedom to achieve more — in leading her life" (Sen, 1997, p. 1959). Applying this perspective specifically to health results in a conceptual framework that links woman's participation in microcredit and health, and which considers women's own choices and values.

Microcredit is not a panacea for alleviating poverty, nor does it address all issues regarding the empowerment of women (Berger, 1989; Mayoux, 1999; Rankin, 2002). Nor are microcredit programmes a magic bullet for reducing illness among poorer women; rather, they are important complements to health promotion and prevention

programmes. Microcredit programmes are promising interventions with potentially far-reaching impacts, including the expansion of women's health capabilities. Public health researchers and practitioners should not exclude the assessment of interventions outside of the health sector as a means to improving population health.

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Notes

1 See Berger (1989) for a typology of different credit programmes, Mayoux (1999) for a distinction among different paradigms, and Montgomery (1996) for an example of a comparison of two programmes, BRAC in Bangladesh and SANASA in Sri Lanka.

2 Martha Nussbaum's version of the capability approach is not discussed in this paper, although it also has important implications for health. The Aristotelian roots of Nussbaum's capability approach are particularly attractive for health scholars (Ruger, 1998).

3 Sen (1997, 1999) has written on the connections between human capital and human capability. He writes that these perspectives are complementary, both centralizing upon human capacities and achievements. The human capital perspective, however, is 'narrower' than the capability perspective, because the primary focus is on increasing production, whereas the capability approach emphasizes substantive freedom and expanding real choices. Because humans are "not merely means of production, but also the end of the exercise", the human capability approach encompasses a wider lens for viewing development (Sen, 1999, p. 296).

4 Some concepts, notably empowerment and autonomy, are often used interchangeably in the literature, leading to confusion in terminology. Definitions of empowerment vary across disciplines, and among authors within similar disciplines (Wallerstein, 1992; Kabeer, 1999). Naila Kabeer (1999) refers to the "fuzziness" of empowerment as an appealing trait for feminists. Her framework for empowerment focuses on the expansion of choice, resources, agency, and achievements. Bargaining power could arguably be substituted for autonomy (Agarwal, 1997).

5 The model included a fourth channel, access to resources and material goods, but the authors admit that a lack of research leads them to merely speculate; we do not include this channel in our framework.

6 Demonstrating an empirical link between participation in microcredit and female autonomy is difficult, due to challenges in defining and measuring autonomy, particularly in different cultural contexts. For an excellent review see Kabeer (2000), who makes several points: (1) conceptualizing empowerment requires an understanding of power relations between men and women grounded in their particular culture, (2) empowerment is a complex phenomenon even within the same context,

(3) empowerment should not be dichotomized, but rather viewed as a "expansion in the range of potential choices", (4) there needs to be a distinction between views of how feminists or development academics see change, and how the women themselves view their own empowerment, and (5) "women" is not a homogeneous group, and therefore different women will respond in different ways to similar stimuli.

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CHAPTER 5

RESEARCH OBJECTIVES AND METHODOLOGY

1.0 Research objectives and hypotheses

The objectives of the practical component of this dissertation are two fold: first, to develop a portrait of women's health in the community and second, to assess the potential unintended health benefits of participating in a self help group. Each of these objectives are addressed in two separate articles:

Article 2: Women's health in a rural community in Kerala, India: do caste and socioeconomic position matter?

Article 2 focuses on women's health achievements in the study area and how these achievements are distributed. There are two hypotheses:

1) low caste and lower socioeconomic position is associated with poor reported health status

2) associations between socioeconomic position and reported health status vary across castes.

Article 3: Can microcredit help improve the health or poor women? Some findings from a cross-sectional study in Kerala, India

Two hypotheses, derived from the theoretical framework developed in Article 1, guide this article:

1) Among poor women, SHG participation contributes to the expansion of a woman's health capability, specifically, compared to non-participants, SHG members face lower rates of exclusion to health care, have less exposure to health risks, and lower rates of male-dominated decision-making.

2) Among poor women, SHG participants will have better health achievements (self assessed health, markers of mental health) than non-participants and these health

achievements are mediated through access to health care, exposure to health risks, and decision-making agency.

Article 3 integrates the theoretical component of the dissertation with an understanding of the socioeconomic and health dynamics of the study site that I developed through the production of Article 2, a series of profiles of the Panchayat (Mohindra, Haddad, Narayana & Aravind, 2005; 2006; Narayana, Haddad, Mohindra & Aravind, 2005; Narayana, Haddad, Mohindra, Felatto & Aravind, 2005), in addition to multiple field visits to the Panchayat[22].

2.0 Context of the study

In order to empirically test certain microcredit-health linkages outlined in my theoretical framework, I employed special survey data from the first phase of an action research initiative, *Access to health care and basic minimum services in Kerala, India*, of which I am affiliated with (Haddad, Narayana & Mohindra, 2001). This is a collaborative initiative between the Centre for Development Studies (CDS) in Trivandrum, Kerala and the Université de Montréal, supported by the International Development Research Centre [grant number : 101595-001]. Since 2003, the initiative has been working with community organisations and local government in one Panchayat (territorial decentralized unit), in Kerala's northern district of Wayanad. The two main objectives were: 1) to support self help groups and other women's organizations to build and implement a Community Based Health Solidarity Scheme, and 2) to design and implement a community based monitoring system to provide the local government and its citizens with a participative and evidence-based information system for needs-based policy formulation and monitoring. In

[22] The original idea to explore SHG and women's health in this dissertation stems from a field visit to Kerala during the period May to June, 2003 with the financial support of the FCRSS/IRSC (Mohindra, 2003). I have since had the opportunity to return to the field.

developing these two interventions, we conducted a number of preparatory studies in the Panchayat, including implementing a baseline household survey covering all the households in the area (also known as Kottathara survey), which I used for the practical component of this dissertation. I actively contributed to the preparation of the baseline survey, including designing the module on women's well-being and the microcredit section of the social inclusion module (see section 4.1.3). I developed these modules based on discussions I held in the field and literature reviews.

3.0 Setting

3.1 Kerala state

Kerala state is located on the south-western tip of India. Kerala is far ahead in human development, ranking highest on the human development index; literacy, life expectancy, and infant survival rates all surpass national levels (Table 3). Achievements are equally impressive for women, the maternal mortality rate is two times lower than the national rate, women's life expectancy is six years higher compared to men, and there is a favourable female to male ratio (Table 3). These achievements are generally associated with historical specificities (e.g. two of three regions were not occupied by British colonials, traditional matrilineal communities), and strong public action and progressive policies (e.g. mass literacy, land redistribution) (Franke & Chasin, 1992; Ramachandran, 1996; Radcliffe, 1978).

Table 3 Selected human development indicators for Kerala and India

Indicator	Kerala	India
Human Development Index*, 2001	0.64	0.47
Gender Disparity Index†, 1991	0.57	0.39
Sex ratio‡, 2001	1058	933
Life expectancy, 1992-96	73	61
Female	76	61
Male	70	60
Infant mortality rate§, 2001	11	66
Maternal mortality rate¶, 1998	198	407
Literacy, 2001	90	65
Female	88	54
Male	94	76

*Human Development Index is a composite of five variables; literacy rate, educational attainment, life expectancy, infant mortality rate, and per capita monthly income per capita adjusted for inequality.
†Gender disparity index measures the proportion of female attainment compared to males for a set of common variables, similar to the human development index, except worker population ratio is used for economic attainment.
‡Sex ratio is females per 1000 males.
§Infant mortality rate is per 1000 live births.
¶Maternal mortality rate is the number of maternal deaths, per 100,000 live births.

Kerala's achievements in health and social development stood out in post-independent India; yet the state had a high incidence of income poverty. During the 1980s, a sharp reduction in poverty was observed and Kerala now has one of the lowest incidences of poverty among all the states (Kannan, 1995; 1999). Poverty, however, persists. Ten percent of the population fall below the poverty line (Deaton & Drèze, 2003). The majority of the poor are asset-poor and belong to labour households (Kannan, 1999). Sixty-three percent of rural households do not own land, compared to only 36% of landless households in India (Drèze & Sen, 2002). There is little industry (both large scale and small to medium size enterprises) and material production, which contributes to a persistent unemployment

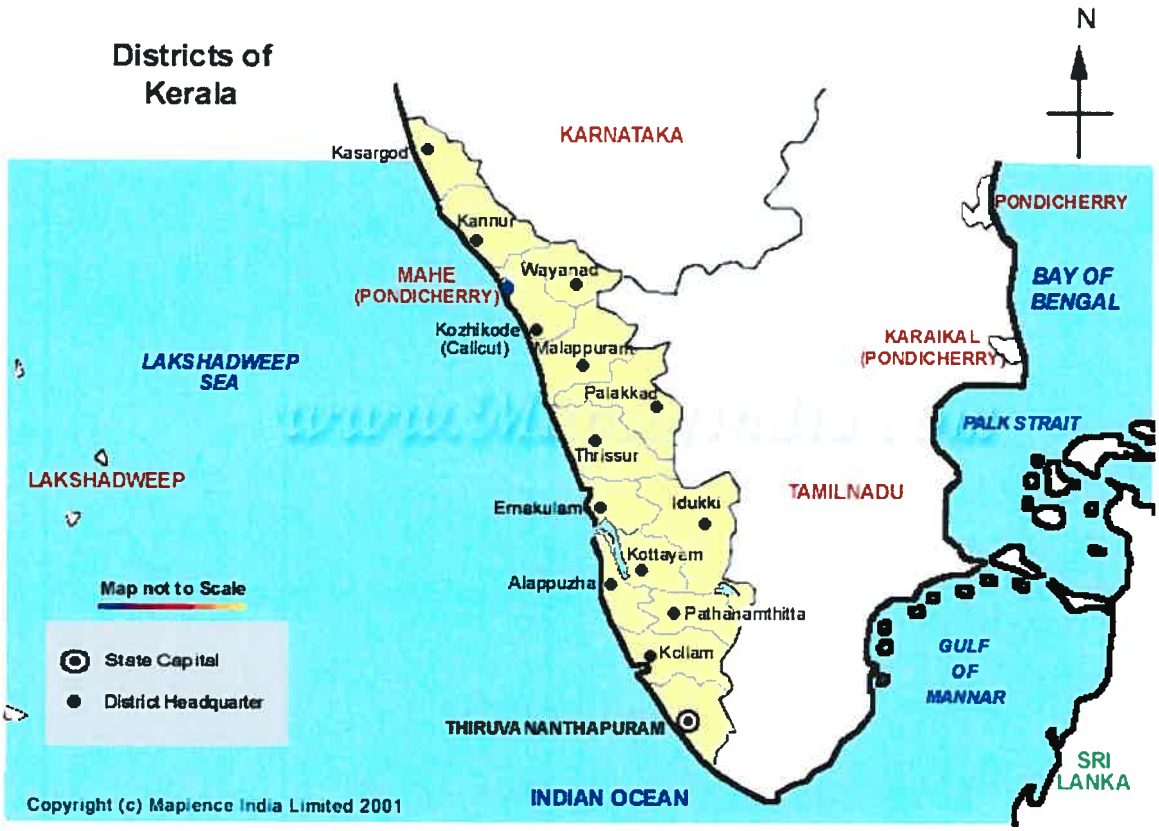
crisis[23] (Ramachandran, 1996). There is a higher incidence of poverty among SC/ST, this group accounts for 23% of the poor, but only constitutes 10% of the population (Kannan, 1995).

3.2 Wayanad district

Wayanad is a mountainous district located in northern Kerala (Figure 1). Wayanad is essentially rural; the percentage of urban population in Wayanad is the lowest among all 14 districts of Kerala. The proportion of tribal populations is the highest in the state (36%). Literacy rates are lower than elsewhere in Kerala due to the lower literacy rates among the tribal groups. The population is largely dependent on agriculture with the main crops being coffee and paddy. Other key crops include pepper, rubber, cardamom, tea, ginger, banana, and lemon grass. Among the population actively engaged in the work force, agricultural activities is the main occupation.

[23] Unemployment in Kerala, is considered higher than any other Indian state. During the late 1980s, 14.1% of men in urban areas and 12.5% of men in rural areas were unemployed. These rates jump even higher for women whose rates are 33.8% in urban areas and 25% in rural areas. There is also a high rate of educated unemployed.

Figure 1 Map of Districts of Kerala



3.3 Kottathara Panchayat

Table 4 compares basic information for Kothathra, Wayanad, and Kerala. A striking characteristic of Kottathara is the high percentage of tribal groups, almost 30%.

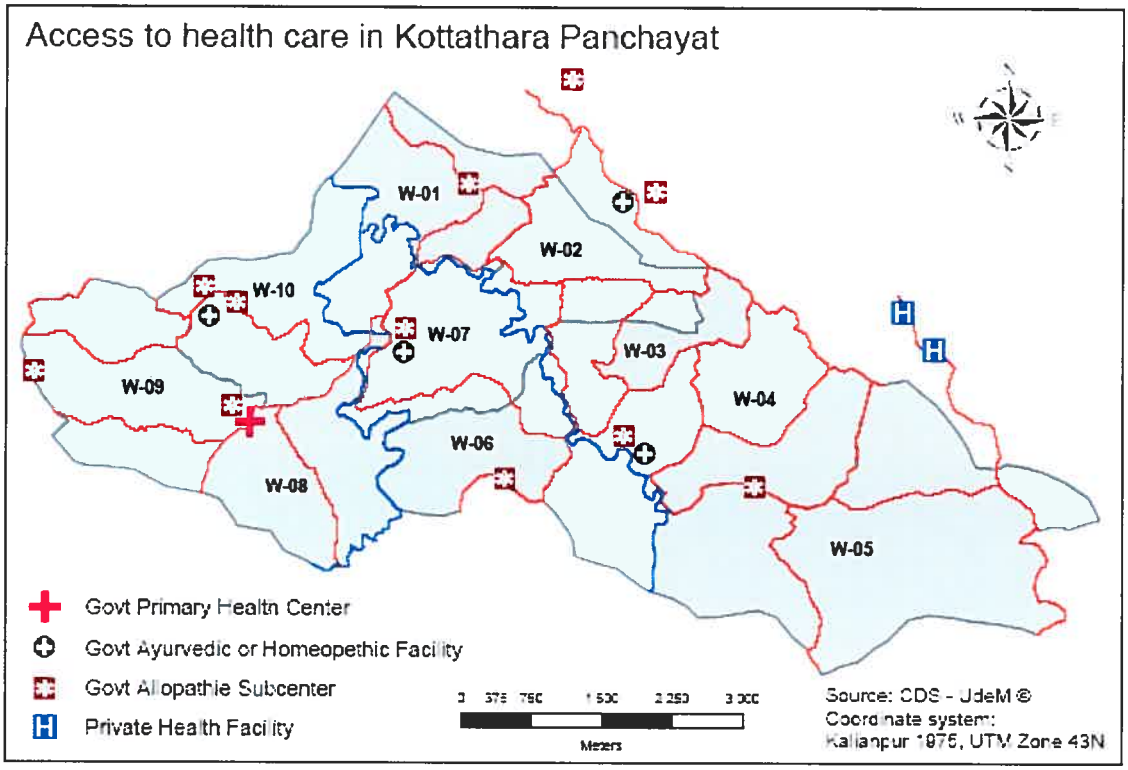
Table 4 Basic information on Kottathara Panchayat, Wayanad district, and Kerala state

	Kottathara[1]	Wayanad[2]	Kerala[2]
Land area	31.75 sq km	2, 131 sq. km	38, 263 sq. km
Population	16,110	786, 627	32,000,000
Percentage of urban population	0%	3.8%	8.3%
Percentage of STs	28%	17%	1%
Number of households	3,352	-	-
Percentage of BPL households	43%	50%	37%
Sex ratio‡	1,012	-	1,058

[1] Panchayat Development Report 2002 and Kottathara survey, 2003, [2]Census of India, 2001 and Below poverty line (BPL) census of 1998-99 of the Rural Development Department.
‡Sex ratio is females per 1000 males.

The Panchayat is situated 20 kms from Kalpetta, the district headquarter. The Panchayat is divided into 10 wards (Map 2). There is one high school, 4 primary schools, and 20 *anganwadi* centres (preschools). There are 10 rations shops; these shops sell basic goods, including rice, kerosene, sugar, and wheat. There are two banks. There is one primary health centre (PHC), situated in ward 8, and four sub-centres, which are situated in wards 1, 4, 6 and 10 (Figure 2). There is also a homeopathic and ayurvedic dispensary in the Panchayat.

Figure 2 Map of Kottathara Panchayat: Wards and distribution of health care facilities



The Panchayat is a multi-religious (Hindus, Muslims, Christians, Jains), multi-caste population. In the Kottathara survey, we identified the specific caste or tribe of each household. We then classified each caste or tribe into one of the three categories traditionally used in India: SC/ST, OBC, and forward caste. This classification system includes non Hindu religions: Muslims are classified as OBC and Christians are classified as forward castes. Previous analyses highlighted one particularly striking difference among the SC/ST category, the Paniya tribe was culturally and socioeconomically distinct from the SC and other tribal groups (Narayana et al., 2005). The Paniya tribes are a landless, deprived group that is culturally distinct from other tribal groups.

We also observed another particular trend among the Paniyas, this tribal group reported their health differently from the rest of the population; they were systematically underreporting poor health (Mohindra et al., 2005). This phenomenon, which has been labelled by some as a perception bias (Sen, 2002a), does not adequately reflect the true health status of this population. Therefore, Paniya women were not included in this study.

3.4 Description of self help group (SHG) networks

Self help groups (SHGs) were originally launched in the 1990s by the National Bank for Agriculture and Rural Development (NABARD), with the support of non governmental organizations (NGOs). Since that time two other forms of SHGs have emerged, one sponsored by the central government under the program, *Swarnajayanti Gram Swarozgar Yojana* (SGSY), and more recently, the *kudumbrasree* program sponsored by local government, emerged as part of the People's Decentralisation Plan. SHGs were promoted as an alternative to previous supply-led, top-down poverty alleviation strategies, adopting the position that the poor are agents.

SHGs, are composed of 10 to 20 women, who live in close proximity to each other. SHGs follow a predetermined set of rules, delineated by the group, for loan distribution and repayment. Group meetings are held weekly, at which time members contribute at least 10 Rupees, which forms the corpus of a fund for advancing loans to the members. After an initial savings period (typically 6 months), SHGs are able to begin taking loans – supposedly for productive activities. There are two different types of loans. First, the more common loan taken, are small loans[24] from group savings. The amount a member qualifies for will depend on individual savings[25]. The women will set the interest rates themselves,

[24] Loans generally range between 100 to 3,000 Rupees.
[25] For every rupee saved, members become eligible for about 3 or 4 rupees in return.

generally at a high rate (around 24%), to match those rates in the local credit market (e.g. moneylenders), but also as a mechanism to increase group savings. Second, a loan may be acquired through a bank based on credit as a SHG member.

The funds are collected and deposited in the bank by the group's president and secretary, who also carefully record all transactions and minutes from their meetings in notebooks. These positions are rotated each year, distributing power and sharing responsibilities among members. Each member will also have a passbook, where they record their personal transactions.

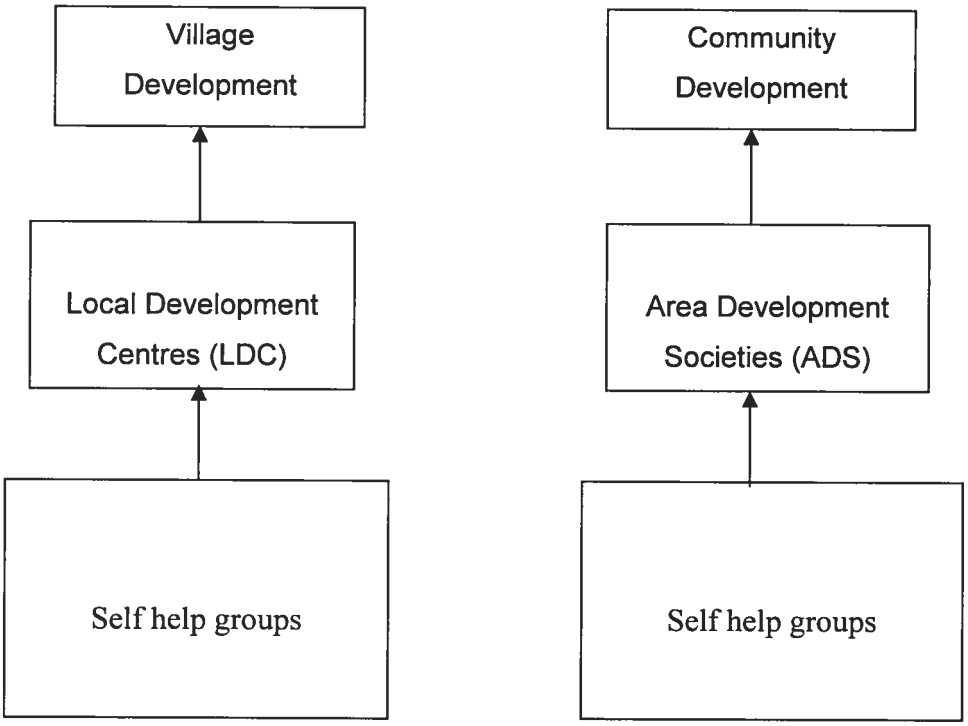
From the groups that I met, loans were generally repaid on time, without major conflict. In order to maintain their finances, many SHGs have integrated flexible and compassionate transactions, distinct from typical banking procedures. For example, when a member is unable to pay one week, the group would pay for her either by drawing on a special pot designated for this purpose, or by members collectively contributing to cover the fee. This member would not be required to repay this fee, but would be expected to contribute the following week.

SHGs may participate in other activities besides savings and credit, such as group micro-entrepreneurship, social activism, and capacity building through various skill trainings organised by NGOs or local government. Women also use the SHG forum as a space for discussion, including voicing personal problems.

In Kottathara Panchayat there are two main SHG networks: (1) the NABARD model, sponsored by RASTA, the local NGO, which began forming groups during the mid 1990s, and (2) *kudrumbrasree*, which started in 2002. The networks have similar three-tiered structures (Figure 3). The NGO model has at its bottom level, SHGs, which are organized into clusters, known as local development centres (LDCs). Meetings and various activities

are held at the LDC level. RASTA currently provides links between SHGs and banks, but eventually, the NGO aims to federate the SHGs, which will be brought under an apex bank, At this point the NGO would withdraw from its involvement and the SHGs would operate independently. The *kudrumbrasree* also has SHGs at the lowest level of organization. These groups are then organized at the ward level into Area Development Societies (ADS). At the ADS level, activities include vegetable cultivation (e.g., banana, tapioca, yam), clearing roads, as well as specialized units involved in the production of poppadons, umbrellas, and soap. The highest level is the Community Development Society (CDS). The CDS is presided by an elected member of the ADS and includes the Panchayat president.

Figure 3 Hierarchical structure of self help groups in study site: NABARD model used by NGOs and kudumbrasree used by local government



NABARD model

Kudumbrasree model

Women eighteen years and older are eligible to participate in a SHG. Unlike other schemes, that target the poor, SHGs include women from both below poverty line (BPL) and above poverty line (APL) households. Under the *kudumbrasree* scheme, women from BPL households are, however, eligible for additional funds channelled by the local government. Despite this difference, the NGO supported SHGs and *kudumbrasree* are similar in their objectives and activities; therefore, I do not discriminate between the networks in this study, henceforth the networks will be collectively referred to as SHGs.

The SHG program covers the entire Panchayat and almost half of women participate (Table 5). The data on basic savings and loan activities indicate that the SHG program is successfully operating; almost three quarters of members have received at least one loan (Table 5).

Table 5 Basic data on savings and loan activities among SHG members in Kottathara

Number of adult women* living in Kottathara	5584
Number of women participating in SHG	2054
Mean contributions to savings per year (Rupees)	650
Median contributions to savings per year (Rupees)	520
% of members who received at least one loan+	71
Mean number of loans taken	1.35
Median number of loans taken	1.00
Mean amount of loans taken (Rupees)	2361.8
Median amount of loans taken (Rupees)	1000

*Adult women here are considered 18 years and older; 18 is the age that women can join SHGs and is also the age of marriage. Females under 18 can participate in 'child' SHGs.

+ This number is an underestimation because women can only receive a loan after a period of 6 months, which is about 3-4% of the women participating at the time of the survey.

Loans were reported to have been taken out for a number of productive purposes, including agriculture, livestock, handicrafts, and shops, and health consumption purposes. A large number of loans was also reported to be used for other purposes, but these reasons were unspecified; therefore we cannot ascertain whether these loans were used for production or consumption. We also do not have information on the level of control that women had over the loans and the extent to which loans were used for the intended purposes.

4.0 Research design

This dissertation adopts a cross-sectional design using household survey data to address the hypotheses raised in Articles 2 and 3. In this section I first describe the household survey, I then outline how the survey was utilised in the empirical articles, by specifying the study population, variables, and data analysis.

4.1 Household Survey

4.1.1 Sampling

The household survey was essentially a census, we implemented the survey to all of the households identified in Panchayat (n=3,352).

4.1.2 Data collection

Following translation of the questionnaire into the local language of Malayalam, the questions were carefully pre-tested (n=20 households). Twenty local females of varying castes and religions were trained as surveyors, under the supervision of the CDS. Head of households and their spouses were the main respondents of the survey, other members responded to specific questions on individual achievements and well-being. The women's

well-being module was implemented to one female per household, either the head (if female) or the spouse of the head of household. Women were encouraged to respond to the women's module in private when possible.

The survey was implemented during the period of April to June 2003. All households agreed to participate. Universal participation rates may be attributed to three main reasons. First, as part of a broader action research project, the community was already familiar with the project and its objectives, which were relayed during public discussions, local forums, and through the local project team living in the area. Second, the surveyors were known and respected community members, including *anganwadi* (pre-school) teachers, who have an established rapport and trust with the community. Third, the extent of participation in community life is very high in the community, for example, according to our survey, over 95% of households have ever voted in an election.

4.1.3 Content of questionnaire

The questionnaire consists of eight modules: identification details, demographic and socioecononomic characteristics of household members, access to services, assets and consumption, health status of members, social inclusion (including SHG membership), women's well-being, and enrolment in Health Insurance Plans (see Annex D).

4.1.4 Ethical consideration

Ethical approval for the household survey used in this study was obtained from the Université de Montréal Ethical Committee on April 25, 2003 [Reference number is CERFM 47(03) 4#88] and the Local Coordination Committee (LCC) set up by the action research team. I was also granted ethical approval by the Université de Montréal Ethical Committee on March 11, 2004 to use the household survey data for this dissertation.

4.2 Specifications of Article 2

In Article 2, I employed multilevel analysis to explore the distribution of women's health achievements across castes and socioeconomic characteristics. The results of this study were used to inform the second article, which incorporates variables of socioeconomic characteristics and caste that were identified to be associated with women's health achievements.

4.2.1 Population

The Kottathara survey identified 8,137 females living in Kottathara Panchayat. For the analysis of Article 2, only non-elderly women (18 to 59 years) who were not affiliated with the Paniya tribe were retained for analysis. This yielded a total of 4,196 women. These 4,196 women were nested in 2,856 households over the 10 wards. For the analysis, the women were subdivided into the three major caste groups: ST/SC, OBC, and forward caste. The number of women and households by wards is presented in Table 6 for each caste group.

Table 6 Number of women and households by ward for SC/ST, OBC, and Forward caste

Ward	SC/ST		OBC		Forward caste	
	Households	Women	Households	Women	Households	Women
1	85	129	65	106	135	201
2	50	74	164	238	121	179
3	41	77	132	195	142	209
4	101	143	103	155	92	134
5	97	154	84	117	97	150
6	20	39	60	81	152	197
7	53	74	249	377	21	25
8	64	99	37	49	136	170
9	53	93	148	230	99	150
10	49	68	74	107	132	176
Total	613	950	1,116	1,655	1,127	1,591

4.2.2 Variables

Three categories of variables are used for Article 2: socioeconomic position, caste, and health achievements. The variables are presented below and are described in Article 2.

Socioeconomic position

The demographic and socioeconomic module contained information on women's education and employment status. The size of land owned by the household is included in the module on assets and consumption .

Caste

The demographic and socioeconomic module contained information on women's age, education, and employment status. This module also included the specific caste of the household head.

Health achievements

Two variables from the health module were used: self perceived health and reported limitations in activities in daily living (ADLs).

4.2.3 Data analysis

The first hypothesis of this article is that low caste and low socioeconomic position is associated with poor reported health status (self perceived health, limitations in ADLs). This was tested by employing age-standardized percentages and age-adjusted odd ratios calculated using Mantel-Haenszel statistics. I then used three-level multilevel multinomial logistic regressions to determine if perceived health (very bad/bad, good, very good/excellent) and limitations in ADLs (great limits, moderate limits, no limits) are associated with each of the socioeconomic variables, while controlling for age. A multilevel approach was adopted in order to account for the hierarchical structure of the data. First, there was a need to adjust for women living in the same household, which violates independence. Second, in order to control for possible unobserved differences across wards the model was extended to three levels. Random intercept models were fitted with individual at level 1, household at level 2, and ward at level 3. The outcomes of interest were the fixed effects, although the models also produced estimates for household and ward level random effects.

The sample was stratified by caste in order to test the second hypothesis: associations between socioeconomic position and reported health status vary across castes. Stratification

has been used elsewhere as an approach to studying ethnic inequalities in health within a multilevel framework (Karlsen, Nazroo & Stephenson, 2002). The advantage of using stratification in this analysis is to address interactions more easily by determining "whether or not the odd ratios are constant, or homogeneous, over the strata" (Hosmer & Lemeshow, 1989, p 71). The advantage of using stratification is especially true for logistic regression, which is not as versatile as linear regressions for assessing interactions; multinomial logistic regression models in particular can quickly become complex and difficult to interpret.

Multilevel analysis was performed using MLWin V.202 (Rasbash, Steele & Browne, 2004). Separate analyses were done for each caste. Models were estimated using reweighted generalised squares. The estimation technique was first order marginal quasi-likelihood (MQL). Using first order MQL as the starting values, attempts were made to use second order MQL and predictive quasi-likelihood (PQL), but these models did not converge. The results of the analyses should be interpreted with caution because first order MQL can lead to biased estimates, particularly in cases where sample sizes within higher levels of analysis are small (Rasbash, Steele & Browne, 2004). Currently, there is no specific criteria for judging the number of observations per predictor in multilevel analysis (Kuate Defo, 2005). There is a small number of women and households in certain wards, such as ward 6 for SC/STs and ward 7 for forward castes (Table 6), which is likely to lead to estimates biased downwards. The convergence tolerance criteria was set at the default (m is 2).

The three-level multinomial logistic regression model for self perceived health and restrictions in ADLs can be written as follows:

$$\text{Log}\left(\frac{\pi^{(s)}_{ijk}}{\pi^{(3)}_{ijk}}\right) = \beta_0{}^{(s)} + \beta^{(s)}X^{(s)}_{ijk} + Z^{(s)}_{ijk}\, f^{(s)}_{jk} + W^{(s)}_{ijk}\nu^{(s)}_{k},\ s=1,2$$

$\mu_{(s)jk} \sim N(O,\sigma^2_{(s)f})$ and $\nu\mu_k \sim N(O,\sigma^2_{(s)\nu})$

Where:

$\pi_{(s)ijk}$ is the probability of reporting perceived health or limitations in activities in daily living for an individual woman i for household j in ward k; there are three response categories for each dependent variable. For perceived health the third or last category (very good/excellent health) is used as the reference category. The subscript (s) represents the other categories and may take the value of 1 (very bad/bad health) or 2 (good health). For limitations in daily activities the last category (no limitations) is used as the reference category and the other categories may take the value of 1 (great limitations) or 2 (moderate limitations).

$X'_{(s)ijk}$ is a vector of fixed covariates, which may be defined at the woman, household, or ward level for s response category

$\beta_{(s)}$ is an associated vector of fixed parameter estimates for s response category

$Z'_{(s)ijk}$ is a vector of covariates, which the effects can vary randomly at the household level for s response category

$W'_{(s)ijk}$ is a vector of covariates, which the effects can vary randomly at the ward level

$f_{(s)jk}$ is a vector of household-level random effects for s response category

$\nu_{(s)k}$ is a vector of ward-level random effects for s response category

4.3 Specifications for Article 3

The second article explores the relationships between microcredit participation and health. Due to the cross-sectional nature of the design I do not attempt to ascertain a cause and effect relationship between microcredit participation and health, but rather establish associations among variables in order to test certain relationships identified by my theoretical framework. I try to strengthen the study design by minimizing selection bias, reverse causality, and time lags between intervention and outcomes. Duration of participation was explicitly considered by distinguishing between women who were early joiners (participated 2 years or more) and early joiners (women who participated less than 2 years). Duration of participation was used in lieu of the number or amount of loans because it is expected that the benefits of participation are more than financial. There is, however, a correspondence between the number and amount of loans and duration of participation: over 90% of early joiners had ever received a loan compared to 68% of late joiners, early joiners. Early joiners were also more likely to have taken out multiple loans and the amount of loans is also more than two times higher (Mean=5,649 Rs; Median=4,000 Rs) compared to late joiners (Mean=2,068 Rs; Median=1,500 Rs). Article 3 provides further details on approaches used to minimize bias in the study.

4.3.1 Population

From the 4,196 women included in Article 2, two further inclusion criteria were applied for Article 3. First, because the study hypotheses are specific to poor women, only women from BPL households were included. Second, because I included variables on women's decision-making agency and emotional stress, only women who responded to the women's well-being module were included (women who were either heads of households or spouses of heads of households). The application of the inclusion criteria led to 928 women being retained in the analysis. In addition to being from households that fall below the poverty

line, the women retained for analysis in Article 3 differ from the population in Article 2 according to other characteristics (Table 7). As expected, the women in Article 3 are more likely to be uneducated, not engaged in paid employment, have SC/ST caste affiliations, and come from households with small landholdings. Since only women who are heads of households or spouses of heads of households were selected, the average age of the population for Article 3 is five years older and the women are more likely to be married. Not only are these women more likely to be married, but because of their position in the household, they tend to wield greater power – especially if they are mothers of adult sons. Women who are heads of households may face higher levels of discrimination as widows and divorced women, but are often the decision-makers in the family. In sum, the women in Article 3 may have greater intra-household decision-making powers compared to other women, which may increase their capacity to join and benefit from a SHG. The findings of Article 3; therefore, should be considered in these terms.

Table 7 Comparison of demographic and socioeconomic characteristics for populations in Articles 2 and 3

	Population for Article 2	Population for Article 3
Mean age in years	34	39
% married	76	91
% with no education	12	44
% not engaged	82	70
% SC/ST	23	39
% OBC	39	39
% households owning 50 cents or less	50	79
Total number of women	4,196	928

4.3.2 Variables

The categories of variables follow the theoretical framework: women's characteristics, health capabilities, health achievements, and SHG participation. The variables used to measure health capability and health achievements were all converted from their original form (scores and likert scales) into binary variables due to limited distribution.

Health capability

I measured health capability via three determinants of health: access to health care, health risks, and decision-making agency. The first two variables come from the health module and operate as health inputs. The third variable originates in the women's well-being module and operates as a conversion factor. The construction of these variables and psychometric properties are detailed in Annex E.

Health achievements

The variables included are those used in Article 2 as measures of self assessed health: self perceived health and limitations in ADLs. Two markers of mental health are also included from the health module: disturbances in mental peace and life satisfaction.

SHG participation

SHG membership and other information related to SHG participation is drawn from the social inclusion module.

Women's characteristics

Variables used in Article 2 to measure socioeconomic position and caste are included as women's characteristics. Age and position in household (i.e. spouse of head or head of household) are also controlled.

4.3.3 Data analysis

A series of logistic regressions were performed to test the hypotheses. I used a progressive approach to building logistic regression models. The data analysis plan is detailed in the methods section of Article 3.

ARTICLE 2

WOMEN'S HEALTH IN A RURAL COMMUNITY IN KERALA, INDIA: DO CASTE AND SOCIOECONOMIC POSITION MATTER?

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My contribution to the article is presented in Annex C

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EVIDENCE BASED PUBLIC HEALTH POLICY AND PRACTICE

Women's health in a rural community in Kerala, India: do caste and socioeconomic position matter?

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Objectives: To examine the social patterning of women's self-reported health status in India and the validity of the two hypotheses: (1) low caste and lower socioeconomic position is associated with worse reported health status, and (2) associations between socioeconomic position and reported health status vary across castes.

Design: Cross-sectional household survey, age-adjusted percentages and odds ratios, and multilevel multinomial logistic regression models were used for analysis.

Setting: A panchayat (territorial decentralised unit) in Kerala, India, in 2003.

Participants: 4196 non-elderly women.

Outcome measures: Self-perceived health status and reported limitations in activities in daily living.

Results: Women from lower castes (scheduled castes/scheduled tribes (SC/ST) and other backward castes (OBC) reported a higher prevalence of poor health than women from forward castes. Socioeconomic inequalities were observed in health regardless of the indicators, education, women's employment status or household landholdings. The multilevel multinomial models indicate that the associations between socioeconomic indicators and health vary across caste. Among SC/ST and OBC women, the influence of socioeconomic variables led to a "magnifying" effect, whereas among forward caste women, a "buffering" effect was found. Among lower caste women, the associations between socioeconomic factors and self-assessed health are graded; the associations are strongest when comparing the lowest and highest ratings of health.

Conclusions: Even in a relatively egalitarian state in India, there are caste and socioeconomic inequalities in women's health. Implementing interventions that concomitantly deal with caste and socioeconomic disparities will likely produce more equitable results than targeting either type of inequality in isolation.

The emphasis on mortality and reproductive health has been criticised as an insufficient approach to assessing women's health in both rich and poor countries.[1 2] Health perceptions and non-reproductive health needs also should be considered. These dimensions are especially relevant as life expectancy increases—chronic illness and disability have a more prominent role in women's lives, and morbidity becomes a critical marker of inequality.[3] Poor self-assessed health tends to be concentrated among women who are poor and belong to deprived ethnic or racial groups.[4 5] Social inequalities in health have been explored in numerous contexts, although less attention has been paid to health disparities in India and other low-income countries.[6]

Indian society is highly stratified by caste and by socioeconomic position. Caste is a hereditary, endogamous, usually localised group, having a traditional association with an occupation and a particular position in the hierarchy of castes. At the bottom of the hierarchy are the low-status castes (scheduled castes) and indigenous groups (scheduled tribes). Historically, low castes and tribes faced high exclusion and were exploited by higher castes. To correct this historical oppression, the government of India adopted a policy of positive discrimination. Caste and socioeconomic position are related but distinct concepts. Caste is a "closed" group, whereas socioeconomic position is "open", and therefore not immutable. Caste tends to overlap with socioeconomic position; upper castes have access to more and better resources and opportunities.[7] In particular, caste and socioeconomic position are correlated among the highest and among the lowest castes, although this correlation is not perfect. Caste discrimination has decreased since the 19th century but it persists. Caste also continues to shape practices, beliefs and social norms, including women's freedom and employment opportunities.[8] Caste disparities exist today owing to both accumulated privileges and disabilities from the past and continued discrimination. Caste-related economic and social differences suggest that women from lower castes will carry a higher burden of ill health.[9] The relationship between socioeconomic position and health status is widely accepted among epidemiologists and public health researchers.[10] People who are socioeconomically better placed tend to be healthier; this relationship has been seen with measures of mortality, morbidity and self-assessed health.[11]

This paper examines social patterning of women's health in the south Indian state of Kerala. Progressive public policies and historical particularities have contributed to population health indicators that are superior to the rest of India despite modest levels of income.[12 13] Although the state domestic product per capita is comparable to India's average (Rs 12 328 rupees *v* Rs 11 799, based on 1993–4 prices),[14] population health indicators of women in Kerala surpass national levels: women's life expectancy is 76 years in Kerala compared with 61 years in India, the maternal mortality is half the national rate (198 compared with 407 per 100 000 live births), and there is a favourable female:male ratio (1058 females per 1000 males in Kerala *v* 933 females per 1000 males in India).[15 16]

Kerala has undergone its health transition, yet—beyond mortality—there is limited evidence on the health of its population in general and the health of women in particular.

Abbreviations: SC/ST, scheduled castes/scheduled tribes; OBC, other backward castes; ADL, activities in daily living

Table 1 Distribution of women by caste groups and socioeconomic level (%)

Socioeconomic indicators	Scheduled castes/scheduled tribes (n = 950)	Other backward castes (n = 1655)	Forward castes (n = 1591)	All women (n = 4196)
Education				
None	26.2	13.5	1.3	11.7
Primary	11.3	19.4	6.2	12.6
High school and above	62.5	67.1	92.5	75.7
Occupation				
Wage	17.7	8.9	4.3	9.2
Non-wage	10.1	6.5	10.9	9.0
Not engaged	72.2	84.7	84.8	81.9
Household land size (cents)				
<10	33.2	23.6	9.7	20.5
10–50	23.3	40.7	21.3	29.4
>50	43.6	35.7	69.0	50.1

To address this gap, we examine two hypotheses: (1) low caste and lower socioeconomic position is associated with worse reported health status, and (2) associations between socioeconomic position and reported health status vary across castes.

METHODS

Study setting

Our study was conducted in Kerala's northern district of Wayanad, which has the highest proportion (36%) of tribal populations, the most deprived social group. Literacy rates are relatively lower in Wayanad owing to lower literacy rates among tribal groups. The population is largely dependent on agriculture, with the main crops being coffee and paddy. Agricultural activities is the main occupation among the population actively engaged in the work force. The study site was a single panchayat (territorial decentralised unit) with a multireligious and multicaste population. The panchayat has a land area of 31.75 km^2 and a population of 16 110.

Data source and study population

Cross-sectional data were used from a household survey implemented by the Centre for Development Studies, Kerala, India, and the Université de Montréal, Québec, Canada, in 2003, as part of a larger action research project. The project obtained ethical approval by the Université de Montréal Ethics Committee on 25 April 2003. All of the households identified in the panchayat were included in the census after receiving informed consent. All households agreed to participate. Universal participation in the survey was probably due to the close interactions between the community and our action research project. The questionnaire had several modules that included questions pertaining to demographics, socioeconomic characteristics and self-reported health status. Non-elderly adult women of marital age (18–59 years) were selected for the analyses.

The caste or tribe of each household was categorised using the conventional three-way classification system adopted in Kerala,[17] which ranks Hindu castes and other religions. The first category, at the bottom of the caste hierarchy, includes both scheduled castes and scheduled tribes (SC/ST). Next is a residual category of lower castes and Muslims, known as other backward castes (OBC). The highest-ranking group is that of the upper or forward castes, including Christians. Our previous work identified heterogeneity among the ST; the Paniya tribe experienced greater levels of deprivation and were culturally distinct from other social groups living in the panchayat.[18] This led to a perception bias, which may arise among people who lack the informational base to assess their own poor health status.[19] Consequently, the Paniyas underreported their poor health conditions and therefore Paniya women were not included in our analysis.

Table 2 Sample sizes, age standardised percentages and age-adjusted odd ratios with 95% confidence intervals for self-perceived bad health and limitations in activities in daily living across caste and socioeconomic indicators

		Age standardised percentages		Age-adjusted ORs*	
	No of women	Bad health†	Limitations in ADLs‡	Bad health†	Limitations in ADLs‡
Caste of household					
SC/ST	950	24.7	28.4	1.88 (1.5 to 2.3)	1.45 (1.2 to 1.8)
OBC	1 655	22.9	30.7	1.73 (1.4 to 2.1)	1.72 (1.4 to 2.1)
Forward	1 591	16.3	22.6	Reference	Reference
Education of woman					
None	493	33.8	43.5	2.14 (1.7 to 2.7)	2.14 (1.7 to 2.7)
Primary	527	24.2	28.8	1.50 (1.2 to 1.9)	1.35 (1.1 to 1.7)
High school and above	3 176	17.4	24.0	Reference	Reference
Occupation of woman					
Wage	384	22.7	24.8	1.07 (0.8 to 1.4)	0.87 (0.7 to 1.1)
Non-wage	376	13.2	21.3	0.53 (0.4 to 0.8)	0.64 (0.5 to 0.9)
Not engaged	3 436	21.0	27.6	Reference	Reference
Household land size (cents)					
<10	860	27.0	30.4	2.22 (1.8 to 2.8)	1.53 (1.2 to 1.9)
10–50	1 234	22.9	29.3	1.69 (1.4 to 2.1)	1.45 (1.2 to 1.7)
>50	2 102	16.7	23.9	Reference	Reference

ADL, activities in daily living; OBC, other backward castes; SC/ST, scheduled castes/schedule tribes.
*ORs were estimated by Mantel–Haenszel statistics.
†Perceived health was converted into a binary variable for these calculations, bad health versus the rest.
‡Limitations in ADLs was converted into a binary variables for these calculations, great and moderate limitations versus the rest.

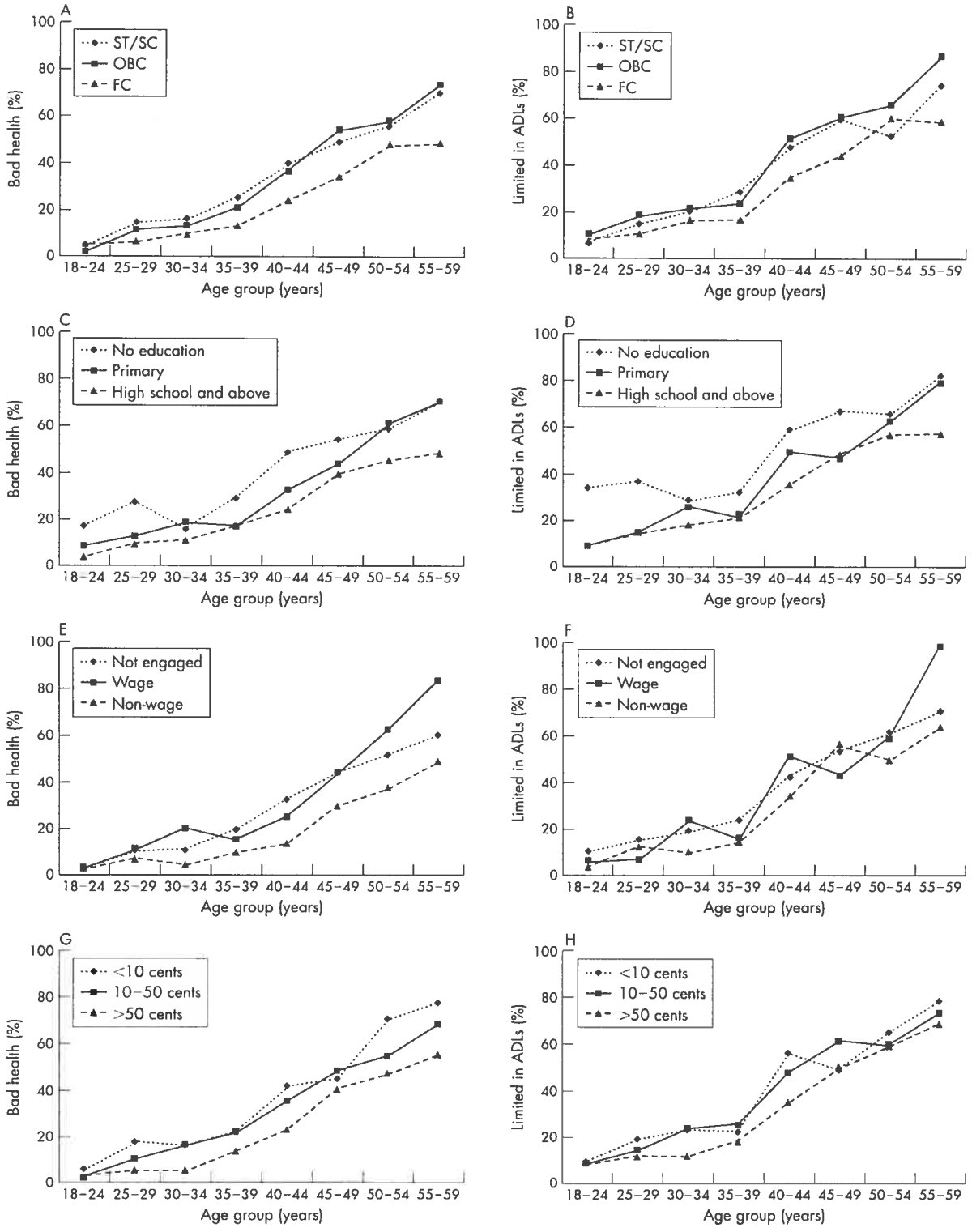

Figure 1 Results of household survey. ADL, activities in daily living; FC, forward castes; OBC, other backward castes; SC/ST, scheduled castes/scheduled tribes.

Measuring socioeconomic position

A variety of socioeconomic measures are used to provide the most comprehensive approach to assessing health disparities.[20 21] We used three indicators that we believe are pertinent for Indian agrarian societies: education, employment status and size of land holdings.

Woman's education was measured as the highest level of education pursued, whether or not it was achieved. There are

three categories: never attended school, primary, and high school and above. For the regression models, we collated "never attended school" and "primary education" into "low education" to ensure convergence of the models. For women's employment status, we adopted the individualistic approach, which uses a woman's current or previous occupation.[22] It is pertinent to specify whether Indian women are engaged in wage labour, which is typically unstable, precarious work, and exposes them to various health risks.[23] The following three categories were used: not engaged, employed wage labourer (has no permanent employer or employment) and employed non-wage labourer (permanent work). As the study is in a rural area, we followed developmental experts in Kerala by using land as an indicator of economic status. We measured the size of household landholdings in cents (100 cents = 1 acre). The categories, relevant in the Kerala context, reflect three levels of ownership: 0–10 cents (limited agriculture activities), 10–50 cents (cultivation) and >50 cents (significant cultivation).

Measuring self-assessed health

Two outcome measures of self-reported health status were used. Respondents were asked to rate their overall self-perceived health based on a five-point Likert Scale: very bad, bad, good, very good and excellent. Owing to limited distribution at the extremes, this variable was collapsed into three categories: very bad/bad, good and very good/excellent (hereafter these categories are referred to as bad, good and excellent). The second indicator is limitations in activities of daily living (ADLs). Respondents were asked to rate their level of limitations for two different sets of activities, physically demanding activities and moderately demanding activities. A single indicator was computed by summing the responses for the two sets of activities. This indicator was then collapsed into three categories: great limitations, moderate limitations and no limitations.

Statistical analysis

A preliminary analysis examined the distribution of poor health across caste and socioeconomic variables. To adjust for age differences across caste and socioeconomic groups, we used the direct method of standardisation, using the average of the total sample of women as the standard population.[24] Age-adjusted odds ratios (ORs) were calculated using Mantel–Haenszel statistics. Then, three-level multilevel multinomial logistic regressions were carried out to determine whether perceived health and ADLs are associated with each of the socioeconomic variables, while controlling for age.

The interactions between caste and socioeconomic position were dealt with by stratifying the analysis by caste. Specifically, interactions examine whether the accumulated privileges of upper castes serves as a buffer (ie, to lower the effect of low socioeconomic position on health), whereas the accumulated deprivations and continued discrimination of lower castes or tribes serve to magnify (ie, to increase the effect of low socioeconomic position on health) inequalities in health. Unordered logistic regressions modelling techniques were used despite the ordinal nature of the dependent variables, because the critical assumption of parallel slopes was not met.[25] To account for the hierarchical structure of the data, a multilevel approach was adopted, the models were fitted with individual at level 1, household at level 2 and ward at level 3. This corrects the estimated standard errors, thereby dealing with the clustering of observations that occurs within units.[26] This permits us to test for statistical significance of the fixed effects of the woman-level variables, although accounting for unobserved effects at the household or ward levels. We used the software MLWin, V.2.02, and our models were estimated using reweighted generalised least squares.[27] Separate models were run for each caste.

RESULTS

The household survey identified 4196 non-elderly women for this study (excluding the Paniya tribe). Socioeconomic position correlates with caste (table 1). The lower the caste, the more likely that a woman has never attended school or is from a household that owns <10 cents of land. The relationship between caste and employment status is more complex. SC/ST women are almost two times more likely to be engaged in paid employment than either OBC or forward caste women. Among employed women, SC/ST women are predominantly wage labourers, OBC women are slightly more likely to work as wage labourers and forward caste women tend to engage in non-wage activities. Table 2 provides the sample sizes, age-standardised percentages and age-adjusted ORs (with 95% confidence intervals (CIs)) of poor perceived health and limitations in ADLs. A higher prevalence of poor health outcomes was observed among SC/ST and OBC women than in the forward caste women. Poor health is also associated with lower levels of education and small household landholdings. The percentage of women reporting poor health outcomes is lowest among women who are engaged in non-wage activities. Little difference is observed between being a wage labourer and not engaging in paid employment. The ORs confirm these associations (the ORs are all statistically significant, except between wage labourer and not being engaged in paid employment). Figure 1 depicts these findings that are consistent across age groups.

Multilevel modelling

Perceived health

Table 3 lists the results of multilevel multinomial models for perceived health by caste. The ORs and 95% CIs (fixed effects) were computed comparing the rankings of bad health and good health with the reference (excellent health).

As expected, poor health is associated with low socioeconomic position. Moreover, the ORs for bad health are higher than for good health, illustrating a progression between poorer ratings of perceived health and low socioeconomic position. The influence of socioeconomic variables varies across caste. Among SC/ST and OBC women, the influence of socioeconomic variables on health tends to have a magnifying effect, whereas among forward caste women, there is a buffering effect (with the exception of education). Among SC/ST women, all three socioeconomic variables are associated with perceived health. Not having a high-school education increases the likelihood that a woman will report being in less than excellent health. Being engaged in paid employment reduces the likelihood that a woman will report less than excellent health, especially among women engaged in non-wage labour. Women from a household owning <50 cents of land are more likely to report being in less than excellent health. Results for OBC women are similar to our findings for SC/ST women, although the associations are tempered and the ORs between employment status and perceived health are only statistically significant for bad health.

These trends diverge from the results for forward caste women. No statistically significant associations were found between perceived health and either household landholdings or employment status. Low education was, however, associated with poor perceived health. Surprisingly, there was a stronger relationship between education and poor health outcomes among forward caste women than in lower caste women. This could possibly be owing to the greater range in educational achievements among forward caste women.

Table 3 Odd ratios (with 95% confidence intervals) estimated by multilevel multinomial logistic regression models of perceived health status using excellent health as the reference*

	SC/ST		OBC		Forward caste	
	Bad health	Good health	Bad health	Good health	Bad health	Good health
Fixed effects						
Low education (ref = high school and above)						
OR (95% CI)	2.69 (1.8 to 4.0)	1.96 (1.4 to 2.8)	1.88 (1.4 to 2.6)	1.58 (1.2 to 2.1)	4.20 (2.7 to 6.4)	2.53 (1.6 to 3.9)
Wage labourer (ref = not engaged)						
OR (95% CI)	0.44 (0.3 to 0.7)	0.59 (0.4 to 0.9)	0.52 (0.3 to 0.8)	0.76 (0.5 to 1.1)	1.01 (0.6 to 1.8)	0.62 (0.4 to 1.1)
Non-wage activities (ref = not engaged)						
OR (95% CI)	0.30 (0.2 to 0.5)	0.46 (0.3 to 0.7)	0.50 (0.3 to 0.9)	0.83 (0.5 to 1.3)	0.62 (0.4 to 1.0)	1.02 (0.7 to 1.5)
<10 cents of land (ref = >50 cents)						
OR (95% CI)	2.99 (2.1 to 4.4)	1.70 (1.2 to 2.4)	2.13 (1.5 to 3.0)	1.01 (0.8 to 1.4)	1.13 (0.7 to 1.8)	0.73 (0.5 to 1.1)
10–50 cents of land (ref = >50 cents)						
OR (95% CI)	2.70 (1.8 to 4.1)	1.75 (1.2 to 2.6)	2.75 (2.1 to 3.7)	1.41 (1.1 to 1.8)	0.89 (0.6 to 1.2)	0.79 (0.6 to 1.1)
Random effects						
Ward (level 2)	0.41 (0.21)	0.68 (0.33)	0.18 (0.10)	0.50 (0.24)	0.06(0.05)	0.26 (0.13)
Household (level 1)	0.16 (0.09)	0.06 (0.08)	0.06 (0.10)	0.24 (0.09)	0.00 (0.00)	0.44 (0.09)

OBC, other backward castes; ref, reference; SC/ST, scheduled castes/scheduled tribes.
*Models are adjusted for age.

Limitations in ADLs

Table 4 shows the fixed results of the multilevel multinomial models for limitation in ADLs. No limitation in ADLs is the reference. The results are comparable to the ORs for perceived health, although the effects are attenuated and generally no longer statistically significant.

DISCUSSION

Self-perceived health status is consistently correlated with mortality and morbidity,[28] and it has been widely used in studies examining the socioeconomic inequalities in health.[1 29] However, the use of self-perceived health, which is influenced by factors such as having regular contact with health professionals and individual's attitudes and perceptions,[19] could be a limitation in such a study. Studies have found that in certain low-income settings, the poor reported better health than the better off. Amartya Sen showed that the incidence of reported morbidity was higher in Kerala than in Bihar, a poorer state with considerably higher mortality.[19] Sen attributed this discrepancy to a perception bias; people from states with more education and greater access to health and medical facilities are in a better position to assess their own health than people from disadvantaged states. In our study, a perception bias was observed among one specific—previously enslaved and socially excluded group—the Paniya tribe. The Paniyas have absorbed an inferior status and lack the capacity to aspire, which led to their reporting better health despite their high levels of deprivation and greater exposure to health risks. By excluding the Paniyas from our analysis and focusing on a relatively homogeneous population, we were able to assess social inequalities in health among a population less susceptible to such a bias. The pattern of being poor but reporting good health is particular to specific situations, notably among excluded populations and poor groups where there is a high level of resignation. But this resignation may be lifted and the poverty-poor health relationship clearly established by either excluding such groups from analysis (as we did with the Paniya tribe in our study) or through general economic development (as seen elsewhere among Korean women).[30]

We complemented our analysis with reported limitations in ADLs, which is considered to be a fairly acceptable and valid measure of physical functioning in low-income countries.[31] In our study, limitations in ADLs and self-perceived health provided similar results, thereby strengthening the confidence in our findings.

Two main patterns in women's health emerged in this study. Firstly, age standardised percentages and ORs showed that women's health varies across caste and socioeconomic position (fig 1 and table 2). A higher prevalence of poor

Table 4 Odd ratios (with 95% confidence intervals) estimated by multilevel multinomial logistic regression models of limitations in activities in daily living using no limitations as the reference*†

	SC/ST		OBC		Forward caste	
	Great limits	Moderate limits	Great limits	Moderate limits	Great limits	Moderate limits
Fixed effects						
Low education (ref = high school and above)						
OR (95% CI)	1.71 (0.9 to 3.2)	1.32 (0.9 to 2.0)	1.56 (1.0 to 2.4)	1.14 (0.8 to 1.6)	2.95 (1.6 to 5.4)	1.56 (1.0 to 2.4)
Wage labourer (ref = not engaged)						
OR (95% CI)	0.32† (0.2 to 0.7)	0.67† (0.5 to 1.0)	0.66 (0.4 to 1.2)	0.59 (0.4 to 0.9)	1.15 (0.4 to 3.0)	1.02 (0.5 to 1.9)
Non-wage activities (ref = not engaged)						
OR (95% CI)	†	†	0.54 (0.2 to 1.2)	0.66 (0.4 to 1.2)	0.42 (0.1 to 1.3)	0.77 (0.5 to 1.3)
<10 cents of land (ref = >50 cents)						
OR (95% CI)	2.95 (1.6 to 5.4)	1.39 (0.9 to 2.1)	2.15 (1.3 to 3.6)	1.18 (0.8 to 1.7)	1.86 (0.9 to 3.7)	1.07 (0.7 to 1.8)
10–50 cents of land (ref = >50 cents)						
OR (95% CI)	1.62 (0.8 to 3.3)	1.39 (0.9 to 2.2)	1.70 (1.1 to 2.6)	1.28 (1.0 to 1.7)	0.98 (0.5 to 1.8)	1.25 (0.9 to 1.8)
Random effects						
Ward (level 2)	0.46 (0.29)	0.29 (0.17)	0.36 (0.21)	0.32 (0.17)	0.56 (0.31)	0.28 (0.15)
Household (level 1)	0.00 (0.00)	0.27 (0.22)	0.40 (0.27)	0.10 (0.16)	0.04 (0.47)	0.30 (0.20)

OBC, other backward castes; ref, reference; SC/ST, scheduled castes/scheduled tribes.
*Models are adjusted for age.
†The original variable for labour status did not converge for SC/ST model owing to insufficient numbers, therefore labour status was collapsed into a binary variable (engaged v not engaged).

health outcomes was reported among lower caste women. Despite Kerala's superior performance in reducing caste discrimination, "intercaste disparity continues to underlie overall disparity".[32] Poor health is associated with lower socioeconomic position regardless of the indicator. Disparities in education and low education were associated with poor health. Education is an inclusive measure of socioeconomic position because women are included regardless of their status in the labour market.[21] Education can provide a woman with a broad set of cognitive resources, in addition to material gains and future financial security through better employment or marriage opportunities.[10 33] Also, there are inequalities in household landholdings, which, our study shows, are linked to poor health. There is a close correspondence between poverty and land ownership in South Asian agrarian societies. Land is both a key productive asset and can help to protect households against economic shocks.[34] Land reforms, undertaken over 40 years ago, helped to restructure the rural classes, ensuring that many rural labourer households had at least a small amount of land, yet disparities persist.[14] Finally, better health is associated with being engaged in paid employment, especially in non-wage labour activities. Because we used cross-sectional data, the direction of the relationship between employment and health cannot be ascertained. On the one hand there could be a "healthy worker effect"—that is, healthy women volunteer themselves into the workforce.[35] On the other hand, employment can lead to positive effects on women's health by enhancing their autonomy and bargaining power, providing access to financial and social resources, producing greater emotional satisfaction, improving their social status and increasing the perceived value of women by household members and society.[36]

Secondly, the relationships between caste, socioeconomic position and health are intertwined. Our regression models showed that the associations between socioeconomic factors and health vary across castes. There are socioeconomic disparities among lower caste women highlighting the need to consider the inter-relations among social inequalities. The burden of low socioeconomic position combined with lowness of caste can lead to "double deficits" in health (with the exception of education). Our findings suggest that caste interacts with socioeconomic variables on health by magnifying or buffering the effect. Small household landholdings, which are linked with poor health, yielded high ORs among SC/ST women, and to a lesser extent among OBC women (tables 2 and 3), showing a magnifying effect. Forward caste women are buffered from the negative effect of small household landholdings. Typically, being from a lower caste magnifies the influence of low socioeconomic position, suggesting that these groups of women are especially vulnerable.

CONCLUSION

Caste and socioeconomic position are two inter-related sources of inequality that can reinforce each other; being from an upper caste can buffer women from the poor health effects related to low socioeconomic status, whereas being from a lower caste can magnify these effects. This study shows that both being from a lower caste and of low socioeconomic status can trap people into poor health more than either inequality on its own.

Even in a relatively egalitarian state in India, there are caste and socioeconomic inequalities in women's health. We need to balance our quixotic view of Kerala with more critical and in-depth research on population health. The elevated status of women in Kerala, compared with women in other states, has shielded deeper probing of sex issues, including the investigation of potential inequalities among women. The benefits of Kerala's progressive development have not been equally shared across the population.[37 38] This study contributes to that body of knowledge by highlighting the caste and socioeconomic disparities in health among women. There is a need in Kerala for devising the appropriate social response to reducing inequalities in health. There are a range of health interventions that target the poor and socially disadvantaged groups within and outside the health sector.[39 40] Implementing interventions that concomitantly deal with caste and socioeconomic disparities will likely produce more equitable results than targeting either type of inequality in isolation.

What is known on this topic

- Social inequalities in health are well documented in various industrialised countries.

What this paper adds

- This paper examines the social patterning of women's health in India—a society highly stratified by socioeconomic position and by caste. The paper shows that there are inequalities in health among women, which should be considered when implementing public health interventions.

Policy implications

- One possible approach to reducing social inequalities in health in India is through participation in poverty-alleviation strategies that have positive health effects ("pro-health" poverty-alleviation strategies).
- However, little research is available on this topic.
- Public health researchers should take it as a priority to inform Indian policy makers.

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Errata to Article 2: Women's health in a rural community in Kerala, India: do caste and socioeconomic position matter?

1. The random effects included in Tables 3 to 5 suggest that household is at level 1 and ward is at level 2. This is incorrect as this is a three-level multilevel analysis with individual at level 1. The correct corresponding levels for household and ward are 2 and 3 respectively.

2. The last sentence of the discussion of the article suggests a broader conclusion than what the evidence in the paper demonstrated. We did not show that being from a low caste magnifies the influence of socioeconomic position for all three indicators used (landholdings, education, employment status). Our conclusion only holds firm for one indicator of socioeconomic position, landholdings. The final sentence of the discussion; therefore, should read: Typically, being from a lower caste magnifies the influence of having small household landholdings, suggesting that these groups of women are especially vulnerable.

ARTICLE 3

CAN MICROCREDIT HELP TO IMPROVE THE HEALTH OF POOR WOMEN? SOME FINDINGS FROM A CROSS-SECTIONAL STUDY IN KERALA, INDIA:

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With permission from my co-authors (See Annex B)

My contribution to the article is presented at the end of the article

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Abstract

Background: This study examines associations between female participation in a microcredit program in India, known as self help groups (SHGs), and women's health in the south Indian state of Kerala. Because SHGs do not have a formal health program, this provides a unique opportunity to assess whether SHG participation influences women's health via the social determinants of health.

Methods: This cross-sectional study used special survey data collected in 2003 from one Panchayat (territorial decentralized unit). Information was collected on women's characteristics, health determinants (exclusion to health care, exposure to health risks, decision-making agency), and health achievements (self assessed health, markers of mental health). The study sample included 928 non elderly poor women.

Results: The primary finding is that compared to non-participants living in a household without a SHG member, the odds of facing exclusion is significantly lower among early joiners, women who were members for more than 2 years (OR=0.58, CI=0.41-0.80), late joiners, members for 2 years and less (OR=0.60, CI=0.39-0.94), and non-participants who live in a household with a SHG member (OR=0.53, CI=0.32-0.90; OR=0.32, CI=0.14-0.71). We also found that after controlling for key women's characteristics, early joiners of a SHG are less likely to report emotional stress and poor life satisfaction compared to non-members (OR=0.52, CI=0.30-0.93). No associations were found between SHG participation and self assessed health or exposure to health risks. The relationship between SHG participation and decision-making agency is unclear.

Conclusion: Microcredit is not a panacea, but could help to improve the health of poor women by addressing certain issues relevant to the context. In Kerala, SHG participation can help protect poor women against exclusion to health care and possibly aid in promoting their mental health.

Background

The deep connections between poverty and health continue to be the source of intensive investigations in the twenty-first century, especially in low and middle-income countries where the burden of illness is the heaviest [1-2]. Reducing social inequalities in health in general and the burden of ill health among the poor in particular are currently driving many global health research and activist agendas. In addition to ensuring that the poor have access to essential health services, there is a need for complementary interventions in poverty alleviation that have positive effects on health [1].

This paper assesses potential health benefits of women's participation in self help groups (SHGs), a microcredit scheme in India. Microcredit aims to extend access to credit to the poor, especially poor women, in order to generate income for participants and their families [3]. These groups were designed as a poverty alleviation strategy and as a means to increase women's access to resources and decision-making powers. And researchers have begun to explore whether microcredit participation may also benefit the health of poor women [4-6]. The bulk of studies focus on a few popular schemes in Bangladesh, notably BRAC and the Grameen Bank. As programs are rooted in the context in which they are being implemented, the available evidence is limited in its generalizability. To gain a broader picture, there is a need to explore other types of microcredit programs, which vary in their typology [7], across contexts with different epidemiological and socioeconomic profiles. This paper aims to contribute to this body of evidence in the south Indian state of Kerala.

Kerala is widely known for its health achievements despite modest economic growth [8]. Women measure up well in basic capabilities: fertility rates are below replacement levels, life expectancy is 76 years, and literacy rates are over 90% [9]. These achievements are generally attributed to progressive public policies, social reforms by pre-independence rulers, and the earlier influence of matrilineal communities that led to greater freedom among women [10]. Less well known are the challenges faced by women. With an aging population, chronic illness and disability

play more prominent roles in women's lives, yet women's non-fatal health status is not well documented [11]. Rising health care costs and a lack of social protection in Kerala are leading to financial burdens, especially among the poor [12], who are vulnerable to exclusion from health care, indebtedness and impoverishment. Threats specific to women's physical and mental health have also been noted, such as the spread of dowry and dowry-related crimes, domestic violence, and male alcohol abuse [13-14]. Meeting the health needs of women – including their mental health – remains an important challenge in this state.

SHGs were launched in India by the National Bank for Agriculture and Rural Development (NABARD), with the support of non governmental organizations (NGOs); the predicted coverage is at least one third of the rural population by 2008 [15]. SHGs were promoted as an alternative to previous supply-led, top-down poverty alleviation strategies. SHGs adopt the position that the poor are agents and that group members themselves should decide loan criteria and identify their own projects and activities. SHGs are linked to commercial banks and group solidarity is used as collateral, enabling access to resources much larger than the group's savings. In Kerala, a SHG program supported by local government, known as *kudumbrasree*, is also underway. These programs emphasize the empowerment of women [7] and engage in a range of activities, including income-generation, skills training, and women's rights and awareness campaigns. The weekly meetings attended by women also provide the opportunity for social support and sharing of knowledge and skills. But SHGs are not affiliated with any formal health program or service. This provides a unique opportunity to first, assess whether SHG participation – in the absence of formal health programs – influences women's health via the social determinants of health, and second, to explore potential avenues in which SHGs may extend their activities to meet health needs of women in the community.

In this paper, we test two hypotheses derived from a theoretical framework developed elsewhere [16], relevant to the Kerala context. First, we explore whether among poor women, SHG participants will have greater opportunities for health, specifically, compared to non-participants, SHG members will face lower rates of exclusion to health care, be less exposed to health risks, and have higher decision-making agency.

Second, among poor women, SHG members will have better health achievements (self assessed health, markers of mental health) compared to non-participants, mediated through access to health care, exposure to health risks, and decision-making agency.

Methods

Setting and SHG program

Our study was conducted in Kerala's district of Wayanad. The population is largely dependent on agriculture with the main crops being coffee and paddy. The study site was a single Panchayat (territorial decentralised unit) with a land area of 31.75 sq km and a population of 16,110 individuals. Forty-three percent of households were classified as below the poverty line at the time of the study in 2003. Women's health is unevenly distributed in the Panchayat; the prevalence of poor health was higher among women of low socioeconomic position and with low caste affiliations [11]. There is a high density of public and private health care facilities and geographical access to care is evenly distributed among the population. However, poor and vulnerable populations continue to be excluded from accessing quality health care, because high economic costs often preclude those who do not have the ability to pay. In addition, the highly developed for-profit private health care system deters many who do not have the capacity to pay for accessing quality care.

In 1995, SHGs began operating in the area. This initiative emerged from within the community, initially led by a small group of women with local NGO support. Following this, there was an incremental expansion of SHGs. Later, in 2002, *kudumbrasree* was introduced. Both networks follow similar procedures: small groups of women engage in savings and loan activities; their weekly contributions are deposited in a commercial bank. After an initial savings period (typically 6 months), members are eligible to take loans. Each SHG sets their interest rates and procedures for loan allocation. Any woman 18 years and older can participate, whether she is from a household that is below or above the poverty line. Due to the similarities of the NGO supported groups and *kudumbrasree*, we do not discriminate between the

networks in this study (hereafter both networks are collectively referred to as SHGs). Basic information on participation and loans are presented in Table 1.

(Table 1 about here)

Sources of data and study population

Cross-sectional data was used from a household survey implemented by the Centre for Development Studies and the Université de Montréal in 2003, as part of a larger action research project. The project obtained ethical approval by the Université de Montréal Ethics Committee on April 25, 2003. Trained local female surveyors canvassed all 3,352 households identified in the Panchayat. The household questionnaire has several modules, including questions pertaining to demographics, socioeconomic characteristics, health, and SHG participation. One woman from each household, the head or spouse of the head, was also invited to participate in a women's well-being module, which collected information on markers of mental health and women's decision-making agency. To maintain privacy, women were encouraged to respond to this module separately from other household members.

The study sample included non-elderly females (18 to 59 years) who responded to the women's well-being module for themselves. Paniya women, a particularly deprived and socially marginalized group, were not included in the study. Large socioeconomic and cultural differences between groups can increase difficulties in comparing health status when using self reported health [17]. We detected that Paniyas were rating their health in a distinct way that underestimated their health; therefore, we did not include Paniya women in our analysis [11]. Finally, because our hypotheses relate specifically to poor women, we only included women from households below the poverty line.

Measurements

Health determinants and health achievements

The variables used to measure health determinants and health achievements were all converted from their original form (scores and likert scales) into binary variables due to limited distribution. Three health determinants were included. First, exclusion to health care was measured at the household level and used as a proxy for women's exclusion. An exclusion score was constructed based on eight items relating to situations in which household members did not receive appropriate and timely care when ill during the previous twelve months. The score was computed by summing the eight items, reliability of the score was confirmed (Cronbach's alpha=0.75, inter-item correlations ranged between 0.42 to 0.93) and the score was converted into a binary variable (exclusion versus no exclusion). Second, decision-making agency was measured by whether a woman's husband was the sole decision-maker in five key areas. An index was constructed by summing these five items, a score of 1 was given to each answer in which the response was husband or other male. Joint and female decision-making were considered to reflect a high level of decision-making agency and were given the score of 0. The index was found to be reliable (Cronbach's alpha=0.86), inter-item correlations ranged from (0.78 to 0.99) and it was dichotomized (male decision-making versus female or joint decision-making). Third, exposure to health risks was assessed through self reports of exposure at home and at work, this index was converted into binary form (exposed to risk versus no risk).

We used four measures of health achievements: two measures of self assessed health and two markers of mental health. Self assessed health was measured first by asking respondents to rate their overall perceived health based on a five point likert scale, which was converted into a binary variable (very bad and bad health versus good, very good, and excellent health). Second, limitations in activities of daily living (ADLs) was measured by asking respondents to rate their level of limitations for two different sets of activities, physically demanding activities and moderately demanding activities. A single indicator was computed by summing the responses for the two sets of activities and it was converted into a binary variable (limitations versus no limitations). This variable does not capture the full range and variation of activities

that a woman may need to perform to lead a healthy life, but does provide a rough indication of the functional status of the woman. Markers of mental health were based on questions adopted from a survey in South Asia [18]. First, women were asked to report the frequency in which they experienced disturbances in mental peace (almost daily, occasionally, rarely, never), a response of almost daily or occasional disturbances was used as an indication of emotional stress. Second, women were asked about their life satisfaction (unsatisfied, satisfied).

SHG participation

SHG participation was measured as a three level variable in order to consider duration of participation – the longer a woman has participated, the more likely she may benefit [16]. The categories were: early joiners (members for more than 2 years), late joiners (members for 2 years and less), and non-members. In our models for exclusion to health care, we further distinguished non-members between women with and without another household member participating in a SHG because exclusion was measured at the household level; therefore, women who have another household member participating in a SHG could indirectly benefit. We gathered additional background information on SHG participation, including the number and purpose of loans of each woman and the reasons for non-participation at the household level.

Women's characteristics

A variety of indicators can be used to measure socioeconomic position. We used three indicators that we believe are pertinent for Indian agrarian societies: education, employment status, and size of land holdings [11]. We also included the specific caste of the household, which was surveyed and categorized using the conventional three-way classification system adopted in Kerala. Finally, we controlled for age and the position of women in the household (i.e. head or spouse of the head of household).

Data analysis

Data analysis followed a three step process (Figure 1). To illuminate potential selection bias in our sample, we began by examining the socioeconomic and demographic characteristics of SHG participation (S1). Basic cross-tabs with chi-squares were used to develop a portrait of the characteristics of participation, followed by multinomial logistic regression analyses to test whether SHG participation (early joiner, late joiner, non-participant) varied according to these characteristics. We also assessed reasons reported for non-participation and the number of and purposes for loans among SHG members.

We then tested the study's hypotheses: SHG participants face less exclusion to health care, lower health risks, and are less likely to engage in male dominated decision-making (A1); SHG participants have greater health achievements, mediated by the determinants of health examined in A1 (A2). Due to the nature of the variables (categorical or scores with little distribution), a series of binomial logistic regressions were performed for each of the dependent variables. Associations between participation and health determinants (A1) adopted a three step approach to modelling. In step one, only SHG participation was included (Model 0), allowing us to assess the independent effects of SHG participation. Steps two and three adopted a sequential approach: socioeconomic characteristics and caste were entered in the model (Model 1), then, SHG participation was added (Model 2). We examined the sequential models in two ways. First, we employed goodness-of-fit tests to observe whether SHG participation significantly improved Model 1 by testing whether the deviance was statistically significant between Model 1 and Model 2. Second, we examined the odds ratios to assess the associations between being an early or late joiner and each of the women's characteristics and the dependent variable.

Modelling of health achievements (A2) followed a similar approach using four steps. In step one, only SHG participation was entered (Model 0). A sequential approach was then followed: socioeconomic characteristics and caste were entered in the model (Model 1), SHG participation was added (Model 2), and finally the determinants of health (exclusion, decision-making, health risks) were added as explanatory variables

(Model 3). This approach allowed us to test the effect of our variable of interest, SHG participation, on our dependent variables, while assessing the influence of other determinants of health. Deviances comparing Model 1 and Model 2 indicate whether or not SHG participation significantly contributes to the model and deviances comparing Model 2 and Model 3 indicate whether, globally, the block of determinants of health significantly improve the model. Odds ratios were examined as in A1. All multivariate analyses controlled for age and women's position in the household. Data analysis was performed using SPSS version 14.0 [19].

(Figure 1 about here)

Results

From the 4,196 non-elderly, non-Paniya women identified in the Panchayat, we included 2,364 women who responded to the women's well-being module. We then limited the population to women from households below the poverty line, yielding a sample size of 928 women.

Non-participation

There are 336 women who did not participate in a SHG, of which 100 women are from households already containing a SHG participant. The main reason reported for non-participation was financial barriers (over 50%), confirming the need to control for socioeconomic characteristics in our analyses. Three percent of households reported ill-health as a reason for non-participation. Sensitivity analysis showed that including women from these households did not affect our results; therefore, these women were retained in the analysis.

SHG participation and loans

Over half of the women are members of a SHG (150 early joiners and 442 late joiners). Almost 75% of members had received at least one loan (91% of early joiners

and 67% of late joiners). In addition to productive activities, a large number of loans were reported to be used for health purposes (n=181).

SHG participation and socioeconomic and demographic characteristics (S1)

Women are less likely to be a SHG member if they are in the youngest or oldest age category and had less than a high school education (Table 2). There are no significant associations between SHG participation and employment status, household landholdings, or caste.

(Table 2 about here)

The results of the models of SHG participation are presented in Table 3. Having no education is associated with a lower odds of being an early or a late joiner, compared to non-participants (reference group). The odds ratio is lower for early joiners than it is for late joiners, suggesting a gradient between education and SHG duration. Having a primary education is associated with a lower odds of being an early joiner compared to non-participants. Women belonging to the middle age category (31 to 44 years) have a higher odds of being an early or late joiner than younger women (under 30 years). These results indicate that education and age are influencing women's self selection into a SHG and confirms the need to control for these characteristics in our analyses.

(Table 3 about here)

SHG participation and health determinants (A1)

The results of the models of exclusion to health care, exposure to health risks, and male decision-making are shown in Table 4.

Thirty-five percent of women come from households reporting at least one episode of exclusion to health care. The odds ratios in Model 0 suggest that SHG participation is

associated with lower rates of exclusion: compared to the reference group, which in this case is non-participants living in a household without a SHG member, the odds of facing exclusion is significantly lower among early joiners (OR=0.56, CI=0.36-0.86), late joiners (OR=0.57, CI=0.41-0.79), and non-participants who live in a household with a SHG member (OR=0.58, CI=0.35-0.94). Belonging to a household with small landholdings (i.e. less than 50 cents of land) and having OBC affiliations is associated with exclusion (Model 1). Notably, there were no statistically significant differences between forward caste and SC/ST women – who rank the lowest on the caste hierarchy. This finding may be attributed to the poorest tribal group (the Paniyas) not being included in the sample. Model 2 shows that after adjusting for women's characteristics, SHG participation is a significant factor of exclusion to care (deviance = (24.2 (3)). The odds ratios are similar to the estimates of Model 0: the odds of facing exclusion is significantly lower among early joiners (OR=0.58, CI=0.41-0.80), late joiners (OR=0.60, CI=0.39-0.94), and non-participants who live in a household with a SHG member (OR=0.53, CI=0.32-0.90) (M2).

Perceived exposure to health risks was reported by 22% of the women. Exposure to health risks is not significantly associated with any women's characteristic (Model 1) or SHG participation (Model 0 and Model 2).

Globally, there appears to be a high level of decision-making agency, only 12% of women reported male decision-making. As an independent predictor, SHG participation was not significantly associated with decision-making (Model 0). There is a lower odds of reporting male decision-making if a woman is engaged in paid employment (Model 1). Models One and Two are significantly different (deviance=10.4(2)). After adjusting for women's characteristics, we found a lower odds of reporting male decision-making if women are late joiners (OR=0.62, CI=0.39-0.97), but contrary to our expectations, we found no significant associations between decision-making and being an early joiner (Model Two).

(Table 4 about here)

SHG participation and health achievements (A2)

This section presents the results of the binomial logistic regressions for A2 for each of the four health achievements (self perceived health, limitations in ADLs, emotional stress, life satisfaction).

Results for models of self assessed health are presented in Table 5. Thirty-five percent of women reported bad health. We found no associations between self perceived health and SHG participation (Model 0). There are significantly greater odds of reporting bad health if a woman is not engaged in paid employment and comes from a household with small landholdings (Model 1). Even after adjusting for women's characteristics, SHG participation is not associated with perceived health (Model 2). As a block, the determinants of health significantly contribute to the model (deviance=366.0(3)). There are robust associations between bad health and all three health determinants (Model Three). A woman has a significantly greater odds of reporting bad health if she faces exclusion to health care, is exposed to health risks, and reported male decision-making. Limitations in ADLs were reported by 41% of women. The logistic regression results for limitations in ADLs are comparable to those for bad health.

(Table 5 about here)

Table 6 shows the results for the markers of mental health. Eighty-eight percent of women reported emotional stress. SHG participation as a sole independent variable was not found to be associated with emotional stress (Model 0).There is a significantly greater odds of reporting emotional stress if a woman is engaged in paid employment and if she comes from a household with small landholdings (Model One). After controlling for women's characteristics, SHG participation significantly improves the model for emotional stress (deviance=18.6(2)). Inspection of the odds ratios highlight a striking result: although we find no associations between emotional stress and being a late joiner, the odds of reporting emotional stress is significantly lower for early joiners compared to non-participants (OR=0.52, CI=0.30-0.93) (Model

Two). The determinants of health significantly improve the model (deviance=55.8 (3)).

Emotional stress is positively associated with exclusion to health (Model 3). The odds of reporting emotional stress is lower if women reported male decision-making (Model 3). After entering the health determinants in the model, the odds ratios for SHG participation remained constant. This indicates that exclusion to health care and decision-making agency are not mediators between SHG participation and emotional stress, but that other explanatory factors, not included in our models, link participation and emotional stress.

Eleven percent of women reported being unsatisfied in life. Interestingly, the odds of being unsatisfied is significantly lower for early joiners (OR=0.34, CI=0.16-0.73), but not for late joiners (Model 0). There are no statistically significant associations between life satisfaction and women's characteristics (Model 1). Adding SHG participation to the model after controlling for women's characteristics, significantly improves the model (Model 2) and we find a similar pattern of odds ratios found in Model 0, early joiners are less likely to report being unsatisfied than non-members (OR=0.32, CI=0.14-0.71). There are no associations between any of the health determinants and life satisfaction (Model 3).

(Table 6 about here)

Discussion

Limitations of the study

This study has three main limitations that warrant discussion. The first limitation is the cross-sectional design, which heightened the potential of selection bias. Women self select themselves into a microcredit program, thereby posing a threat to internal validity [5]. Women who have decided to join, may exhibit certain characteristics or have preferences, which also affect health, leading to spurious outcomes. As in other similar studies, we cannot guarantee that we were able to adequately address selection

bias, but we tried to minimize this bias in several ways. First, we modelled the relationship between women's characteristics and their participation, then we controlled for these characteristics through multivariate analysis. Second, we restricted our sample to women who came from households below the poverty line, yielding a more homogenous population of women with respect to education levels, employment status, and living standards. These women were also more likely to have similar reasons for deciding whether or not to join a SHG compared to women who are better off. Third, we asked non-participating households why there was no SHG member in the households and sensitivity analysis confirmed that ill health did not affect our main findings. Fourth, our variable for SHG participation allowed for multiple comparisons. Although, we did not find a gradient in health, we did find that for emotional stress, there was a diverging pattern between early and later joiners, justifying our approach.

The second limitation was that we conducted the study in one Panchayat, selecting non-members living in the Panchayat as the controls; therefore, we cannot exclude the possibility of contamination – changes in norms or practices among female members may spill-over to non-members. For example, several SHGs reported that they had used their savings to help out other women in the community who faced health care costs they were unable to pay for. The dilution of the effects of SHG participation reduces our ability to detect differences between SHG members and non-members, but because SHGs exist across Panchayats and urban areas it was not possible to select controls from an area without a SHG program.

The third study limitation is that we relied on measures of self reported health, which are vulnerable to perception bias [17]. Self assessed health status should not, however, be disregarded. Health is a multidimensional construct that can be viewed through multiple lenses. Self-assessed measures address one limited, but relevant, dimension of health. These measures focus on a person's ability to walk, earn a living, or engage in some social activity, instead of on the underlying pathology of a particular disease [20]. It is important, however to identify key social factors when measuring self-assessed health, such as income, education, access to public health facilities, and perceived social stigma [20]. Our prior analysis determined that a deprived and culturally distinct group of tribal

women (the Paniyas) were systematically underreporting their health status [9]; therefore, this group was not included in the study. While this reduced the potential for bias in the study, it also precluded an analysis of the group with the greatest need and the most potential to benefit from a development intervention. However, as it is common among microcredit interventions in which the poorest of the poor do not participate, the Paniyas have low participation rates in SHGs. We would; therefore, have had insufficient power to assess the health benefits of their participation. It is with these limitations in mind that we now discuss the key findings of the study.

Key findings

The primary finding of this study is that SHG participation appears to offer protection against exclusion to health care; regardless of whether a woman is an early joiner or a late joiner. Moreover, non-participants living in the same household as a SHG member benefit. This is likely attributed to the ability of SHG members, and their household members, to acquire loans to cover health costs when in need – suggested by the high number of loans taken for health purposes. These findings indicate that it is not primarily through an increase in income that exclusion to health care is reduced, as might be expected since SHGs are first and foremost an income-generation strategy. Instead, SHGs are unofficially operating as a coping strategy, helping women to overcome financial barriers and budgetary constraints. Microcredit can be considered as an effective risk mitigation strategy that prevent women from being excluded to health care or falling into debt or impoverishment due to the financial burden of health care. This striking result is congruent with findings of a study conducted in Indonesia; households with better access to financial institutions were better able to smooth their consumption against health shocks [21]. Because microcredit was not designed as a mechanism to protect against exclusion to health care, this may be viewed as an unintended benefit of microcredit participation. In the context of Kerala, where there is a considerable burden of health care costs, this offers an important source of social protection.

Before discussing the policy implications, we outline some other findings of this study, beginning with decision-making agency. We expected that the longer a female

participated in a SHG, the less likely she would be to engage in male decision-making, a pattern found in Kerala's neighbouring state of Tamil Nadu [22]. However, male decision-making was reported less among late joiners, but no significant differences were found between early joiners and non-participants. Decision-making agency is difficult to measure and there is no standard approach [22]. Our variable may have inadequately captured the complexities of decision-making agency.

Less exposure to health risks was expected among SHG participants, but no significant differences in exposure to health risks were found between early joiners, late joiners, and non-participants. Although SHG participation may provide opportunities for greater income and informational support that can help to reduce a woman's exposure to health risks [16], this may be insufficient without specific health awareness and education programs (e.g. proper handling of pesticides). Moreover, SHG participants engaging in income-generation activities may face new health risks. We know little about the specific health risks that women are exposed to in the Panchayat; therefore, there is a need to better document these risks and their distribution in the population and to devise appropriate interventions.

After controlling for women's characteristics, SHG participation was not found to display any discernable relationship with perceived health or limitations in ADLs. This may be due to a time lag between the intervention and changes in self assessed health [16], although we expected to see improvements among the early joiners. It is also possible that there were changes in perceptions of SHG participants [23]. It is plausible that participation in a SHG may change perceptions as women's livelihoods improve and they develop greater levels of awareness and self-interest. This, in turn, may lead to a greater potential to assess their own health status. To our knowledge no study has examined microcredit participation and changes in women's perceptions. Finally, we can also not rule out that SHG participation may insufficiently expand women's health opportunities to achieve better self perceived health or improve functionings in their daily activities. Complementary programs or services that address a wider set of women's health determinants may be required, such as awareness campaigns for specific health risks.

Our investigations with respect to markers of mental health paint a different picture. First, among this sample of women, we found a very high rate of women reporting emotional stress, close to 90%, which should be interpreted in light of recent concerns of mental health problems among women in Kerala [14]. Emotional stress was found to be especially concentrated among the poorest women, and more importantly, SHG participation was found to be associated with a lower likelihood of reporting emotional stress and poor life satisfaction. Another study conducted in Bangladesh, did not find a relationship between women's microcredit participation and their emotional stress [18].

An interesting result from our study is that being an early joiner (but not a late joiner) was associated with lower rates of emotional stress. Women who joined earlier have a greater propensity to obtain different kinds of benefits, such as taking up leadership positions. In addition, over time, women may have had opportunities in "breaking the barriers of traditional norms and behaviours ascribed to women by patriarchal society, micro-credit may generate anxiety and tension among its recipients" [18, p. 1964]. We can not, however, exclude the possibility that there may be unobserved heterogeneity between early and late joiners that were unaccounted for in our models. Our study also does not illuminate the specific mechanisms involved in reducing emotional stress – this requires further investigation.

Policy implications

In addition to the potential unintended health benefits of participating in a SHG, microcredit could serve as a springboard to address local health challenges with complementary or parallel programs [24]. Deciding if and how to integrate microcredit with other health programs or services depends on the local context and health needs of the population. Our study illuminates two possible avenues for building health programs onto the existing SHG networks in Kerala.

First, rising health care costs and inadequate access for the poor suggest a need for social protection mechanisms. We found a large number of loans were reported to be used for health consumption, although loans are supposed to be used for productive

activities. The reliance on consumption loans by microcredit participants has been previously noted; various suggestions have been proposed to modify lending practices and incentive arrangements for borrowers [25-26]. Given the robust relationships between SHG participation and exclusion to health care, local government and NGOs may wish to broaden their SHG program to specifically address the health care burden and reduce consumption loans among SHGs. This could be done by "piggybacking" a community health solidarity scheme onto the existing SHG program. Implementing health insurance schemes based on existing community-based or indigenous arrangements have been proposed as one approach to developing community based health insurance [27]. Our action research project currently underway in the Panchayat witnessed a similar demand from the community. SHGs have recently undertaken the development and implementation of a health insurance program. Efforts to launch similar initiatives could benefit other communities in Kerala and warrant further investigation. Such arrangements need to be attentive to design and implementation in order to ensure that the intervention is equitable and effective [28]. And women should be at the forefront in managing and controlling the scheme.

Second, SHG programs already seem to address some determinants of women's mental health via the provision of social support, protection against financial burdens of health care, and opportunities for income generation. Microcredit could serve as a platform for disseminating education and awareness programs on mental health issues.

Conclusions

The connections between microcredit and health support the current trend of aligning poverty and health in development policy [2]. Microcredit is increasingly advocated in the global fight against poverty and the second phase of the Microcredit Summit Campaign, which aims to ensure that 100 million of the poorest have access to microcredit, is underway [29]. SHGs have, thus far, received relatively little attention, but these groups have been gathering force across Kerala and other states. SHGs are not a panacea for development [7], but could contribute to improving the health of poor women. The type and extent of health benefits are closely intertwined with the

context, type of program and the implementation of the program. In Kerala, women tend to have their basic health needs met, but remain vulnerable to other dimensions of ill health due to the persistence of poverty, financial distress, and gender discrimination. Participation in SHGs can help to ensure that poor women are able to adequately access health care without falling into debt or further impoverishment, while promoting their mental health.

Competing interests

None declared

Authors' contributions

This article is based on KM's PhD dissertation. She conceptualized the paper, analyzed the data, and drafted the paper. SH and DN are the principle investigators on the project in which KM's work is affiliated with. SH is KM's PhD supervisor, he guided her in the data analysis and provided substantive comments on the text. DN facilitated KM's field research and provided substantive comments on the text.

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Figure 1: Determinants of SHG participation (S1) and associations (A1,A2) between SHG participation, women's characteristics, health determinants, and health achievements, and variables used in the study

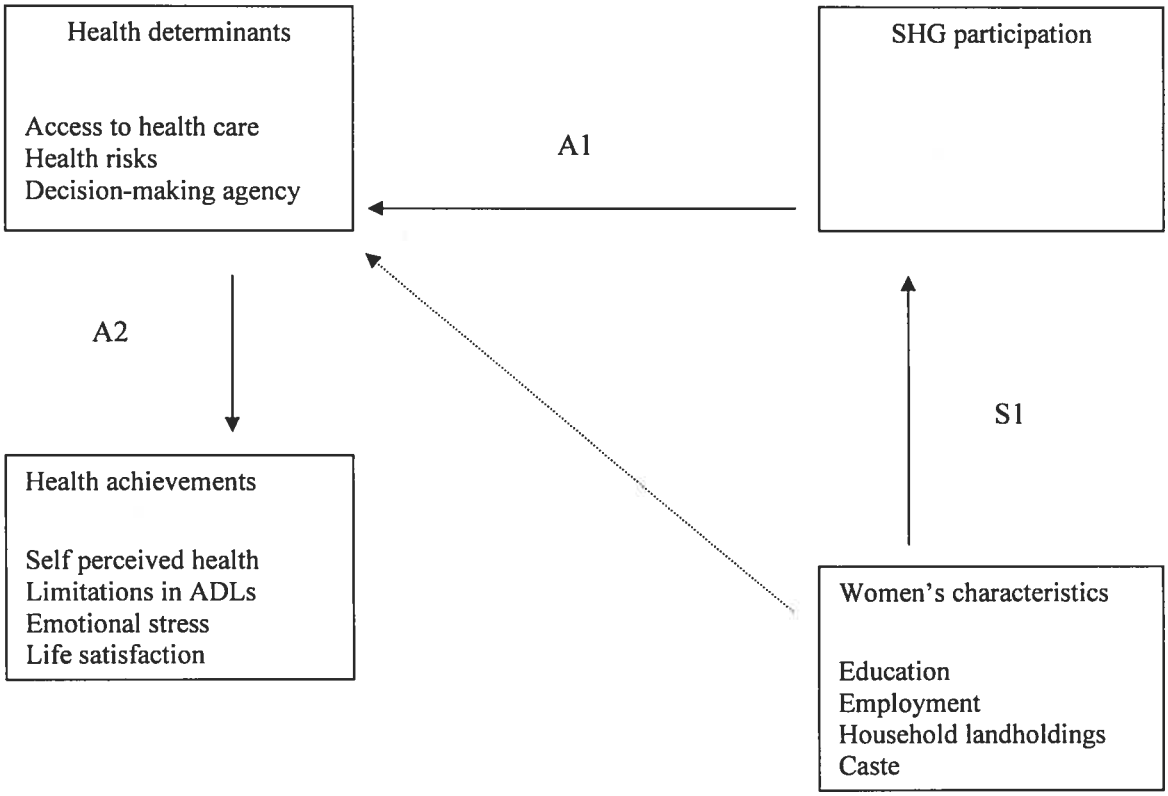

Table 1: Basic data on SHGs: participants, savings and loan activities n Kottathara Panchayat, Kerala, 2003

Number of adult women living in Kottathara[a]	5584
Number and % of adult women participating in SHG	2034 (36%)
Mean contributions to savings per year (Rupees)	650
Median contributions to savings per year (Rupees)	520
% of members who received at least one loan[cd]	73
Mean number of loans taken[d]	1.91
Median number of loans taken[d]	1.00
Mean amount of loans taken (Rupees)[d]	3344.50
Median amount of loans taken (Rupees)[d]	2000.00

Data source : authors.

[a]Adult women here are considered 18 years and older; 18 is the age that women can join SHGs and is also the age of marriage. Females under 18 can participate in 'child' SHGs.
[b] includes women who participate in both kudumbrasree and NGO-supported groups.
[c]This number includes only those women who are eligible for a loan, which is after 6 months of participation.
[d]The recall period is over the duration of women's participation.

Table 2: Demographic and socioeconomic characteristics of women, by SHG participation (percentages)

*p<0.05, **p<0.01, ***p<0.001, tested by chi-square.

Characteristic		Not member N=336	Member N=592	
			Late joiner (N=442)	Early joiner (N=150)
Age of woman (years)***	30 and under (n=227)	38.3	48.5	13.2
	31-44 (n=418)	28.0	52.4	19.6
	45-59 (n=283)	46.6	39.9	13.4
Relationship to head	Head (n=126)	39.7	39.7	20.6
	Spouse (n=802)	35.7	48.9	15.5
Education of woman***	None (n=242)	47.9	43.8	8.3
	Primary (n=194)	37.1	46.9	16.0
	High school+ (n=492)	30.1	49.8	20.1
Employment status of woman	Engaged (n=240)	35.0	44.2	20.8
	Not engaged (n=688)	36.6	48.8	14.5
Size of household landholdings	50 cents or less (n=729)	34.3	48.8	16.9
	> 50 cents (n=199)	43.2	43.2	13.6
Caste of head	ST/SC (n= 363)	38.6	46.6	14.9
	OBC (n=357)	38.7	46.2	15.1
	Forward (n=208)	27.9	51.9	20.2
Total	*(n=928)*	36.2	47.6	16.2

Table 3: SHG participation, by characteristics. Multinomial logistic regression: odds ratios with 95% confidence intervals, using non-member as reference group[a]

	Early joiner (N=150)	Late joiner (N=442)
Age (ref=30 years and under)		
31 to 44	**2.63**	**1.74**
	[1.53-4.53]	**[1.18-2.58]**
45 to 59	1.39	0.92
	[0.73-2.66]	[0.58-1.44]
Relationship to head (ref=spouse)		
Head	1.52	0.92
	[0.85-2.72]	[0.58-1.45]
Education (ref=high school+)		
No education	**0.22**	**0.62**
	[0.12-0.41]	**[0.42-0.94]**
Primary	**0.57**	0.83
	[0.34-0.98]	[0.55-1.24]
Employment (ref=not engaged)		
Engaged	1.33	0.89
	[0.84-2.09]	[0.63-1.27]
Landholdings (ref=>50 cents)		
50 cents or less	1.53	1.41
	[0.90-2.60]	[0.97-2.05]
Caste of head (ref=forward)		
OBC	0.69	0.68
	[0.39-1.19]	[0.45-1.04]
SC/ST	0.91	0.80
	[0.52-1.60]	[0.52-1.24]

[a] Notes: Results in bold are statistically significant, OBC=Other Backward Caste, SC/ST=Scheduled Caste/Scheduled Tribe

Table 4: Models for exclusion to health care, exposure to health risks, limited decision-making agency. Binomial logistic regression: odds ratios with 95% confidence intervals and goodness of fit statistics [a]

	Dependent variables								
	(I) Excluded to health care (yes, n=325, no, n=603)			(II) Exposed to health risk (yes, n=206, no, n=722)			(III) Male decision-making (yes, n=114, no, n=814)		
	M0	M1	M2	M0	M1	M2	M0	M1	M2
Socioeconomic characteristics & caste									
Education (ref=high school+)									
Primary		0.92 [0.63-1.35]	0.90 [0.61-1.32]		1.24 [0.80-1.93]	1.27 [0.82-1.97]		1.23 [0.72-2.11]	1.22 [0.71-2.09]
No education		1.40 [0.96-2.05]	1.35 [0.91-1.99]		1.43 [0.92-2.23]	1.50 [0.96-2.35]		0.73 [0.39-1.34]	0.72 [0.38-1.33]
Employment (ref=not engaged)									
Engaged		0.82 [0.59-1.14]	0.81 [0.58-1.14]		0.96 [0.66-1.39]	0.95 [0.65-1.37]		**0.45 [0.25-0.81]**	**0.44 [0.24-0.79]**
Landholdings (ref=>50 cents)									
50 cents or less		**1.52 [1.05-2.20]**	**1.52 [1.05-2.21]**		1.46 [0.96-2.21]	1.45 [0.95-2.20]		0.89 [0.53-1.50]	0.90 [0.53-1.52]
Caste of head (ref=forward)									
OBC		**1.57 [1.06-2.34]**	**1.52 [1.02-2.27]**		0.67 [0.43-1.05]	0.67 [0.43-1.05]		1.01 [0.57-1.79]	0.96 [0.54-1.72]
SC/ST		1.08 [0.72-1.63]	1.11 [0.73-1.68]		0.72 [0.46-1.14]	0.72 [0.45-1.14]		1.35 [0.76-2.40]	1.31 [0.74-2.34]
SHG participation									
SHG (ref=not member)									
Early joiner	**0.56 [0.36-0.86]**		**0.60 [0.39-0.94]**	1.27 [0.81-1.97]		1.35 [0.84-2.18]	1.00 [0.58-1.74]		0.90 [0.53-1.74]
Late joiner	**0.57 [0.41-0.79]**		**0.58 [0.41-0.80]**	0.90 [0.64-1.27]		0.99 [0.69-1.42]	0.71 [0.46-1.10]		**0.62 [0.39-0.97]**
(Not member but SHG in household)	**(0.58) ([0.35-0.94])**		**(0.53) ([0.32-0.90])**						
Chi-square (df)	13.3 (3)**	24.3(9)**	36.4(12)***	2.3(2)	51.6(9)***	53.6(11)***	2.8(2)	51.3(9)***	56.5(11)***
-2 log likelihood	1188.6	1177.6	1165.5	980.2	930.9	928.9	688.7	640.2	635.0
Deviation		*24.2(3)****			*4.0(2)*			*10.4(2)***	

[a] Notes: Models are adjusted for age and women's household position. Results in bold are statistically significant, *p<0.05, **p<0.01, ***p<0.001
OBC=Other Backward Caste, SC/ST=Scheduled Caste/ Scheduled Tribe.

Table 5: Models for self assessed health. Binomial logistic regression: odds ratios with 95% confidence intervals and goodness of fit statistics [a]

	Dependent variables							
	(I) Bad health (yes, n=321, no, n=607)				(II) Limits in ADLs (yes, n=377, no, n=551)			
	MO	M1	M2	M3	MO	M1	M2	M3
Socioeconomic characteristics & caste								
Education (ref=high school+)								
Primary		1.18 [0.79-1.76]	1.20 [0.80-1.79]	1.11 [0.70-1.75]		1.31 [0.89-1.92]	1.31 [0.89-1.92]	1.26 [0.83-1.91]
No education		1.49 **[1.00-2.23]**	**1.53 [1.02-2.31]**	1.37 [0.87-2.17]		**1.83 [1.24-2.70]**	**1.82 [1.23-2.71]**	**1.71 [1.12-2.62]**
Employment (ref=not engaged)								
Engaged		**0.62 [0.43-0.88]**	**0.61 [0.43-0.87]**	**0.61 [0.40-0.91]**		**0.64 [0.46-0.91]**	**0.65 [0.46-0.91]**	**0.68 [0.47-0.98]**
Landholdings (ref=>50 cents)								
50 cents or less		**1.55 [1.06-2.27]**	**1.55 [1.06-2.26]**	1.39 [0.91-2.13]		1.38 [0.96-1.98]	1.37 [0.95-1.98]	1.22 [0.82-1.80]
Caste of head (ref=forward)								
OBC		1.00 [0.66-1.52]	1.00 (0.66-1.52)	1.15 (0.71-1.85)		0.80 (0.54-1.19)	0.80 (0.54-1.19)	0.81 (0.53-1.25)
SC/ST		0.93 [0.61-1.43]	0.93 [0.60-1.43]	1.04 [0.64-1.70]		0.71 [0.47-1.06]	0.71 [0.47-1.07]	0.72 [0.46-1.12]
SHG participation								
SHG (ref=not member)								
Early joiner	0.97 [0.65-1.44]		1.22 [0.78-1.90]	1.17 [0.70-1.94]	0.79 [0.53-1.18]		0.97 [0.62-1.50]	0.91 [0.56-1.46]
Late joiner	0.77 [0.57-1.04]		0.93 [0.67-1.29]	1.02 [0.70-1.47]	0.94 [0.70-1.25]		1.14 [0.83-1.57]	1.29 [0.91-1.81]
Health determinants								
Exclusion *(ref=no exclusion)*								
Exclusion				**1.94 [1.37-2.74]**				**2.02 [1.47-2.78]**
Health risks *(ref=no risks)*								
At least one risk				**10.3 [6.87-15.3]**				**5.60 [3.84-8.17]**
Decision-making *(ref=female/joint)*								
Male				**2.55 [1.57-4.16]**				**2.23 [1.41-3.52]**
Chi-square (df)	3.21(2)	143.0(9)***	144.6(11)***	327.6(14)***	1.36 (2)	129.5(9)***	130.5(11)***	252.5(14)***
-2 log likelihood	1193.7	1053.9	1052.3	869.3	1252.3	1124.1	1123.1	1001.1
Deviation			*3.2(2)*	*366.0(3)****			*2.0(2)*	*244.0(3)****

[a] Notes: Models are adjusted for age and women's household position. Results in bold are statistically significant, *p<0.05, **p<0.01, ***p<0.001,
OBC=Other Backward Caste, SC/ST=Scheduled Caste/Scheduled Tribe.

Table 6: Models for markers of mental health. Binomial logistic regression: odds ratios with 95% confidence intervals and goodness of fit statistics [a]

	Dependent variables							
	(I) Disturbances in mental peace (yes, n=820, no, n=108)				(II) Unsatisfied in life (yes, n=99, no, n=829)			
	MO	M1	M2	M3	MO	M1	M2	M3
Socioeconomic characteristics & caste								
Education (ref=high school+)								
Primary		1.07 [0.58-1.96]	1.02 [0.56-1.88]	1.07 [0.57-1.98]		1.18 [0.66-2.11]	1.10 [0.61-1.97]	1.10 [0.61-1.97]
No education		0.86 [0.48-1.52]	0.76 [0.42-1.38]	0.71 [0.39-1.31]		1.53 [0.85-2.72]	1.32 [0.73-2.38]	1.30 [0.72-2.36]
Employment (ref=not engaged)								
Engaged		**2.04 [1.13-3.67]**	**2.17 [1.20-3.92]**	**2.29 [1.21-4.04]**		1.47 [0.92-2.35]	1.51 [0.94-2.43]	1.57 [0.97-2.54]
Landholdings (ref=>50 cents)								
50 cents or less		**1.90 [1.16-3.12]**	**1.95 [1.18-3.20]**	**1.80 [1.08-3.00]**		0.85 [0.50-1.44]	0.89 [0.52-1.52]	0.86 [0.50-1.48]
Caste of head (ref=forward)								
OBC		1.20 [0.66-2.20]	1.20 [0.65-2.21]	1.14 [0.62-2.12]		1.09 [0.60-2.00]	1.06 [0.58-1.94]	1.04 [0.56-1.91]
SC/ST		0.85 [0.48-1.52]	0.85 [0.47-1.52]	0.86 [0.47-1.56]		0.77 [0.40-1.45]	0.76 [0.40-1.45]	0.75 [0.39-1.43]
SHG participation								
SHG (ref=not member)								
Early joiner	0.64 [0.38-1.10]		**0.52 [0.30-0.93]**	**0.52 [0.29-0.94]**	**0.34 [0.16-0.73]**		**0.32 [0.14-0.71]**	**0.32 [0.14-0.72]**
Late joiner	1.29 [0.81-2.04]		1.26 [0.78-2.02]	1.34 [0.82-2.18]	0.65 [0.42-1.00]		0.68 [0.43-1.08]	0.71 [0.45-1.12]
Health determinants								
Exclusion *(ref=no exclusion)*								
Exclusion				**2.98 [1.73-5.13]**				1.23 [0.79-1.93]
Health risks *(ref=no risks)*								
At least one risk				1.56 [0.86-2.85]				1.13 [0.69-1.87]
Decision-making *(ref=female/joint)*								
Male				**0.52 [0.31-0.89]**				1.37 [0.70-2.68]
Chi-square (df)	6.29(2)*	27.7(9)***	37.0(11)***	64.9(14)***	10.0 (2)**	22.4(9)**	32.1(11)***	34.0(14)**
-2 log likelihood	661.2	639.8	630.5	602.6	620.1	607.7	598.0	596.1
Deviation			*18.6(2)****	*55.8(3)****			*19.4(2)****	*3.8(3)*

[a] Notes: Models are adjusted for age and women's household position. Results in bold are statistically significant, *p<0.05, **p<0.01, ***p<0.001,
OBC=Other Backward Caste, SC/ST=Scheduled Caste/Scheduled Tribe.

CHAPTER 6

DISCUSSION

In this chapter I return to the central theme of this dissertation, poverty and health. I begin by outlining the main limitations of this dissertation. I then discuss my use of the capability approach and the thorny issue of its operationalization. This is followed by an overview of the key findings and contributions of my work on social inequalities in women's health and the role that microcredit can play as a public health intervention. I conclude by outlining a personal research agenda stemming from this dissertation.

1.0 Limitations

The limitations of this dissertation can be categorized into two main groups. The first group encompasses the drawbacks related to the cross-sectional design. These limitations have been discussed in Articles 2 and 3, but further discussion is warranted in order to understand how the results of the study may have been affected. The cross-sectional design did not permit an assessment of the sequencing of events, including the direction of the relationship between certain variables. In Article 2, the direction between social factors and women's health could only be ascertained for variables in which there was *a priori* knowledge that these variables could not be affected by health (i.e. caste affiliation). It was not possible to determine whether a woman's employment status influences her health or whether her health affects her employment status or if there is a bi-directional relationship.

In attempting to link an intervention and health outcomes in Article 3, the cross-sectional design raises considerably greater concerns. The outcomes of the study could have been influenced by unobservable characteristics between non-participants and participants or between early joiners and late joiners. If women who decided to join a SHG were, on average, more likely to have pre-existing health conditions than women who decided not to join, this could influence the study's outcome by lowering the likelihood of detecting an improvement in health conditions among members. This could explain the inability of the study to demonstrate improvements in health among members. On the other hand, if the

women who did not join carried an initial heavier burden of ill health compared to women who joined, then results may have inflated the positive effect of SHG participation on the health of members (reverse causality). However, the survey identified the households reporting ill health as a reason for non-participation and the results of the sensitivity analysis suggests that reverse causality was not likely a factor in this study (Annex F). In sum, without knowing a woman's prior health condition, the likelihood of detecting true health benefits – self assessed health or markers of mental health – was diminished. Moreover, this was likely exacerbated by a potential time lag between SHG participation and improvements in health. These issues may explain the lack of any discernable improvements in health in the study.

Despite limitations of a cross-sectional design it is generally the most feasible option, especially in resource poor areas. A cross-sectional design can, however, be improved by the inclusion of questions that explicitly address time sequences. For example, in Article 3, it would have been useful to have information on certain indicators prior to a woman joining a SHG, such as her employment status or levels of autonomy. This type of information would have better linked opportunities for health prior to a woman joining a SHG with her situation at the time of the survey.

The second group of limitations in the dissertation concerns the choice of variables and approaches to data analysis. In Article 2, stratified analysis was used as an approach to present the interactions between caste and socioeconomic position in an easily understandable fashion. This, however, needs to be balanced by the trade-off I made in terms of the efficiency of this approach. A three level multilevel multinomial analysis including multi-categorical independent variables yielded a small numbers of cases in some wards. This may have produced less precise estimates compared to treating caste as an independent variable and examining interactions with socioeconomic position, which may have also permitted more rigorous estimation techniques (e.g. second order MQL, PQL). In

addition, I used models that did not retain the full information of the response variables, based on the ordinal structure of the original variables. Failing to use an ordered approach for ordered data can lead to a loss of efficiency, however it is unlikely to lead to biased results and because the assumption of parallel slopes was not met in the study, losing efficiency was the most prudent strategy to adopt (Borooah, 2002).

In Article 3, I would have hoped to better explore the full pathways from microcredit participation to health achievements as outlined in my theoretical framework. But to accomplish this I would have needed a data set that included a broader array of variables with the necessary information to measure complex constructs (e.g. sense of coherence) and longitudinal data to better understand the dynamics. This type of project would have required a more extensive surveying tool best implemented by a multidisciplinary research team. Among the variables that I did have access to, I was further constrained because these variables were either categorical or indexes with little distribution. I was unable to perform structural equation modelling, a more efficient data analysis technique enabling the simultaneous testing of associations, thereby presenting stronger evidence on the theorized pathways. Moreover, the binary response variables did not capture the broader continuum in which health is generally conceptualized. These are important drawbacks that precluded a richer more in-depth understanding of the pathways. My work can, however, be considered as an initial step towards testing the theoretical framework and exploring pathways as opposed to only focussing on a limited set of outcomes.

Finally, information was not available on the level of control over loans exerted by women and the extent to which loans reflect women's preferences. More precise information on how loans were used would have highlighted whether women controlled credit within their households or, as some authors have shown in Bangladesh, were appropriated my male relatives (Goetz and Gupta, 1995). Given the relatively low levels of male decision-making

reported by women and the high literacy levels, it is likely that women exerted an important degree of control over the loans.

2.0 A capability approach to health: the challenge of its operationalization

The capability approach to health has been advocated by Sen and others (Rugers, 1998; 2004; Sen, 1999; 2002b) and the theoretical relevance of the capability approach has been discussed by various public health researchers (Frohlich, Corin & Potvin, 2001; Mooney, 2005; Perreira, 1993), but there has been little insight into how we could practically apply the capability approach to public health issues. In my attempt to adopt the capability approach, I encountered a challenge common to applications of the capability approach more generally – its operationalization. The informational basis required to put the capability approach into practice is demanding: "in order to construct even individual capability sets much less compare capabilities we need a great deal of information which will not be straightforward to obtain (Alkire, 2002, p. 8). One of the key aspects raised in the literature about its operationalization is the identification of the relevant functionings and capabilities to be assessed[26]. As a public health researcher, the decision to focus on health capability is obvious. In addition, health is almost universally accepted as a core dimension of development or central human capability among development experts (Alkire, 2002; Nussbaum, 2000; 2003; Robeyns, 2003; Sen, 1998; 1999b; Stewart, 1985; Qzilbash, 1996) and by the poor themselves (Narayan, 2000).

The main operationalization challenge in this study was measuring a woman's health capability – an individual's opportunity to achieve good health. Measuring a capability is more difficult than measuring an achieved functioning (Robeyns, 2000; 2005).

[26] This issue has been discussed extensively and is the source of debate among capability theorists (Nussbaum, 2000; 2003; 2005; Sen, 2005), Nussbaum promotes the need for a universal list of central capabilities, whereas Sen has purposefully avoided making such a list, believing instead that the question of relevant capabilities should be pursued through democratic means.

Achievements tend to be observable (even if only indirectly), but a woman's capability includes unobservable facts: the opportunities that she had but chose not to take. A woman's capability involves choices; therefore, these choices need to be evaluated when making interpersonal comparisons. These difficulties have not deterred researchers from pursuing various ways to operationalize the capability approach, although most researchers tend to measure functionings and not capabilities *per se* (Robeyns, 2000). Sen argues that health achievements are a good indication of health capability because women tend to choose more and better health when faced with the opportunity (Sen, 2002b). This is supported by Michael Grossman's health production theory, which posits that individuals seek to maximize their health given their constraints (Grossman, 1972). A vast body of work, including Article 2, demonstrates the need for and utility of assessing health achievements and the distribution of these achievements as a means of identifying the sickest and most vulnerable in a population. Although our ultimate objective is to improve the health status of the poor, exclusively focussing on health achievements could become problematic, to some extent, because of the complex biological and genetic factors that determine health that are beyond public health policies and interventions. Also, the freedom associated with the pursuit of well-being achievements is important. A woman may, for example, choose to continue participating in a microcredit program despite objections from her husband, increasing her vulnerability to domestic violence, while reaping the benefits of greater sense of self worth and life satisfaction that contribute to better mental health. Assessing health capability in addition to health achievements seems to me to be a worthy project. But the dilemma remains: how do we measure health capability?

Although I was not able to directly measure a woman's health capability, this dissertation offers an initial step towards its operationalization: I propose that there is a clear distinction between a health capability and a determinant of health[27]. In Article 1, I argued that a health

[27] I am indebted to Kate Frohlich for raising this point.

capability is the opportunities that a woman has to achieve health; these opportunities are generated by the proximate determinants of health. A health capability expands by two separate but complementary processes: production and conversion. I differentiated health determinants as either operating as inputs into the production of health (e.g. access to health care) or as factors that convert inputs into health capability (e.g. autonomy). Centralising the health capability as the evaluative space explicitly acknowledges what is often overlooked in public health interventions: inter-personal heterogeneity. Not all individuals have the same capacity to benefit from a similar bundle of resources. Distinguishing determinants that influence production from those determinants that influence conversion may help us to sort out why some participants benefit from interventions and others do not. This distinction requires further scrutiny. It may be useful to assess whether or not we should prioritize those interventions that concomitantly increase health promoting resources and the ability to convert these new resources into health capability over those interventions that affect only production or conversion. There is also a need to go beyond the somewhat simplistic pathways described in the theoretical framework to a deeper understanding and analysis of the pathways as they operate in the real world, including the optimal sequencing of production and conversion factors. Should increasing production and conversion operate in concert or should conversion factors be enhanced prior to increasing production or vice versa? How do the different pathways interact? What role do factors, such as social stratification, play in moderating pathways? These and other questions require further study.

By applying the theoretical framework to my own empirical investigations in Article 3, I was able to assess determinants of health that affected production (exclusion to health care, exposure to health risks) and conversion (decision-making agency). I was, however, unable to exploit the framework to its fullest within my study because only one of the three determinants of health, exclusion to health care, was clearly associated with SHG participation. Although this is an exciting finding in terms of my research question

(discussed in detail below), it was insufficient by itself to explore how a production factor operates in conjunction with conversion factors. For example, how might conversion factors, such as greater awareness or better disease self management, interact with access to health care to produce more and better health?

This leads to a limitation of my theoretical framework raised by my empirical analysis: distinguishing production and conversion factors identifies some of the nuts and bolts of a health capability, but does not clarify how to measure a health capability *per se*. I do not, however, consider that this is an indication that a health capability cannot be measured. My study was based on an existing household survey data that was not devised to measure a woman's health capability. To determine how to best measure health capabilities, new approaches and methodologies will need to be investigated. This may be inspired by some of the techniques being used in the economic and development literature, such as capability cost-benefit analysis (Alkire, 2002), capability asset mapping (Jasek-Rysdahl, 2001), or narrative accounts (Nussbaum, 2000).

Finally, my work examined the well-being aspects of the capability approach, but what about agency? An agency analysis may include assessing which health goals a woman prioritizes and how she will pursue these goals. The capability approach stresses that regardless of whether one is attempting to evaluate well-being achievement, well-being freedom, agency achievement, or agency freedom, the informational basis should be based on functionings and capabilities. "A focus on agency will always transcend an analysis in terms of functionings and capabilities, and will take agency goals into account" (Robeyns, 2005, p. 103). Thus far, however, the literature has tended to focus on well-being and capability expansion, including Sen's own empirical work. The relationship between agency and capability expansion remains vague among the writings of Sen and other capability scholars and only recently has there been an attempt to go beyond mere descriptions of agency (Alkire, 2005). To help clarify agency aspects of the capability

approach, we could follow other scholars, who have attempted to enrich our understanding of agency and how it can be measured by drawing on the work of sociologists (Frohlich, Corin & Potvin, 2001) and psychologists (Alkire, 2005).

3.0 Poverty and health revisited

3.1 Social inequalities in women's health

Despite the explosion of studies documenting social inequalities in health, we know relatively little about health disparities in India, especially among women. The findings of Article 2 draw attention to two distinct but mutually reinforcing sources of inequalities: socioeconomic position and caste. Regardless of the choice of socioeconomic indicator used – household land holdings, education, employment status – poorer women are more likely to report bad health or limitations in their activities in daily living (ADLs). The use of multinomial logistic regression further demonstrated that a gradient exists between socioeconomic position and self assessed health. The lower the rating for either self-perceived health or limitations in ADLs, the more robust the association was with low education and small household landholdings. The findings also demonstrated that women who come from lower caste groups are more likely to report poor health than forward caste women. By stratifying the sample by caste, I further demonstrated that although there is a degree of correspondence between caste and socioeconomic position, they do not perfectly overlap. Low caste is also associated with social exclusion and discrimination. While the extreme versions of caste discrimination have been drastically reduced (e.g. untouchability is no longer practiced in Kerala), there appears to be some residual negative social disadvantages, although, in this study I cannot ascertain the specific pathways to poor health (e.g. lack of social opportunities, a sense of inferiority, etc.).

Because caste is structural (unlike socioeconomic position), we know that health does not influence caste; the lowness of caste or tribe leads to poor health. Although sociologists and economists have explored caste disparities, little attention has been paid to caste inequalities in health. My study demonstrates that caste should be considered in addition to socioeconomic status. Although we cannot modify caste, public interventions can contribute to reducing caste discrimination and help to remove caste barriers to social opportunities.

I was also able to explore caste in a unique way in this study. The Kottathara survey collected information on the specific caste or tribal affiliation of each household allowing the opportunity to explore heterogeneity among the traditional categories in the caste hierarchy, in particular examining heterogeneity among the lower caste group composed of Scheduled Castes and various tribal groups. Data on caste/tribe affiliations – if available at all – is generally confined to whether or not there are SC/ST affiliations.

What if I had not considered caste in this dissertation? First, Paniya women would have been included in my analyses leading to diverging results. Paniya women would have been classified as poor, but would have reported good health. Consequently, the relationship between poverty and health would have been artificially dampened. Second, the double deficits associated with being from a low caste and having low socioeconomic position would not have been observed, thereby underestimating the vulnerability of certain groups of women. This has important policy implications: we need to ensure that women who are poor and of low caste have access to interventions, the Indian public health challenge is not only to raise aggregate levels of population health, but also to address social inequalities in health.

Demonstrating socioeconomic and caste inequalities in health in Kerala has two important implications. First, although women in Kerala are better off relative to women in other

Indian states with respect to their basic health needs and elevated status, this does not prevent women from becoming entangled in the cycle of poverty and ill health. Poor self perceived health, a broad measure of health and an important predictor of morbidity, and limitations in daily activities are concentrated among poor women. Poverty continues to limit women's capability to achieve good health. Moreover, because sickness also reduces women's productivity and increases health care needs, this can exacerbate the poverty ill health cycle, leading to further impoverishment – a pressing problem in Kerala.

The romanticized view of this state tends to veil the realities faced by women. Despite progressive social reforms, Kerala has yet to shed the overarching systems that envelops the country, namely patriarchy and caste, which continue to shape the lives of women (Kodoth & Eapen, 2006; Nabar, 1996). The results of Article 2 demonstrate that caste is a determinant of women's health. Because I did not include men in this study the influence of patriarchy is not evident, although I have shown elsewhere that women, regardless of caste or socioeconomic position, are more likely to report poorer health than their male counterparts (Mohindra et al., 2005). Deeper discussions on the intersection between poverty, gender, and caste warrant further investigation.

The second implication of demonstrating social inequalities in women's health in Kerala is related to the generalizability of these findings to the rest of India. Due to the relatively egalitarian context, it is likely that socioeconomic and caste inequalities are muted compared to other regions. Similar studies carried out in other states will probably uncover social inequalities of a much larger magnitude.

3.2 Poverty and health: an interventionist perspective

Until recently, public health researchers have been predominantly concerned with what causes disease rather than evaluating public health interventions (Rychetnik, Frommer,

Hawe & Shiell, 2006). Now, there is a burgeoning literature on health impact assessment as a tool for investigating interventions that fall outside of the health sector (cf. Krieger et al., 2003; Mindell, Boaz, Joffe, Curtis, and Birley, 2004). However, little empirical research has been conducted in India and other low-income countries (Davenport, Mathers & Parry, 2006). In this dissertation I argued for such consideration to be extended to local poverty alleviation interventions and because of the potential to affect women's underlying determinants of health, I proposed that microcredit, should take central stage of these efforts.

3.2.1 Microcredit can contribute to breaking the poverty ill health cycle...

In Article 3, I explored microcredit as one potential intervention to help break the cycle of poverty and ill health and reduce social inequalities in health. Specifically, I tested two hypotheses. First, I examined whether SHG participation was linked with lower rates of exclusion to health care, less exposure to health risks, and lower rates of male dominated decision-making. Second, I explored whether health achievements (self assessed health and markers of mental health) were higher among SHG participants compared to non participants. The hypotheses were tested among women who were either heads or spouses of the heads of households. These women were likely to have more senior roles in the household and greater levels of autonomy compared to other women. There is a need for further study to examine the study's hypotheses among other women, which may lead to diverging results. For example, lower levels of autonomy among younger women who have never married or who live with their in-laws may, on the one hand, be less likely to join a microcredit program if they are not permitted to join, but on the other hand, may benefit more by participating in a SHG, where they have the opportunity to enhance their financial autonomy and decision-making powers.

My findings from Article 3 were mixed. Although I did not confirm all the elements in my hypotheses, I found evidence to suggest that SHG participation can contribute to breaking the poverty ill health cycle in rural Kerala along certain dimensions. The primary finding is that SHG participation offers protection against exclusion to health care. There is also some evidence suggesting that SHG participation can help to promote women's mental health. In the section that follows, I discuss the broader implications of these two findings in relation to current trends in rural Kerala.

During the twentieth century in Kerala, one of the major contributing factors of the rapid decline in mortality and rising life expectancy was the state's commitment to the expansion of health facilities (Bhat & Rajan, 1997; Ratcliffe, 1978). The extension of primary health care centres and subcentres throughout the state were particularly effective in controlling infectious diseases and improving maternal and child health. Geographical access is not, however, the only dimension of access to health care (Haddad & Mohindra, 2002); rising out-of pocket costs for public and private health care services can drive households into poverty and exacerbate poverty among the already poor. This trend has been referred to as the medical poverty trap and has several consequences, including exclusion to health care, long-term impoverishment, and the irrational use of drugs (Whitehead, Dahlgren & Evans, 2001).

A lack of a national health insurance program leaves the poor vulnerable to high health expenditures when faced with illness (Krishnan, 1999). In Kerala, escalating health care costs increases financial stress among those households where a family member falls ill (Kunhikannan & Aravindan, 2000). Over 15% of non-poor individuals who were hospitalized in Kerala, became poor because of their medical costs (Peters et al., 2002). In Kottathara Panchayat, 3.6% of the households reported health expenditure to be over 50% of their annual income and 20% of households spent more than 20% of their income on hospitalization, signalling catastrophic health expenditures (Mohindra et al., 2005).

Untreated morbidity and delayed treatment negatively affect a person's health and can have financial consequences, such as being forced to seek more expensive care when the health situation becomes an emergency (Whitehead, Dahlgren & Evans, 2001). Longer recovery periods reduce productivity, which can lead to further impoverishment.

In this context, finding a link between SHG participation and lower exclusion rates is especially encouraging. Although SHGs are primarily an income generation strategy, I expected that an increase in income would improve women's access to care. Yet, it appears that SHGs reduce exclusion by operating as an informal risk management strategy, helping women to overcome financial barriers and budgetary constraints. Because SHGs are supposed to provide loans for productive purposes, women are informally sanctioning loans for the purpose of health consumption. In the field, SHGs reported that a loan for health consumption would be sanctioned, but the group would officially record the purpose of the loan as productive activities. Higher literacy rates among women in Kerala have contributed to SHGs being relatively autonomous bodies. Each SHG maintains their own records and manages their finances. In this situation, the women themselves devised and executed a plan to overcome the pressing issue of financial burdens of health care costs. Also, women take out loans based on terms established by the members themselves, which includes flexible repayments schedules, thereby offering a safe and relatively stress-free environment. This contrasts with having to rely on moneylenders – typically men who control the terms, interest rates (generally exorbitant), and repayment schedules – which has been identified as an important psychological stress among women (Patel, 2001).

Given this situation, it would be relevant to formally attach the SHG to a community health insurance scheme (CBHI), by piggybacking a health insurance program onto the existing SHG networks. We are currently supporting such an initiative in our action research project in the Panchayat. There are several attractive features of the SHG program in rural Kerala, including its high density coverage, the choice of network to participate in (NGO or

government-supported), and the sustainability of the groups (even if a SHG dissolves a woman can join another group). Furthermore, participants are already knowledgeable about savings and credit, thereby facilitating their understanding of how a health insurance scheme operates. The idea of the Kottathara CBHI originally emerged during discussions with community representatives and women engaged in SHGs during the initial stages of our project. Women reported that their families were regularly confronted with various forms of temporary or permanent exclusion and they were willing to contribute additional funds to their weekly group savings towards developing a community insurance scheme – they had already been thinking of proceeding towards achieving this goal. The formal mechanisms of the CBHI will provide a more sophisticated protection against health shocks than the informal mechanisms of the SHG. The CBHI provides an institutional non-probabilistic response to the uncertainty of illness (Evans, 1984) that averages risks and costs, which could otherwise be too large for individuals to address on their own. This redistributes the burden of health cost from the sick to the healthy and from the wealthy to the poor (even if premiums are equal for rich and poor, illness is more prevalent among the latter). Formalizing the CBHI may also improve the effectiveness of the SHG since members can shift loan use from health consumption to productive activities.

The second set of findings – although not as robust and requires caution in interpreting results because I did not measure mental health, but rather markers of mental health – are important in drawing attention to a public health issue in Kerala, poor mental health. There is a tendency to focus on poverty in its relation to physical disease but mental health is also relevant (Patel & Kleinman, 2003; Patel et al., 1999; WHO, 2001). In my study I found that there was a high rate of women reporting emotional distress, and among this group of women, the poorest women (i.e. women from households owning little land) were more likely to report emotional distress. Vikram Patel (2001) argues that in the Asian context, there is a cycle of poverty and mental ill health. Poverty causes emotional distress due to insecurity: the stress of making ends meet, coping with emerging difficulties and crises, and

indebtedness and dependency on moneylenders. The lack of gainful employment can lead to feelings of hopelessness and despair and inadequate social support can increase the risk of depression. Illiteracy or lack of education is also found to be a consistent risk factor for common mental disorders in India and other low-income countries (Patel, 2001; Patel & Kleinman, 2003). A lack of education is correlated with reduced opportunities to access resources. Poor mental health can also exacerbate poverty (Patel, 2001). This direction operates through two main mechanisms. First, mental disorders can be disabling, reducing productivity and the ability to perform daily activities. Second, individuals with mental health problems tend to receive more health care and are less likely to have their costs for health care covered by the government.

The Kerala context is interesting due to the high literacy rates and educational achievements among women in this state. The educational achievements are often adduced as an indication of women's elevated status leading to high levels of well-being. Yet, their educational achievements have not translated into anticipated levels of autonomy, gainful employment, self actualization, and freedom from domestic violence (Eapen & Kodoth, 2003; Kodoth & Eapen, 2006; Panda & Agarwal, 2005). Education is often used as a means to enhance female "marriageability" and after marriage women are often expected to refrain from working outside of the home (Eapen & Kodoth, 2003). There are also few employment opportunities that will meet levels of education and expectations, women in rural Kerala are often confined to working as an agricultural labourer. The discrepancy between education levels and real opportunities to be gainfully employed has been described as a major source of emotional distress among women[28] (Haliburton, 1998). An intervention that provides opportunities to engage in new forms of income-generation activities, such as small businesses, may help to bridge the education employment divide.

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[28] Haliburton has also proposed that this is an explanation for the high levels of suicide in Kerala; Kerala's suicide rates are more than three times the national rate and 50% higher than the second highest state.

SHGs may also help promote women's mental health by an expanded social support network and an ability to acquire loans without relying on moneylenders.

3.2.2 ...but microcredit is not a panacea

History has taught us that there is no magic bullet solution to improving the health of the poor nor is there any clear path to ending poverty (Amrith, 2004; Easterly, 2006). Microcredit is "not a magic sky-hook that reaches down to pluck the poor out of poverty" (Matin, Hulme & Rutherford, 2002, p. 273), rather it helps to avert deprivation in specific ways, for certain groups. Microcredit tends to meet the needs of the entrepreneurial poor, who have their basic needs met, but lack the means to escape out of poverty; this group is more apt to risk taking, investing in new technology, and using their loans for productive purposes (El-Sohl, 1999; Mosley & Hulme, 1998). The poorest of the poor do not have the necessary resources to meet their basic needs, the priority is survival, which is reflected in their almost exclusive use of loans for consumption purposes – if they manage to join a scheme. Although microcredit programs are generally successful in reaching households below the poverty line, the poorest of the poor are often excluded (Mosley & Hulme, 1998; Kabeer, 2002). Finally, microcredit tends to function well in certain contexts but not in others. For example, the SHG program is more widespread in the south of India compared to the north, which has been attributed to a higher density of NGO programs in the south (Narayana, 2002) and possibly other contextual factors, such as literacy rates, levels of inter-personal trust, and patriarchal norms.

In Kottathara, I found that among my population in Article 3 (below the poverty line, non Paniya population), SHGs were reaching poor and low caste women – although uneducated women were less likely to participate after controlling for caste and other indicators of socioeconomic position. In this context, education is probably less an indication of socioeconomic position as it is an indication of greater levels of awareness and a tendency

towards entrepreneurial activities. This population, however, did not include the most deprived group, the Paniyas. In examining SHG participation rates among all the households in the Panchayat (below and above the poverty line, Paniya and non-Paniyas), I found that compared to the other social groups, the Paniyas were more than two times less likely to have a household member participating in a SHG (unpublished data). Moreover, over 60% of Paniya households reported that they were willing to participate and cited the main reason for their non-participation as financial barriers. These results suggest that non-participation among the Paniyas is predominantly a function of their deprivation and is not related to cultural differences. This type of exclusion requires additional strategies to be put into place in order to help vulnerable groups meet their basic needs and possibly also subsidize their participation in microcredit groups.

Microcredit also does not address the larger economy or the effects of globalization. Loans taken by microcredit participants are modest and generally used for labour-intensive, small-scale informal level activities. In order to compete with large, formal sector business, macroeconomic policies need to create a level playing field (Berger, 1989). Women's cottage industries and other small businesses need to be protected from exploitation; these women should not merely be the producers of cheap labour (Mies 1982).

Another important dimension of microcredit is that it requires participation, which has two important implications. First, there is the simple matter of preferences, microcredit may not appeal to all women. If a woman does not wish to join a microcredit group does this mean she should not have access to other opportunities to improve her life? Second, microcredit participation is demanding on women's time: "unless substitutes are found for women's reproductive work at home, women's experience of participation can be negative, exacting a high cost in terms of intensified demands on women's labour" (Goetz & Gupta, 1995, p. 61). As a member of a SHG, women are required to attend weekly meetings and to reap the full benefits of SHGs, women also need to engage in skills training, income-generation

activities, and social events, which is even more time consuming. In agricultural societies women work longer hours than men, with double and even triple work burdens. In addition to their domestic duties and roles as primary care givers, many women engage in unpaid productive activities, such as maintaining kitchen gardens or assisting their husbands in the fields (Kodoth & Eapen, 2006; Mencher, 1988). Because SHGs and other microcredit programs do not address women's work burdens, women's time is further constrained.

Finally, as a pro-health poverty alleviation strategy, microcredit cannot obviously address the multitude of health determinants. Health promotion and preventive programs are required, as are sustained investments in health systems to ensure that the delivery of health care is accessible and of good quality.

4.0 Personal research agenda

This dissertation highlighted a particularly vulnerable and deprived group: the Paniyas. However, because the Paniyas are so distinct and their reports of self reported health diverged from other groups in the population, I could not include them in my analyses. Consequently, we know little of how SHG participation may contribute to the health of the poorest of the poor, the marginalized, the oppressed – the very group that we most strive to reach in our interventions. To address a number of unanswered questions, of which the most important question is: do Paniya women reap health benefits (similar to those demonstrated among other poor women) by participating in SHGs, I am pursuing further (post-doc) research focussing on the plight of the Paniya tribe. I aim, in particular, to document the health needs and determinants of health among the Paniyas (females and males) and the linkages between women's SHG participation and their health. I will draw upon multiple sources of information: panel and clinical data that is being collected by our

action research project (Haddad, Narayana & Mohindra, 2001), in-depth interviews and focus groups, and further analysis of the Kottathara survey, which is already underway[29].

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[29] Mohindra, K., Haddad, S., Narayana, D., Felatto, M. "Health inequalities and Scheduled Tribes in Kerala, India", presented at the 4th Biennial International Conference of the International Society for Equity in Health Creating Healthy Societies through Inclusion and Equity at the University of Adelaide, Australia, September 11 - 13, 2006.

CHAPTER 7

CONCLUSION

1.0 Pursuing an evidence base

There is a Malayalam proverb: "people cut down the forests to build a well, not seeing the connection between the trees and the water". The connections between poverty and ill health have been known for a long time and there is an extensive literature that has identified socioeconomic development as necessary for improvements in population health (and vice versa), yet there lacks an evidence base demonstrating linkages between health and the various anti-poverty interventions. Building such an evidence base will expand our public health arsenal in breaking the cycle of poverty and ill health, helping to inform policy makers and align public health objectives with local and national development goals.

In this dissertation I have attempted to contribute to this evidence base in two main ways. First, I proposed a generic theoretical framework that can serve as a tool for guiding empirical analysis and as an umbrella under which we can pull together the pieces of evidence in a coherent fashion. It is my hope that others will continue to critique, improve, and ultimately utilize the framework adapting it to their particular program of interest and study context. Second, I examined SHGs, a program unique to India, that has, to my knowledge, not yet been examined with respect to potential health benefits. I also focussed on a state, which tends to be examined with respect to its superior performance compared to other states and regions, instead of also looking from within, including – as this dissertation highlighted – the challenges that women continue to face and continue to overcome.

2.0 In defence of the Indian woman

I purposefully chose to focus exclusively on the potential benefits of women's microcredit participation on *their own health*. Often, despite good intentions, development policy overemphasizes women as targets of programs as a means to reach their children and the household unit. The mission of the *kudumbrasree* program in Kerala, for example, is to

reach families through women and to reach communities through families (*kudumbrasree* literally means prosperity of the family). Indian women, in particular, have been lauded for their sacrificial nature and many social scientists have held the perception that they do "not have any clear perception of individual welfare, having instead some unsplittable compound notion of family well-being" (Kynch & Sen, 1983, p. 364). I do not deny that women contribute to the well-being of their households and communities, but I agree with Cecile Jackson who, 10 years ago, wrote:

> It may well be true that women prioritize children's needs, but there is a sense in which one might wish women to be a little less selfless and self sacrificing. It is the sense that women have to be the "deserving poor" to earn the attention of development agencies which disturbs (Jackson, 1996, p. 497).

My focus on women was not meant to dismiss the potential effects of women's participation on the household unit or the community, but rather to urge that women also be viewed as beneficiaries of their own actions. I encourage theoretical and empirical investigations of women's participation in relation to the production of household and community health, but we should never lose sight of the intrinsic value of women's health.

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ANNEXES

Annex A-List of essential and expanded services for women's health

Essential services for women's health

Essential health interventions	Essential interventions for behavioral change
Prevention and management of unwanted pregnancies • Family planning • Management of complications from unsafe abortion • Termination of pregnancy Pregnancy services Prenatal care • Prompt detection, management, and referral of pregnancy complications • Tetanus toxoid immunization • Iron and folate supplements • Iodine supplements, where warranted • Malaria prophylaxis in infested areas Safe delivery • Hygienic routine delivery • Detection, management, and referral of obstetric complications • Facility-based obstetric care Postpartum care • Monitoring for infection and haemorrhage Prevention and management of sexually transmitted diseases • Condom promotion and distribution • Prenatal screening and treatment for syphilis • Symptomatic case management • Screening and treatment of commercial sex workers	Promotion of positive health practices • Laws, education, and services to encourage delayed childbearing among adolescents • Counselling and public education to promote safe sex • Public education and programs to ensure adequate nutrition • Strategic efforts to increase male involvement in women's health issues Elimination of harmful practices • Public education and services to discourage gender discrimination, domestic violence, and rape • Policy dialogue and public education to discourage female genital mutilation

Source: World Bank, 1997

Expanded services for women's health

Additional health interventions	Additional interventions for behavioral change
Expansion and improvement of essential services • Increased choice of contraceptive methods • Enhanced maternity care • Expanded screening for and treatment of sexually transmitted diseases • Extended nutrition assistance to vulnerable groups • Screening, treatment, and referral for victims of violence Cancer screening and treatment • For cervical cancer from age 35 • For breast cancer from age 50 (where resources permit)	Increased attention to early prevention of health problems • In-school education about reproductive physiology, sexuality, and reproductive health • Public health and services to prevent unwanted pregnancy and sexually transmitted diseases • Education about adolescents' special nutritional needs • Education to discourage smoking and substance abuse Strategic efforts to reduce and gender discrimination and violence • Public education initiatives • Training for health care workers • Networking within the community Greater focus on women beyond reproductive age • Education about nutritional requirements • Self-help links with support networks

Source: World Bank, 1997

Annex B- Permission from journals and co-authors to reprint Articles 1 and 2

Déclaration des coauteurs de l'article 1

1. Identification de l'étudiante et du programme

Katherine S. Mohindra
Doctorat en santé publique, promotion de santé

2. Description de l'article

Mohindra, K.S. and Haddad, S. (2005). "Women's interlaced freedoms: a framework linking microcredit participation and health", Journal of Human Development, 6(3), 353-374.

3. Déclaration de tous les coauteurs autres que l'étudiante

À titre de coauteur de l'article identifié ci-dessus, je suis d'accord pour que Katherine Mohindra inclue cet article dans sa thèse de doctorat qui a pour titre « On poverty and health : an interventionist perspective. A study of women microcredit groups in Kerala, India ».

Slim HADDAD	[redacted]	18/07
Coauteur	Signature	Date

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Katherine S. Mohindra
Doctorat en santé publique, promotion de santé

2. **Description de l'article**

Mohindra, K.S, Haddad, S. and Narayana, D. (forthcoming) "Women's health in a rural community in Kerala, India: do caste and socioeconomic position matter?", accepted by the Journal of Epidemiology and Community Health April 27, 2006.

3. **Déclaration de tous les coauteurs autres que l'étudiante**

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1. Identification de l'étudiante et du programme

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2. Description de l'article

Mohindra, K.S., Haddad, S. and Narayana, D. "Helping to break the poverty ill health cycle among women in Kerala, India: The case of microcredit", submitted to Social Science and Medicine.

3. Déclaration de tous les coauteurs autres que l'étudiante

À titre de coauteur de l'article identifié ci-dessus, je suis d'accord pour que Katherine Mohindra inclue cet article dans sa thèse de doctorat qui a pour titre « On poverty and health : an interventionist perspective. A study of women microcredit groups in Kerala, India ».

Coauteur	Signature	Date
Slim HADDAD		18/07/2006
D. NARAYANA		23 June 2006

Annex C-My contribution to Articles 1 and 2

My contributions to Articles 1 and 2

For Article 1, *Women's interlaced freedoms: a framework linking microcredit participation and health*, I conceptualized and wrote the paper. SH suggested modifications to the framework, including some of the terminology, and contributed to the organization of the paper.

For Article 2, *Women's health in a rural community in Kerala, India: do caste and socioeconomic position matter?*, I conceptualized the paper, developed the data analysis plan and performed the analysis, and I wrote the paper. SH guided the data analysis, provided key terminology, and contributed to the organization of the paper. DN provided substantive comments on the paper.

Annex D-Kottathara household survey

HOUSEHOLD IDENTIFICATION AND SUMMARY OF INTERVIEWS
STRICTLY CONFIDENTIAL

01	Household #	|___|___|___|___|___|	07	Address	
02	Name of HEAD				
03	WARD #	|_____|			
04	Building # (1)	|_____|	08	Area	
05	Building # (2)	|_____|	09	Longitude (GPS coord.)	
06	Building # (3)	|_____|	10	Latitude (GPS coord.)	

Summary of interviews

First Visit	Second visit	Third visit	Visits Summary
Date |___|___|____|	Date |___|___|____|	Date |___|___|____|	
Interviewer |_____|	Interviewer |_____|	Interviewer |_____|	
Supervisor |_____|	Supervisor |_____|	Supervisor |_____|	No. of visits |___|
Next visit date |___|___|____|	Next visit date |___|___|____|	Next visit date |___|___|____|	
Next visit time |__|__||__|__|	Next visit time |__|__||__|__|	Next visit time |__|__||__|__|	
Result* |___|	Result* |___|	Result* |___|	Final Result* |___|
If not completed, give the main reason_____	If not completed, give the main reason_____	If not completed, give the main reason_____	No. of visits |___|

*** Result Codes:** **Completed... 1** **Not completed ... 2** **Refused ... 3**

Summary of Verifications

First Control	Second Control	Third Control	Summary
Verif. Date |___|___|____|	Verif. Date |___|___|____|	Verif. Date |___|___|____|	
Verif. Time |___|____|	Verif. Time |___|____|	Verif. Time |___|____|	
Supervisor |_____|	Supervisor |_____|	Supervisor |_____|	
Place* |_____|	Place* |_____|	Place* |_____|	No. of Verifications
Observations	Observations	Observations	

*** Place Codes** **Field ...1** **Post Hoc review of questionnaires ... 2** **Codification ... 3**

HOUSEHOLD ROSTER: BASELINE

GENERAL INSTRUCTIONS.

PERSON INTERVIEWED: PREFERABLY THE HEAD OF THE HOUSEHOLD. IF HE/SHE IS NOT AVAILABLE, FIND A "PRINCIPAL RESPONDENT" TO ANSWER THE QUESTIONS IN HIS/HER PLACE. THE PERSON SELECTED MUST BE A MEMBER OF THE HOUSEHOLD WHO IS ABLE TO GIVE INFORMATION ON THE OTHER HOUSEHOLD MEMBERS. INFORMATION CONCERNING CHILDREN SHOULD IDEALLY BE OBTAINED FROM THE CHILD'S MOTHER.

INSTRUCTIONS FOR THE BASELINE SURVEY

1) First of all, I'd like to make a complete list of the persons **who normally live here and eat meals together in this dwelling**.

   a) Start with the head of the household, followed by the spouse and their children, from oldest to youngest. Note the names of other persons related to the head of the household or spouse as well as their family who normally live and eat their meals in this dwelling. Note the names of those who are not related to the head of the household or spouse(s) as well as their family but who eat regularly with the members of the household.

   b) Review the completed list of persons with the respondent and verify that no one was omitted from the list.

2) Are there other persons **who are not now present (that means who do not slept here in last night) but normally live and eat their meals together in this dwelling**? For example, any person studying somewhere else or who is on vacation or who is visiting other people. Add their names of these persons to the list.

3) Are there others **who have just arrived in the household and slept here last night but do not normally live here?** Add the names of these people to the list.

Section 1 Household Characteristics

20	21	22	23	24	25	26
Religion of Head Hindu ... 1 Muslim ... 2 Christian ... 3 Other (specify) ... 9	Caste of Head	Religion of spouse Hindu ... 1 Muslim ... 2 Christian ... 3 Other (specify) ... 9	Caste of spouse	For tribes only: Tribal group	If the HH lives in a colony: name of the colony and colony code Codes to be defined	Size of the Household
					_____ Code:	

Roster

100	101	102	103		104	105	106	107	108	109	110	111	112*
Name of persons usually living in the household.	ID #	Sex Male-1/ Female-2	Date of birth or age Month & year of birth	Age	Relationship to the current head of the household SEE CODES BELOW	Residential status SEE CODES BELOW	Present Marital status SEE CODES BELOW	Education: Highest level achieved? (YEARS)	Currently attending school? (Y/N)	In the last 7 days were you engaged in work? Fully engaged.....1 Partly engaged...2 Not engaged.....3 1 or 2 go to 111	Why did they not work in the last 7 days? SEE CODES Go to 112	Principal occupation in the last 7 days SEE CODES	Total monetary value of all incomes in the last 12 months**
	01		|___|___|										
	02		|___|___|										
	03		|___|___|										
	04		|___|___|										
	05		|___|___|										
	06		|___|___|										
	07		|___|___|										
	08		|___|___|										
	09		|___|___|										
	10		|___|___|										

Code for 104:

Head of household.....01
Spouse of head of household.....02
Son / Daughter.....03
Grandchild.....04
Father / Mother.....05
Sister / Brother.....06
Cousin.....07
Niece / Nephew.....08
Daughter / Son-in-law.....09
Sister / Brother-in-law.....10
Mother / Father-in-law.....11
Other relatives of head of household or of spouse.....12
Other non-related household members.....19

Codes for 105: Present Resident...1 (Normally live and eat meals in the household and slept there last night)
Absent Resident... 2 (Normally live and eat meals in the household but did not sleep there last night)
Visitor... 3 (Does not normally live or eat meals in the household)

Codes for 106 Married .... 1 Widow / Widower... 2Divorced ..... 5 Separated ..... 6 Never married 7

Codes for 110

Unemployed	01	Retired	04	Student	07
Looking for employment	02	Illness, temporary incapacity	05	Too young	08
Housekeeping	03	Permanent incapacity	06	Too old	09
				Other	19

Codes for 111:

Independent cultivator .....1 Independent other producer .....2 Wage Labourer.....3 Govt. Service 4
Private Service .....5 Housewife .....6 Domestic Servant.....7 Other 9

****112: Try to estimate, as close as possible, the total value of all incomes, in currency and in goods (includes clothes, room and board, etc.), received or to be received, by each individual of the household and corresponding to the employment activities of the last 12 months.**

Section 2. Access to Basic services

2000. Check one box on who responds to this section: (Codes- head of the household-1; spouse-2; both-3): ☐

List all Household Members receiving pensions/ assistance/ benefits.

	2001	2002	2003	2004	2005
Name of Member	**Member ID**	**Which benefit was received? See codes**	**Month last received/ Year**	**Amount received**	**For how many months?**

2002 Codes: Agricultural Labor pension- 1; Widow pension-2; Old age pension-3; Unemployment allowance-4; State/ Central government pension-5; company/ private pension-6; Disability allowance-7; Maternity benefits-8; Child allowance (for schooling etc; convert uniform, books into amount)-9; Any other assistance- 10.

Specify any other assistance, the amount you received for each item and the date this assistance was received.

2006 (see codes below)	2007	2008
Code	Amount received	Month/year

2006 codes : Housing-1, Latrine construction-2, Drinking or other water development-3, Other assistance (specify)-9.

2.1 Access to road transport

2010	2011	2012	2013	2014
What is the distance to the tarred roads (in kms)	**How is the house connected to the tarred road? By :** **Path.....1** **kutcha road.....2** **pucca road.....3** **no proper connection..4**	**What is the time taken to reach a bus stop (minutes)**	**What is the frequency of bus service to Kalpetta/ Mananthavady?** **Every less than one hour.....1** **Every hour.....2** **Once two hours...3**	**What is the time taken to reach a point to catch a jeep/ auto/ any vehicle other than a bus?**

2.2 Drinking water

2020	2021	2022	2023	2024	2025	2026	2027	2028
What is the source of drinking water? Public well....1 Private well...2 Public pipe....3 River.....4 Pond.....5 Others (specify).....9	What is the distance to the source (kms)	When is water available? All through the day.....1 Part of the day..2 Only few buckets a day.....3	What is the quality of water? Clean.....1 Muddy/dirty.....2 Brakish/ saline..3	If public supply, how much do you pay per month?	Do you store water at home? Yes...1 No...2, If NO go to 2030.	What vessel do you use? Plastic bucket.....1 Aluminium bucket..2 Steel vessel.....3 More than one type.....4 Other (specify).....9	Do you cover the vessel? Yes...1 No...2	How do you take water from the vessel? By dipping a mug/cup.....1 By dipping a long handle cup.....2 By tilting the bucket/vessel.....3

2.3 Sanitation

2030	2031	2032
Do you have a latrine in the house? Yes...1 No...2	Who uses it? Men.....1 Women.....2 Children.....3 All members-.....4	Where do you dispose household waste? On the street.....1 In the backyard....2 In an open pit.....3 Other (specify).....9

2040	2041	2042	2043	2044	2045	2046	2047
Is the house electrified? Yes-1 No-2 If no, go to 3000	When was the house electrified? Month/ year	Was it part of a Panchayath/ government scheme? Yes...1 No....2	Did you get a subsidy? Yes...1 No...2	What was the amount of subsidy?	What was the last bill amount?	Was power disconnected any time during the last one-year?	After how many days was it reconnected?
	|___|___|						

Section 3: Assets / Consumption.

3000. Check one box on who responds to this section: (Codes- head of the household-1; spouse-2; both-3): ☐

3001	3002	3003	3004	3005	3006	3007	3008	3009
Is the household a BPL household? Yes...1 No....2	Do you own a house? Yes...1 No...2	In the house your reside what is the number of rooms	bedrooms	What was the principal material used for the floor? Soil.....1 Cement...2 Tiles.....3 Other.....9	What was the principal material used for the roof? Soil.....1 Cement/concrete.2 Thatch/ grass.....3 Sack sheet.....4 Other.....9	What is the condition of the house? Very poor....1 Poor.....2 Good.....3 Very good...4	What is the extent of land owned (cents)	How many Cows/buffaloes/ bulls does the household own?

3010	3011	3012	3013	3014	3015	3016	3017
Do you have a telephone at home? Yes-1 No-2	Do you own a black and white TV? Yes-1 No-2	Do you own a color TV? Yes-1 No-2	Do you own a refrigerator? Yes-1 No-2	Do you own a car/jeep/bus/ lorry? Yes-1 No-2	Do you own a Motorcycle/ scooter/ three wheeler? Yes-1 No-2	Do you own a gas stove? Yes-1 No-2	Do you own a gas stove? Yes-1 No-2

3020. Check box on who responds to this section: (Codes- head of the household-1; wife/husband-2; both-3): [ ]

What has been the expenditure on consumption of the household ? (during the last seven days)

	Items of consumption	Expenditure on purchases from		Cost of home produced items	Total expenditure
		Ration shop	Market/ shop		
3021	Rice, wheat				
3022	Tubers				
3023	Pulses				
3024	Edible oil				
3025	Sugar				
3026	Milk and milk products				
3027	Vegetables				
3028	Fruits and nuts				
3029	Meat, fish and eggs				
3030	Salt, spices, beverages etc				
3031	Fuel, light				
3032	Liquor, tobacco, pan etc				

What has been the expenditure on other items of consumption of the household during the previous 365 days?

3041	Clothing and footwear		3044	Conveyance	
3042	Education		3045	Entertainment	
3043	Durable goods		3047	Furniture	

4.Health:

Respondents: Individuals Age 15 And Over Self Report; Mothers/Guardians Answer For Children Less Than Age 15

	4001	4002	4003	4004	4005	4006	4007	4008	4009	4010	4011	4012	4013	4014	4015	4017
ID code	Is the person answering for himself / herself? (Y/N)	If the person is different, copy the ID code of the respondent who answers from the HH roster (Q101)	In general, would you say your (Name) health is: Excellent ...1 Very good ...2 Good ...3 Bad ...4 Very bad ...5	Does your (Name's) present state of health limit your (Name,s) activities? If yes, to what degree? **Greatly limits me (Name) ...1** **Moderately limits me(Name) ... 2** **Does not limit me (Name) ...3** In physically demanding activities such as running, lifting heavy objects.	In moderately physical activities such as moving a table or lifting a moderately heavy object	In doing your (his/her) work.	Do you (Name) suffer from a physical incapacity or handicap? (Y/N) .	What is your (Name's) handicap or physical incapacity? CODES	Do you (Name) suffer from a chronic illness, that is to say, some illness that has lasted for more than 6 months? (Y/N)	What is this / are these Chronic illness? CODES 1st	2nd	3rd	For how long did you (Name) have a chronic illness? take the first CI Number	Unit month-1, year-12	Do you think you (Name) need care for this chronic illness	Are you (Name) currently receiving any treatment for your chronic illness? (Y/N)
01																
02																
03																
04																
05																
06																
07																
08																
09																
10																

Codes for 4008: visual...1; hearing.....2; speech.....3; locomotor.....4; amnesia/ senility.....5; any other (specify).....6.

Codes for 4010 4011 4012:

Asthma.....01 Diabetes ..... 03 Rheumatism/ problem of joints..5 Other of occupational origin ..... 07 Do not know 09

Hypertension.....02 Heart Disease ..... 04 Skin disease .....6 Other of non-occupational origin .... 08 Cancer..... 10

ID code	4301 Have you (Has Name) ever smoked on a regular basis? (Y/N) If N0>> 4303	4302 Do you (Name) still smoke or have you totally quit? (Still /Quit)	4305 Do you feel you are (Name is) exposed in your (his/her) work to any particular health risk? (Y/N) If NO >>4307	4306 Please specify the risk	4307 Do you feel you are (Name is) exposed in your (domestic is/her) activities to any particular health risk? (Y/N) If NO >>4310	4308 Please specify the risk	4310 Had a health problem in the last 4 weeks ? (Y/N) If NO >> 4312	4311 What was the major complaint? (cf. CODES)	4312 Is he or she currently hospitalised? (Y/N) If NO >> 4314	4313 For what reason is he / she currently hospitalised	4314 For how long has he/she been hospitalized ? UNIT = days	4315 Has been hospitalised in the last 12 months (Yes/No) If NO >> 4400	4316 How many times?	4317 How long, in total, was he/she hospitalized in the last 12 months (DAYS)
01				.....		.....				.....				
02				.....		.....				.....				
03				.....		.....				.....				
04				.....		.....				.....				
05				.....		.....				.....				
06				.....		.....				.....				
07				.....		.....				.....				
08				.....		.....				.....				
09				.....		.....				.....				
10				.....		.....				.....				

Codes for 4311

Fever	01	Drinking/breast feeding poorly (Child)	05	Convulsion	09	relating to pregnancy, child birth	13
Cough	02	Vomiting repeatedly	06	Anal itching	10	diseases of mouth, teeth and gum	14
Difficult breathing	03	Diarrhea	07	Abdominal pain	11	diseases of ear	15
Fast breathing	04	Blood in Stool	08	Join Pain	12	eye problems	16
Other (specify)	99						

Health Habits: Respondent: Head of household or spouse

4400. Check one box on who responds to this section: (Codes- head of the household-1; spouse-2; both-3): ☐

Could you please let us know your impressions on how often the members of the family:

Systematically/Always ..... 1 Sometimes 3
Most of the time .... 2 Rarely 4

4401	Wash their hands before having food	
4402	Boil the water for drinking and avoid to drink non-boiled water	
4403	Use latrines	

Household Expenses for health care purposes in the LAST THREE MONTHS (Surveyor: Look for an event that can be used as a marker)

5000. Check one box on who responds to this section: (Codes- head of the household-1; spouse-2; both-3):

5001	5002	5003	5004	5005	5006	5007	5008	5009	5010	5010	5010
Allopathic medicine /treatment purchased for household members	Ayurvedic medicine /treatment purchased for household members	Homeopathic medicine /treatment purchased for household members	Consultation with allopathic doctors, nurses or midwives	Consultation with ayurvedic doctors, nurses or midwives	Consultation with homeopathic doctors, nurses or midwives	Preventative care, prenatal care, and vaccination consultations	Hospitalization or surgery	Value of payment in kind for traditional healing services or others	Accommodation and transportation for members of the household that are sick or accompanying those who are ill	Sending medications to parents who do not live in household	Other expenses (specify)

Exclusion and coping strategies:

	During the last 12 months, did your household face one of these situations:	A Answer (Y/N)	B If Yes, How many times	C Was this primarily due to a lack of financial means (Y/N)?
5100	A child in the family was sick, but we were not able to obtain **the required** health care.			
5101	An adult in the family was sick, but we were not able to obtain **the required** health care.			
5102	An elderly member of the family was sick, but we were not able to obtain **the required** health care.			
5103	One of our family members, having a chronic illness, had to stop his/her treatment for a certain period of time.			
5104	A doctor recommended a hospitalisation for one of our family members but we did not have it done.			
5105	A doctor recommended a surgery for one of our family members but we did not have it done.			
5106	One of the women of the HH had to deliver at home			
5107	One of the women of the HH delivered in a hospital			
5110	The household solicited aid from friends or family for health purposes			
5111	Land was sold to pay for care of a household member			
5112	Household food stocks were sold to pay for the care of a household member			
5113	Household items were pawned to pay for care of a household member			
5114	Loans were taken from friends, family or bank to pay for the care of a household member			
5115	Loan were taken from SHGs in order to pay for the health care of a household member			
5116	Savings were withdrawn to pay for the care of a household member			
5117	A doctor recommended a hospitalisation for one of our family members but we postponed it.			
5118	A doctor recommended a surgery for one of our family members but we postponed it.			

Financial Protection

6000. Check one box on who responds to this section: (Codes- head of the household-1; spouse-2; both-3): ☐

6001	How often do you worry that you might not be able to cover the financial needs of your family in the future?	Never 1	Rarely 2	Often 3	Always 4	Don't know 5

	I am now going to read to you a set of statements. Please tell me whether you strongly agree, agree, disagree or strongly disagree or if you are uncertain of your opinion on the statement.	Strongly agree	Agree	Disagree	Strongly disagree	Not sure
6010	Our current income is sufficient to enable us to meet our family's important needs	1	2	3	4	5
6011	Our current income is sufficient to enable us to face unexpected expenditures	1	2	3	4	5
6012	I am confident, my family's living conditions and welfare are going to get better over the next couple of years	1	2	3	4	5
6013	If my family was in a financial distress (unexpected, significant drop in household income), I am confident we could find a way to sustain my family adequately until the end of that distress	1	2	3	4	5

	I am now going to propose a set of hypothetical situations. Please tell me with what level of difficulty you would be able to react to this situation, or if you are uncertain about how you might react	With great difficulty	With difficulty	Easily	Very easily	Not sure
6020	If a death occurred in your family, would you find the money needed for the funeral...	1	2	3	4	5
6021	If a member of your family were to become seriously ill, would you find the money needed for the necessary health care services...	1	2	3	4	5
6022	If somebody in your family had to be hospitalized for a surgery, would you find the money needed to pay for his/her care...	1	2	3	4	5
6023	If you or your spouse lost your job, would you find the money needed to sustain your family adequately while you looked for a new job...	1	2	3	4	5
6024	If you or your spouse got a chronic illness that obliged either one of you to significantly reduce your professional activities for a long period of time, would you find the money needed to sustain your family...	1	2	3	4	5

Social In sion

7000. Check one box on who responds to this section: (Codes- head of the household-1; spouse-2; both-3): ☐

I would like to ask you some questions about the participation of your family in not-for-profit community organizations which either promote well-being or defend individual or community interests		Codes		
7100a	Are you or your spouse(s) a member of any community organization?	Yes 1	No 2	Don't know 3
7102	In how many community organizations are you or your spouse(s) a member (in total)?	Number |____|____|		
7103	Are you or your spouse(s) involved in the activities of these organizations?	Yes 1	No 2	Don't know 3
7104	Does your family usually use services from local public administrations?	Yes 1	No 2	Don't know 3
7105	Does the head of the household have a voter identity card?	Yes 1	No 2	Don't know 3
7106	Does the spouse of the head of the household have a voter identity card?	Yes 1	No 2	Don't know 3
7107	Does the head of the household have a bank account?	Yes 1	No 2	Don't know 3
7108	Does the spouse of the head of the household have a bank account?	Yes 1	No 2	Don't know 3
7109	Did the head of the household ever vote in an election?	Yes 1	No 2	Don't know 3
7100b	Did the spouse of the head of the household ever vote in an election?	Yes 1	No 2	Don't know 3

Membership in micro-credit groups

7200. Check one box on who responds to this section: (Codes- head of the household-1; spouse-2; both-3): ☐

7201	Is anyone of your household a member of a SHG? Yes.....1 No.....2	If ,Yes Go to 7300
7202	What is the main reason for you or your spouse not joining a micro credit group? Lack of money to pay for contribution...1 Do not have information about SHGs...2 Do not believe in SHGs.....3 Do not trust in their staff..... 4 Do not need credit.....5 Family member does not allow..... 6 Never thought about that.....8 Other reason (specify)...9	
7203	If you had the opportunity to join a SHG, would you do it? Yes..1 No..2 Don't know..3	

		7301	7302	7303	7304	7305	7306	7307
Who is a member of a micro-credit group?		Name of SHG network	When did that person first become a member of this group?	What was the main reason for joining?	How much and how often do the member(s) contribute(s) to the savings?		How much did the member(s) contribute for savings last year?	Did the member(s) ever receive a loan from this group? Yes 1 No 2→ **go to 8000**
ID	Name	Kudumbasree-1 RASTA.....2 Both.....3	(month and year)	SEE CODES BELOW	Amount	Periodicity Weekly....1 Monthly.....2 Other.....9		
			____					
			____					
			____					

Codes for 7023: Develop saving habit-1, Access to loans-2, Access to production activities-3, Skill development-4, Part of a social group-5, Others (specify).....9

		7400		7401	7402	7403	7404
Member receiving loan Recopy information from 7300 here		How many loans did the member(s) of your family receive from that group until now?		What was the main purpose of the loan(s)? **Agriculture...1; Shop...4** **Handicrafts...2; Health..5** **Livestock...3** **Other (specify)...9**	Which advantages other than loans do(es) the member(s) of your family get from this group? (several answers permitted) SEECODES BELOW	What is your level of participation in the SHG? SHG activities only...1 Cluster/ADS and SHG activities...2 Participant in group income generation projects...3	What is your experience in SHG, present or past? SHG member only...1 SHG president...2 SHG secretary...3 Cluster/ADS president...4 Cluster/ADS secretary...5
ID	Name	Number	Amount				

Codes for 7402:

Acquired new skills/knowledge...1
Increased social mobility.....2
Enlarged social network.....3
Better household dynamics.....4
Capacity to help others in community.....5
Decrease reliance on men (if woman respondent)...6
Other (specify).....9

8000. Check one box on who responds to this section: (Codes- head of the household-1; spouse-2; both-3): ☐

8100	8101	8103	8104	8105	8106
Do you ever suffer from disturbances in mental peace? If yes, how often? Almost daily....1 Occasionally....2 Rarely...3 Never...4 If NEVER go to 8103	What was the main cause of this disturbance? **See below for codes**	What did you generally do at this time(s)? Kept problem to self...1 Seek help from family member...2 Seek help from God...3 Seek help from neighbour, friend, or group member...4 Other (specify)...9	(Name), how satisfied are you with your life? Very...1 Moderately...2 Unsatisfied...3 No opinion...4	In the past year, did your level of satisfaction become : Much more...1 A little bit more...2 A little bit less...3 Much less...4 No change...5 If respondent answered 3 to 5 go to 8200	What is the main reason for having a higher life satisfaction? More money...1 Greater social mobility...2 Less tension in household...3 More confident...4 Better health...5 Other (specify)...9

Codes for 8101:

Difficulties in meeting household needs...1
Problems related to husband 2
Problems related to family 3
Illness of family member 5
Other (specify).....9

I am now going to read to you a list of activities. Please tell me whether your husband or another male family member restricts this activity generally, occasionally, never, or if you are not sure. Also please tell me if the level of restriction has been reduced in the past year.

		Gener-ally	Occa-sionally	Never	Not sure	Restriction has decreased in past year 1 = yes, 2 = no
8200	Visiting your parental home	1	2	3	4	
8201	Visiting a health care centre or hospital	1	2	3	4	
8202	Going to the market	1	2	3	4	
8203	Setting aside money for your personal use	1	2	3	4	

I am now going to ask you about decision-making on several matters. Please tell me if decisions were made by your husband (or other male relative), yourself, together, or if you are not sure. Also, please tell me if in the past year you have been more active in decision-making process.

		Husband only*	Wife Only**	Joint	Not sure	More active in past year 1= yes, 2 = no
8300	Seeking health care of family member	1	2	3	4	
8301	Daily household expenditures	1	2	3	4	
8302	Child's education in school	1	2	3	4	
8303	Family planning	1	2	3	4	
8304	Voting in an election	1	2	3	4	

*COULD BE MALE RELATIVE IN A FEMALE HEADED HOUSEHOLD. **OR FEMALE HEAD OF HOUSEHOLD

9.0 Participation in Health Insurance Plan

9000. Check one box on who responds to this section: (Codes- head of the household-1; spouse-2; both-3): ☐

9100	Is there anybody in the household, who is member of a Health Insurance or currently covered by a Health Insurance Plan (HIP)?	Yes...1 **(Go to 9200)**	No...2

Non members

9101	Have you ever heard of a HIP available for the people living in this area?	Yes...1 **(Go to 10000)**	No...2
9102	If you knew that a HIP was available, would you join this plan? **GO to 10000**	Yes...1	No...2

Current members of Health Insurance Plan

			Insurer name	CHI or not	Code	ID & name of the Household's HIP holder	
						ID	Name
9200	**Please tell me, the names of the household members who are holders of a HIP, and the name of their HIP (or HIPs if they hold more than one).** *Holder: the member of the household who is identified as the member of the HIP or under whose name the family is enrolled or is the common interlocutor of the HIP* SURVEYOR: Identify from the list in column 3, whether this HIP is (1) a Community Health Insurance (CHI) or not (2)	HIP1					
		HIP2					
		HIP3					
		HIP4					

	These questions refer to HIP characteristics, benefits and coverage of members. RESPONDENT = MEMBER IDENTIFIED AS THE HIP HOLDER		1 HIP1	2 HIP2	3 HIP3	4 HIP4
9206	Which service does this HIP cover? TICK IN THE APPROPRIATE BOXES	Consultation fees...1	1	1	1	1
		Medication...2	2	2	2	2
		Hospitalization...3	3	3	3	3
		Transportation of ill persons...4	4	4	4	4
		XRAY - Lab test...5	5	5	5	5
		Childbirth...6	6	6	6	6
		Other (specify)...9	7	7	7	7
9208	What is the annual amount of your membership fees to this HIP?					
9209	What is the annual amount of your contributions to this HIP?					
9213	How difficult is it for your family to make the contributions? Very difficult...1 Difficult...2 Not too difficult...3 Easy...4 Very easy...5		|__|	|__|	|__|	|__|
9220	Did you make any reimbursement claims last year? Yes...1 No...2		|__| **If 2>>[9000]**	|__| **If 2>>[9000]**	|__| **If 2>>[9000]**	|__| **If 2>>[9000]**
9221	How many reimbursement claims did you make last year?		|__|__|__|	|__|__|__|	|__|__|__|	|__|__|__|
9222	How much did you receive for these reimbursement claims?					

10.00 Health Insurance Preferences

10000. Check one box on who responds to this section: (Codes- head of the household-1; spouse-2; both-3): ☐

10001	Do you think it is very important, somewhat important or not important for you and your family to be covered by a Health Insurance Plan (HIP)?	Very important...1 Somewhat important...2 Not important...3

				A	B
10100	10101 A	In your opinion, which health care services should principally be covered by a HIP? TICK IN THE APPROPRIATE BOXES IN COLUMN 2	Visits fees...1		
			Medication...2		
			Hospitalization...3		
			Transportation of ill persons...4		
	10101 B	How would you classify them by level of priority, in a scale where 1 corresponds to the health care service which should firstly covered by a HIP, 2 to the second one, and so on? WRITE THE LEVEL OF PRIORITY (e.g. 1,2,3...) IN COLUMN 3	Xray - Lab test...5		
			Childbirth...6		
			Other (specify)...7		
				A	B
10200	10202 A	According to you, what are the main advantages of a HIP for members? TICK IN THE APPROPRIATE BOXES IN COLUMN 2	Reduce out-of-pocket expenses for health...1		
			Improve access to health services and care...2		
	10202 B	How would you classify these advantages by level of priority, in a scale where 1 corresponds to the most important, 2 to the second one, and so on? WRITE THE LEVEL OF PRIORITY (e.g. 1,2,3...) IN COLUMN 3	Make member able to better cope with health emergencies...3		
			Other (specify)...4		
			None...5		
				A	B
10300	10301 A	According to you, what are the main advantages of a HIP for the community?. TICK IN THE APPROPRIATE BOXES IN COLUMN 2	Reinforce solidarity among people...1		
			Reduce gap between Richs and the poor...2		
			Contribute in making a more equitable society...3		
	10302 B	How would you classify these advantages by level of priority, in a scale where 1 corresponds to the most important, 2 to the second one, and so on? WRITE THE LEVEL OF PRIORITY (e.g. 1,2,3...) IN COLUMN 3	Bring more health...4		
			Other (specify)...5		
			None...6		

Annex E-Construction of indexes for Article 3

Indexes for Article 3: Items, psychometric properties, and frequencies

Exclusion (coding: 0=no, 1=yes)

variable	*variable label*
ex_child	child sick no care
ex_adult	adult sick no care
ex_elder	elderly sick no care
ex_stop	stop treatment for chronic illness
ex_not	did not have hospitalization
ex_not2	did not have surgery
ex_delay	postponed hospitalisation
ex_del_a	postponed surgery (Could remove maybe)

Tetrachoric correlations (N=3352)

	ex_child	ex_adult	ex_elder	ex_stop	ex_not	ex_not2	ex_delay	ex_del_a
ex_child	1							
ex_adult	.9044	1						
ex_elder	.7697	.9303	1					
ex_stop	.5379	.7422	.8062	1				
ex_not	.5966	.7346	.6693	.8509	1			
ex_not2	.4163	.5567	.5308	.7148	.7754	1		
ex_delay	.5886	.6504	.579	.6987	.7509	.7528	1	
ex_del_a	.5192	.611	.5139	.6397	.7198	.9231	.90861	1

Reliability Statistics

Cronbach's Alpha	N of Items
,750	8

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
child sick no care	6,44	1,267	,507	,713
adult sick no care	6,50	1,065	,669	,673
elderly sick no care	6,42	1,248	,598	,692
stop treatment for chronic illness	6,42	1,296	,515	,711
did not have hospitalization	6,36	1,486	,426	,729
did not have surgery	6,33	1,647	,261	,752
postponed hospitalisation	6,34	1,582	,328	,744
postponed surgery	6,32	1,665	,266	,752

hh exclusion (index 8 items)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no exclusion	2412	72,0	72,0	72,0
	1	254	7,6	7,6	79,5
	2	282	8,4	8,4	87,9
	3	213	6,4	6,4	94,3
	4	117	3,5	3,5	97,8
	5	49	1,5	1,5	99,3
	6	10	,3	,3	99,6
	7	9	,3	,3	99,8
	8	6	,2	,2	100,0
	Total	3352	100,0	100,0	

Health risks (coding, 0=no risk, 1=yes risk)

variable variable label

riskwor1 risk at work
riskhom1 risk at home

Tetrachoric correlations (N=2364)

	riskwor1	riskhom1
riskwor1	1	
riskhom1	.7318	1

Reliability Statistics

Cronbach's Alpha	N of Items
,522	2

-

Healthrisk index

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no risk	1958	82,8	82,8	82,8
	1 risk	299	12,6	12,6	95,5
	2 risks	107	4,5	4,5	100,0
	Total	2364	100,0	100,0	

Autonomy : Decision-making agency (coding : 0=female/join, 1=male only)

Tetrachoric correlations (N=2364)

variable name variable label

---

autonomy decide health care
autono_a decide hh expenditures
autono_b decide child school
autono_c decide family planning
autono_d decide voting

	autonomy	autono_a	autono_b	autono_c	autono_d
autonomy	1				
autono_a	.9852	1			
autono_b	.957	.989	1		
autono_c	.9718	.9785	.8957	1	
autono_d	.8334	.8248	.7779	.8611	1

Reliability Statistics

Cronbach's Alpha	N of Items
,857	5

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
decide health care	,31	,671	,840	,778
decide hh expenditures	,28	,633	,822	,787
decide child school	,34	,768	,739	,809
decide family planning	,37	,877	,649	,835
decide voting	,39	1,053	,358	,889

decision making index

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 high autonomy	2004	84,8	84,8	84,8
	1	62	2,6	2,6	87,4
	2	84	3,6	3,6	90,9
	3	110	4,7	4,7	95,6
	4	79	3,3	3,3	98,9
	5	25	1,1	1,1	100,0
	Total	2364	100,0	100,0	

Annex F-Results of sensitivity analysis for Article 3

Models for exclusion to health care, exposure to health risks, limited decision-making agency. Binomial logistic regression: odds ratios with 95% confidence intervals and goodness of fit statistics [a] (excluding the households reporting non-participation in SHGs due to ill health) – See Table 4 in Article 3 for comparison

Health determinants. Binomial logistic regression: odd ratios with 95% confidence intervals

	Dependent variables								
	(I) Excluded to health care (yes, n=325, no, n=603)			(II) Exposed to health risk (yes, n=206, no, n=722)			(III) Male decision-making (yes, n=114, no, n=814)		
	M0	M1	M2	M0	M1	M2	M0	M1	M2
Socioeconomic characteristics & caste									
Education (ref=high school+)									
Primary		0.89 [0.61-1.31]	0.86 [0.59-1.27]		1.28 [0.82-1.99]	1.31 [0.84-2.04]		1.32 [0.77-2.26]	1.30 [0.76-2.25]
No education		1.38 [0.94-2.02]	1.31 [0.89-1.94]		1.49 [0.96-2.32]	1.57 [1.00-2.47]		0.74 [0.40-1.39]	0.74 [0.39-1.40]
Employment (ref=not engaged)									
Engaged		0.82 [0.59-1.15]	0.81 [0.58-1.13]		0.97 [0.67-1.41]	0.96 [0.66-1.39]		**0.47 [0.26-0.84]**	**0.45 [0.25-0.82]**
Landholdings (ref=>50 cents)									
50 cents or less		**1.54 [1.06-2.23]**	**1.55 [1.07-2.25]**		1.43 [0.94-2.18]	1.42 [0.93-2.16]		0.90 [0.53-1.53]	0.91 [0.53-1.55]
Caste of head (ref=forward)									
OBC		**1.59 [1.07-2.36]**	**1.55 [1.04-2.30]**		0.65 [0.41-1.02]	0.65 [0.42-1.03]		0.94 [0.53-1.68]	0.91 [0.51-1.63]
SC/ST		1.06 [0.70-1.61]	1.09 [0.72-1.66]		0.70 [0.44-1.10]	0.69 [0.44-1.10]		1.26 [0.71-2.25]	1.23 [0.69-2.20]
SHG participation									
SHG (ref=not member)									
Early joiner	**0.55 [0.36-0.85]**		**0.59 [0.38-0.93]**	1.27 [0.81-1.98]		1.39 [0.86-2.24]	1.08 [0.62-1.89]		1.03 [0.57-1.87]
Late joiner	**0.56 [0.41-0.78]**		**0.57 [0.40-0.79]**	0.91 [0.64-1.28]		1.01 [0.70-1.46]	0.77 [0.49-1.20]		**0.66 [0.41-1.05]**
(Not member but SHG in household)	**0.57 [0.35-0.94]**		**0.53 [0.32-0.90]**						
Chi-square (df)	13.5(3)	24.8(9)	37.2(12)	2.34(2)	52.0(9)	54.2(11)	2.02(2)	49.9(9)	54.1(11)
-2 log likelihood	1177.8	1166.5	1154.1	971.2	921.5	919.3	671.5	623.6	619.5
Deviation		*24.8 (3)****			*4.4(2)*			*8.2(2)*	

Models for self assessed health. Binomial logistic regression: odds ratios with 95% confidence intervals and goodness of fit statistics [a](excluding the households reporting non-participation in SHGs due to ill health) – See Table5 in Article 3 for comparison

Self reported health. Binomial logistic regression: odd ratios with 95% confidence intervals

	Dependent variables							
	(I) Bad health (yes, n=321, no, n=607)				(II) Limits in ADLs (yes, n=377, no, n=551)			
	MO	M1	M2	M3	MO	M1	M2	M3
Socioeconomic characteristics & caste								
Education (ref=high school+)								
Primary		1.22 [0.81-1.82]	1.24 [0.83-1.85]	1.13 [0.71-1.80]		1.30 [0.88-1.92]	1.30 [0.89-1.92]	1.24 [0.82-1.89]
No education		1.51 [1.01-2.27]	**1.56 [1.04-2.36]**	1.37 [0.86-2.18]		**1.84 [1.24-2.73]**	**1.85 [1.24-2.76]**	**1.71 [1.12-2.63]**
Employment (ref=not engaged)								
Engaged		**0.62 [0.44-0.89]**	**0.61 [0.43-0.88]**	**0.61 [0.40-0.91]**		**0.65 [0.46-0.92]**	**0.66 [0.47-0.93]**	0.68 [0.47-0.99]
Landholdings (ref=>50 cents)								
50 cents or less		**1.56 [1.07-2.29]**	**1.56 [1.06-2.28]**	1.40 [0.92-2.15]		1.38 [0.96-1.99]	1.37 [0.95-1.98]	1.22 [0.82-1.81]
Caste of head (ref=forward)								
OBC		0.96 [0.63-1.45]	0.96 [0.63-1.46]	1.10 [0.68-1.79]		0.77 [0.52-1.15]	0.78 [0.52-1.16]	0.80 [0.52-1.24]
SC/ST		0.92 [0.60-1.41]	0.91 [0.59-1.41]	1.05 [0.64-1.73]		0.69 [0.45-1.04]	0.69 [0.46-1.04]	0.71 [0.46-1.11]
SHG participation								
SHG (ref=not member)								
Early joiner	0.98 [0.66-1.46]		1.26 [0.80-1.97]	1.19 [0.71-1.99]	0.81 [0.54-1.20]		1.00 [0.64-1.55]	0.93 [0.57-1.50]
Late joiner	0.78 [0.58-1.06]		0.95 [0.68-1.33]	1.04 [0.72-1.52]	0.96 [0.72-1.28]		1.18 [0.86-1.64]	1.33 [0.94-1.88]
Health determinants								
Exclusion *(ref=no exclusion)*								
Exclusion				**2.03 [1.43-2.88]**				**2.01 [1.46-2.78]**
Health risks *(ref=no risks)*								
At least one risk				**10.7 [7.12-16.04]**				**5.80 [3.96-8.49]**
Decision-making *(ref=female/joint)*								
Male				**2.70 [1.65-4.44]**				**2.35 [1.48-3.75]**
Chi-square (df)	2.9(2)	143.1(9)***	144.7(11)***	331.4(14)***	1.15(2)	131.0(9)***	132.3(11)***	255.9(14)***
-2 log likelihood	1182.1	1041.9	1040.3	853.6	1240.4	1110.5	1109.2	985.7
Deviation		*3.2(2)*	*373.4(3)****			*2.6(2)*	*247.0(3)****	

Models for markers of mental health. Binomial logistic regression: odds ratios with 95% confidence intervals and goodness of fit statistics [a] (excluding the households reporting non-participation in SHGs due to ill health) – See Table 6 in Article 3 for comparison

Markers of mental health. Binomial logistic regression: odd ratios with 95% confidence intervals

	Dependent variables							
	(I) Disturbances in mental peace (yes, n=820, no, n=108)				(II) Unsatisfied in life (yes, n=99, no, n=829)			
	MO	M1	M2	M3	MO	M1	M2	M3
Socioeconomic characteristics & caste								
Education (ref=high school+)								
Primary		1.08 [0.59-1.97]	1.03 [0.56-1.89]	1.09 [0.58-2.02]		1.31 [0.73-2.37]	1.22 [0.67-2.22]	1.23 [0.68-2.23]
No education		0.86 [0.48-1.52]	0.77 [0.43-1.39]	0.72 [0.40-1.33]		1.70 [0.94-3.08]	1.49 [0.82-2.73]	1.46 [0.80-2.69]
Employment (ref=not engaged)								
Engaged		**2.06 [1.14-3.71]**	**2.19 [1.21-3.96]**	**2.23 [1.22-4.08]**		1.57 [0.98-2.53]	1.61 [1.00-2.60]	1.66 [1.02-2.70]
Landholdings (ref=>50 cents)								
50 cents or less		**1.90 [1.16-3.11]**	**1.94 [1.18-3.19]**	**1.79 [1.07-2.98]**		0.79 [0.46-1.35]	0.83 [0.48-1.42]	0.79 [0.46-1.37]
Caste of head (ref=forward)								
OBC		1.18 [0.65-2.16]	1.18 [0.64-2.18]	1.11 [0.60-2.07]		1.07 [0.58-1.97]	1.04 [0.56-1.93]	1.01 [0.54-1.89]
SC/ST		0.84 [0.47-1.51]	0.84 [0.47-1.52]	0.85 [0.47-1.55]		0.74 [0.38-1.43]	0.74 [0.38-1.43]	0.73 [0.38-1.42]
SHG participation								
SHG (ref=not member)								
Early joiner	0.66 [0.39-1.13]		**0.54 [0.30-0.96]**	**0.54 [0.30-0.98]**	**0.36 [0.17-0.79]**		**0.36 [0.16-0.81]**	**0.36 [0.16-0.82]**
Late joiner	1.32 [0.84-2.09]		1.30 [0.81-2.09]	1.39 [0.85-2.26]	0.70 [0.45-1.09]		0.76 [0.48-1.22]	0.79 [0.49-1.26]
Health determinants								
Exclusion *(ref=no exclusion)*								
Exclusion				**2.98 [1.73-5.13]**				1.29 [0.82-2.04]
Health risks *(ref=no risks)*								
At least one risk				1.55 [0.85-2.83]				1.12 [0.67-1.86]
Decision-making *(ref=female/joint)*								
Male				**0.51 [0.30-0.87]**				1.24 [0.60-2.55]
Chi-square (df)	6.4(2)*	27.9(9)***	37.2(11)***	65.5(14)***	8.11(2)*	25.9(9)**	33.2(11)***	34.9(14)
-2 log likelihood	659.2	637.6	628.3	600.0	603.1	585.4	578.1	576.3
Deviation		*18.6(2)****	*56.6(3)****			*14.6(2)****	*3.6(3)*	