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The Impact of Health Promotion on Health in Old Age: Results from Community-based Studies in Rural Bangladesh



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From Aging Research Center (ARC)
Department of Neurobiology, Care Sciences and Society (NVS)
Karolinska Institutet, Stockholm, Sweden

**THE IMPACT OF HEALTH PROMOTION ON
HEALTH IN OLD AGE: RESULTS FROM
COMMUNITY-BASED STUDIES IN RURAL
BANGLADESH**

AKM Masud Rana



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To my parents, children and wife

ABSTRACT

Background: It is common knowledge that Bangladesh has a high prevalence of illness among its older people and that the government healthcare services offer them inadequate support. Despite this, however, information about older people's health and illnesses as a function of health promotion is scant.

Aims: To examine the impact of a health promotion intervention on health in old age; to examine associations between bone and joint diseases and health-related quality of life; and to study associations between social capital and quality of life among older people in rural Bangladesh.

Methods: This thesis is compiled based on two intervention studies and two cross-sectional studies. Data for Studies I, III and IV were derived from the Primary Healthcare in Later Life: Improving Services in Bangladesh and Vietnam (PHILL) project. Data for Study II were derived from the Poverty and Health in Aging (PHA) project. The projects were located in one of the 64 districts of Bangladesh and situated 70 kilometers southeast of the capital Dhaka. In the PHILL project, eight villages were selected through simple random selection and all the older people (≥ 60 years) who were residing in the selected villages ($n=1,135$) were chosen for the study. In PHA ($n=850$) older people were selected through simple random selection from two purposively selected research blocks. Health promotion interventions in PHILL included physical activity, advice on healthy food intake and other aspects of management. To create an enabling environment, social awareness was provided by means of information about the contribution of and challenges faced by older people at home and in the community, including information about their health and healthcare. The intervention activities were provided to older people themselves, their caregivers, household members, community people, and healthcare providers for a period of 15 months. During analyses, participants in the intervention area were further stratified into compliant ($n=315$) and non-compliant ($n=110$) groups based on reported compliance with the intervention activities. Arthritis-related illness and bone and joint diseases were indicated by the presence of any form of arthritis, joint and back pain. Health-related quality of life (HRQoL) was measured using a multi-dimensional generic instrument. Quality of life was assessed using a single global question.

Results: Study I revealed that older people who adhered to health promotion activities reported significantly less arthritis-related illness and less healthcare expenditure. Study II showed that bone and joint diseases were significantly associated with various dimensions and overall HRQoL. Furthermore, being an elderly woman and being a woman with self-reported joint and back pain were associated with lower scores in various dimensions of HRQoL. Study III indicated that, in the non-compliant group, the probability of increased HRQoL scores was less likely only in overall HRQoL. In the control group, the probability of increased scores was less likely in the physical, social, spiritual, environment dimensions and overall HRQoL. Study IV revealed that low social capital, both at the individual and community levels, was significantly associated with poor quality of life.

Conclusions: This thesis suggests that the provision of community-based health promotion intervention among older people could help to both reduce the burden of arthritis-related illness and its related healthcare expenditure, and improve their health-related quality of life.

Keyword: Health promotion, older people, intervention study, community-based, rural, Bangladesh

LIST OF PUBLICATIONS

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LIST OF ABBREVIATIONS

ANOVA	Analysis of Variance
BRAC	Formerly known as Bangladesh Rural Advancement Committee
DSS	Demographic Surveillance System
GDP	Gross Domestic Product
HBM	Health Belief Model
HRQoL	Health-related Quality of Life
HSPI	Health Strategy and Policy Institute
icddr,b	icddr,b: Knowledge for Global Lifesaving Solutions
IDOP	International Day of Older People
IHCAR	Division of International Health
MDGs	Millennium Development Goals
NGO	Non-government organization
NVS	Department of Neurobiology, Care Sciences and Society
OAA	Old Age Allowance
PHA	Poverty and Health in Aging
PHILL	Primary Health-care in Later Life: Improving Services in Bangladesh and Vietnam
PHVs	Preventive Home Visits
SHG	Self-Help Group
UK	United Kingdom

1.1 INTRODUCTION

A century ago, the proportion of people aged over 65 years across the globe was one in twenty. Currently it is one in six, and by 2051 it is expected to be one in four (The Lancet, 2008). Presently about two thirds of the world's elderly population live in low-income countries and this proportion is projected to rise to approximately 75% by 2025 (World Health Organization, 2006). The emergence of a large elderly population has changed the nature of the demand at primary, secondary and tertiary levels of healthcare services. As populations age, they are at risk of lifestyle and environment related chronic non-communicable diseases such as diabetes, hypertension, arthritis-related illness, leading to increasing healthcare needs among older people (World Health Organization, 2005). Research also indicates that chronic non-communicable diseases are well-known causes of poverty, particularly where out-of-pocket payments for healthcare are common (Beaglehole and Bonita, 2008).

1.2 ARTHRITIS-RELATED ILLNESS

Arthritis-related illness refers to all forms of arthritis, joint and back pain. Evidence shows that a considerable proportion of the adult population is reaching the age at which the prevalence of arthritis-related illness is commonly reported (Oliver and Hill, 2005). Arthritis-related illness rarely causes death, but is associated with disability (Guralnik and Kaplan, 1989; Grotle et al., 2008). Osteoarthritis alone accounts for one percent of the loss of disability adjusted life years (DALY) globally (Lindstrand et al., 2006). Research in Bangladesh indicates that about 80% of older people report some form of arthritis-related illness (Ahmed, Rana and Kabir, 2003) and more than one third suffer from arthritis (icddr,b 2007; Kalam and Khan, 2006). Arthritis is the seventh most common illness in the adult population and the second most common illness among older people in Bangladesh (Bangladesh Bureau of Statistics, 2005). Knowledge regarding the management of arthritis-related illness is poor among older people and their caregivers in Bangladesh (Biswas and Hossain, 2004). The World Health Organization (WHO) has considered these medical conditions as a public health problem and announced 2000-2010 as the 'Bone and Joint Decade', with the aims of raising awareness, promoting prevention and management of bone and joint diseases through education campaigns, and advancing research for better healthcare and ways of reducing the burden of bone and joint diseases (Hazes and Woolf, 2000).

1.3 ARTHRITIS-RELATED ILLNESS AND HEALTH PROMOTION

The increasing burden of arthritis-related illness warrants the dissemination of knowledge about the effects of self-care management on this illness (Dominick et al., 2004) and in managing arthritis-related illness, health promotion could play an effective complementary role. Notably, physical activity has become an important provision for management of arthritis-related illness. In the Netherlands, in managing low back pain that is considered to be a symptom of arthritis-related illness, physical activities is a common form of medical advice provided at healthcare centers to alleviate lower back pain (Groenendijk et al., 2007). Frelove-Charton, Bowles and Hooker (2007) found that recommended levels of physical activity improve health-related quality of life among arthritic older people. However, research indicates that the majority of adults with arthritis do not pursue recommended levels of physical activity despite its beneficial effects (Fontaine, Heo and Bathon, 2004). Evidence shows that dietary-related advice also has some benefits for arthritis-related illness, although not all forms of arthritis-related illness are associated with diet. Research also shows that high intake of meat and protein and low intake of fruits, vegetables and vitamin C are associated with increased inflammatory arthritis-related illnesses such as polyarthritis or rheumatoid arthritis (Choi, 2005). Gout, an arthritis-related problem, is also aggravated by specific foodstuffs such as meat, liver, duck/chicken brain, which produce uric acid crystal in the joints (PDRhealth, 2009). Thus, avoiding food containing uric acid might improve or prevent gout-related arthritis conditions.

1.4 HEALTH PROMOTION IN OLD AGE

Literally definitions of health promotion and health education vary. Catford and Nutbeam (1984) state that health education implies the improvement or protection of health through voluntary changes in behavior as a consequence of learning opportunities. Health promotion refers to the improvement or protection of health through behavioral, environmental and socioeconomic changes. However, in this thesis the two terms are used as synonyms. Health promotion is one of the major and essential measures to improve health (Beaglehole and Bonita, 2008) and enables people to make informed choices about health and healthcare (Nutbeam et al. 1993). Health promotion also advances health and healthcare by improving knowledge about known modifiable risk factors of health and illnesses through creating an enabling environment. These activities enable individuals to take control over their own health by encouraging them to pursue available preventive and curative options for healthcare. Furthermore, health

promotion provides knowledge on known modifiable risk factors of ill health such as diet, smoking and physical activity. Health promotion is sometimes viewed as an alternative to the current medical model of healthcare (McWilliam et al., 1999) and health promotion activities play an important role in maximizing the healthy life span (Jenkins, 2003), minimizing the illness burden associated with ageing (Brenner and Arndt, 2004), slowing down functional decline and improving independence (Borglin, 2005; Lee, Ko and Lee, 2006). Research demonstrates that absence of healthy lifestyle, including physical inactivity, is an important risk factor for functional decline and deterioration of independence (American College of Sports Medicine, 2004). Research also shows that adopting a healthier lifestyle by doing more exercise is beneficial even in old age (Ford, Spallek, and Dobson, 2007).

People who exercise regularly are less likely to use inpatient care services, and they incur lower inpatient expenses (Lin, 2008). Preventive health measures benefit all age groups, including the very old (Infeld and Whitelaw, 2002; Agahi, 2008). However, older people are often kept out of health promotion interventions and preventive care, and focus is generally directed towards middle-aged people (Agahi, 2008). This approach needs to change as evidence of the beneficial effects of health promotion and disease prevention in old age is well documented (Vass et al., 2007). Increasingly, prescribing regular physical activity is one of the main non-pharmaceutical measures offered to older people as low rates of physical activity is frequently noticed in this age group (Vogel et al., 2009).

Lifestyle-related health interventions also work in low-income countries (Sarrafzadegan et al., 2009). Research indicates that a number of phenomena need to be considered when it comes to achieving the goals of health promotion activities among older people. These include changing attitudes and behaviors, social and structural change, mobilizing community resources, supporting families to promote healthy and active ageing and encouraging and enabling individuals to adopt healthy behavior (World Health Organization, 2005). It is important to bear in mind that since the elderly population is not a homogenous group, it possesses diversified characteristics that need to be addressed when implementing health promotion activities. Hence, health promotion activities should be diversified based on culture, environment, economic status, age and gender. This can be done by introducing culturally sensitive, environmentally suitable, age-group-specific and gender-sensitive intervention activities. Satariano, Haight and Tager (2002) found that living arrangements i.e living

with spouse or with children and others as well as more social contacts with friends and relatives are important determinants of leisure time physical activity.

Evidence shows that limited primary research on health promotion is conducted in low-income countries as compared to high-income countries thus, information about health and illness as a function of health promotion intervention is scant in the elderly populations in low-income countries (McMichael, Waters and Volmink, 2005). Due to a scarcity of resources and the substantial disease burden in low-income countries, effective health promotion intervention is necessary to reduce the burden of diseases and to improve population health (McMichael, Waters and Volmink, 2005) and preventive measures could potentially be of enormous importance (Nugent, 2008). The growing elderly population, especially in low-income regions of Bangladesh, creates a new group in the public health arena (World Health Organization, 2009; Kabir, 2001).

This is of concern as older people are frequently exposed to various acute and chronic illnesses and is likely to require more healthcare resources. Research indicates that the aging population poses a challenge to health workers, planners and the society (Cheng et al., 2002) as this segment of the population has less access to income-earning activities and is exposed to multiple chronic illnesses. Notably, it is shown that healthcare is not equitably distributed across all age groups. Murray and O'Neill (2009) argue that healthcare is essential equitably for all generations as it is observed that inequity is measured based on gender, education, income, ethnicity and place of residence and ignores ageism.

1.5 SOCIAL AWARENESS AND OLDER PEOPLE

Decline in fertility results in decreased family sizes, which may have repercussions for older people in a country like Bangladesh where the support and care of elderly parents has traditionally been the responsibility of the children (Kabir, 2003). Culturally, sons are expected to take the major role in financially looking after parents and the majority of the primary caregivers i.e daughters-in-law are often responsible for the day-to-day practical and physical assistance of their elderly including preparing and serving food, providing basic forms of care, etc. It has been shown that most of the support in old age is provided by households in low-income countries, and reciprocity plays a key role in sustaining older people (Heslop, 1995; Kabir, 2001).

It is increasingly discussed that, although most older people live in extended families, their relationships with other adult family members are not always favorable and kinship bonds are weakening (Rahman et al., 2007). To improve relationships between

adults and elderly family members, social awareness education could play an important role. Often it is discussed, that in Bangladesh, older people are traditionally considered prime counselors, mediators and decision makers in families and societies, these traditional roles are nevertheless eroding, thereby undermining older people's dignity and status in both society at large and in their own households.

1.6 QUALITY OF LIFE AND HEALTH-RELATED QUALITY OF LIFE IN OLD AGE

Quality of life is a broad concept, and covers a range of domains. The World Health Organization defines quality of life as 'an individual's perception of his or her position in life, in the context of the culture and value systems in which individual lives and in relation to goals, expectation, standards and concerns' (The WHO-QOL Group, 1998). The domains of health-related quality of life (HRQoL) are narrower than quality of life. Quality of life represents overall state of wellbeing, whereas HRQoL represents both generic and disease-specific health-related quality of life. As older people make up an ever-greater proportion of the population, measuring quality of life and health-related quality of life is necessary in order to provide evidence of their self-perceived needs (Tajvar, Arab and Montazeri, 2008). These assessments may enrich knowledge gaps about the determinants of quality of life and health-related quality of life in old age.

Evidence shows that determinants of quality of life and health-related quality life vary across age groups, socioeconomic groups, nations and sexes. A recent qualitative study in Europe indicates that several aspects are associated with quality of life in old age including social relationships, social roles and activities; leisure activities enjoyed alone, health, psychological outlook and wellbeing, home and neighborhood, financial circumstances and independence (Bowling and Gabriel, 2007). A qualitative study conducted in Bangladesh among older people showed that having a role in the family and the community, and being functional both physically and economically are associated with improved quality of life (Nilsson et al., 2005). Poor quality of life in old age is associated with financial hardships, functionally limiting diseases, and lack of trusting relationships (Netuveli et al., 2006). Findings in these studies reveal that financial circumstances, health and social roles are similar aspects in both low- and high-income countries and crucial for quality of life among older people. Wilhelmson et al., (2005) found that social relations, functional ability and activities influence the quality of life of older people as much as their health status.

1.7 SOCIAL CAPITAL AND QUALITY OF LIFE IN OLD AGE

Social capital refers to networks, norms, relationships, values and informal sanctions that shape the quantity and cooperative quality of a society's social interactions, enables people to build communities, to commit them to each other and to knit the social fabric (Field, 2003). Indicators of social capital consist of diverse aspects such as social integration, friendship and valued role, all of which have preventive effects on physical and mental ill-health (World Health Organization, 2005). Over the last twenty years, the issue of social capital has emerged as a crucial indicator in the social, economic and healthcare development arena. Scientists are keen to show the importance of social capital in alleviating poverty, improving social cohesion and in improving health indicators (Yamaoka, 2008). It is widely accepted that possessing good social capital facilitates health and improves quality of life and economic development.

Increasingly, therefore, the importance of social capital is being recognized in the development arena. Many studies have noted a significant association between social capital and health and economic outcomes (Scheffler and Brown, 2008). Social capital can be divided into the three categories - bonding, bridging and linking. In the domain of bonding, social capital refers to ties between people in similar situations, such as immediate family, close friends and neighbors. Bridging social capital consists of more distant ties between similarly minded people, such as acquaintances and workmates. Linking social capital refers to ties between dissimilar people in different situations, such as to those who are entirely outside of the community, thus enabling members to leverage a far wider range of resources than are available in the community (Woolcock, 2001). These three forms of social capital might also be seen as two perspectives. Bonding and bridging social capitals as the horizontal perspective, and linking social capital as the vertical perspective (Engström et al., 2008). Associations between these three forms of social capital and the quality of life of older people are examined in this thesis, where bonding social capital is considered to be close contact with children and decision-making roles in the households. Bridging and linking social capital are considered to be being a member of an organization and having friends to spend leisure time with and voting in the parliamentary election.

1.8 BRIEF PROFILE OF BANGLADESH

Bangladesh is a populous country with a population of almost 150 million people, making it the seventh largest country in the world in terms of population size (CIA World Factbook, 2008). It has a surface area of 147,570 square kilometers (Bangladesh Bureau of Statistics, 2005) and the population density is about 976 per square kilometer. It is also one of the poorest countries in the world where 36% of the population live on less than US\$1 per day (World Bank, 2006). According to the Human Development Index, Bangladesh ranks 139th out of the 192 member countries, with low achievement in education and standard of living indicators based on gross domestic product (GDP), literacy rate and life expectancy (United Nations Development Program, 2005).

1.9 OLDER PEOPLE IN BANGLADESH

Bangladesh is one of the 20 countries in the world with the largest number of older people (United Nations Organization, 2006). Due to substantial improvements in the public health sector, such as a reduction of child mortality over the last two and half decades, life expectancy at birth has increased for both men and women. Thereby the absolute numbers of older people are increasing rapidly in Bangladesh. It is projected that in Bangladesh, the population of 60 years and above will increase from 8.5 million in 2000 to 14 million in 2020 (World Health Organization, 2003). Further, it is projected that the number of older people in Bangladesh will increase tenfold during this century, placing a substantial burden on the health system, especially due to chronic illnesses (Kim and Karar, 2008).

Life expectancy at birth is currently 62 years for men and 63 years for women in Bangladesh (World Bank, 2006) and healthy life expectancy (HALE) at birth is 55.3 years for men and 53.3 years for women (World Health Organization, 2003). Furthermore, research on perceived quality of life, using the SF-36 instrument among adults in a rural area of Bangladesh, showed a gradual deterioration in physical and mental health with advancing age (Ahmed et al., 2002). Research also shows that the prevalence of illness among older people is high in Bangladesh (Kabir et al., 2003; Ahmed et al., 2005). However, due to poverty, many older people do not seek healthcare when they fall ill. In some instances, family members do not provide their sick older members with healthcare because of old age, and older people are simply

considered as unproductive (Chaklader & Kabir, 2003). This scenario of inadequate healthcare of older people was reflected in another study showing that hospitalization among older people with chronic diseases was infrequent (icddr,b, 2007).

At the family level, it has been shown that increasing adult migration from rural to urban areas generates various problems for older people as they are left behind uncared for and lonely (Mostafa and Streatfield, 2003). Nevertheless, the family still plays a key role in taking care of older people in Bangladesh (Kabir, 2001).

1.10 HEALTHCARE SERVICES FOR OLDER PEOPLE IN THE GOVERNMENT SECTOR IN BANGLADESH

Despite the large numbers of older people (≥ 60 years) and a steady rise in terms of proportion of the population, attention given to this segment of the population by policy planners has remained negligible (Kabir, 2001). The national policy on older people is still in its infancy. In the absence of a pro-elderly national policy, inadequate support for older people is offered by both the state and non-governmental organizations (Kabir, 2003). In many low-income countries, older people's health is not prioritized in the health agenda. For instance, at the primary and other levels of healthcare in Bangladesh, older people's healthcare needs are rarely addressed (Kabir, 2001). The scenario at other levels of healthcare is similar.

Age-specific morbidity analysis demonstrates that higher proportions of children and older people suffer from various illnesses compared to adults (18-59 years) (Dilip, 2007). Although these two groups are more vulnerable to illness, the provision of healthcare services is often directed toward children alone (Lloyd-Sherlock, 2004), which is commendable as this is one of the disadvantaged groups. However, it is necessary to provide healthcare to older people as well since they are also disadvantaged. This can help them live longer without debilitating conditions that are aggravated by multiple chronic illnesses. Recent research in China indicates that access to healthcare service throughout life is a strong predictor of increased healthy longevity among older adults (Gu, Zhang and Zeng, 2009). This implies that ignoring healthcare service for older people may shorten their healthy life span. Thus, it is necessary to address the healthcare needs of older people through feasible cost-effective healthcare measures that facilitate prevention and lead to better management of illness in order to enhance their health.

1.11 STATE SUPPORT FOR OLDER PEOPLE IN BANGLADESH

Although there are no systematic state healthcare services for older people, a decade ago the Government of Bangladesh took a generous step by initiating old age allowance (OAA). This scheme provides poor older people (65 years and above) with about US\$3 a month in cash. A recent population-based cross-sectional study conducted on beneficiaries of old age allowance indicates that this financial assistance, albeit small, is improving the economic and social dimensions of older people's health-related quality of life (Research and Evaluation Division, 2008). Importantly, improvement in the social dimension has important repercussions in a society where most of older people live together with intergenerational household members and depend on family for material and emotional support (Kabir, 2001). It is important to note that beyond the old age allowance scheme, some other social security benefits are also offered to the poor and other groups in the form of cash transfers. These include widow, disability and freedom fighter allowances. Of these, widows and disability schemes are offered to the poor irrespective of age. Freedom fighter allowance is paid out, irrespective of economic status and age, to those who took part in the war of independence in 1971. These benefits give a considerable proportion of older people access to social security assistance programs as some of them are awarded irrespective of age. It is also worth mentioning here that, unlike government employees in Bangladesh, no life-long pension scheme is offered to private sector employees. It was found that about 3% of the total elderly population receives a government pension (Rajan, Perera and Begum, 2009). Moreover, most Bangladeshi people are self-employed and work in the agricultural sector. As a result, the provision of systematic social security assistance is unavailable for most of them. In the absence of systematic economic support in later life, the availability of old age, widow, freedom fighter and disability allowances is commendable and might enhance the lives of older people even if only a small amount of money is offered.

1.12 MILLENNIUM DEVELOPMENT GOALS (MDGS) AND OLDER PEOPLE

At the beginning of this century, the Millennium Development Goals (MDGs) were introduced. These are regarded as global pledges to reduce poverty, improve health, education, social aspects, gender disparity and environmental development. However, these pledges do not put any specific focus on older people.

It is observed that, in low-income countries, the MDGs play an important role in forming national health policies and most of the countries set up programs to achieve them. For instance, the government of Bangladesh is committed to fulfilling the Millennium Development Goals. As part of this commitment, a Poverty Reduction Strategy Paper (PRSP) was prepared outlining key programs to achieve the MDGs (Government of Bangladesh, 2005). Non-governmental organizations that promote the welfare of older people are lobbying more and more intensively to have older people's issues incorporated into the MDGs. Thereby older people will eventually receive priority in the national development agenda.

1.13 HEALTH AND ECONOMIC DEVELOPMENT PROGRAMS IN NGOS FOR OLDER PEOPLE IN BANGLADESH

In Bangladesh, a large number of NGOs have long been offering health and economic development programs aimed at different disadvantaged groups. Older people are rarely targeted however and even small-scale efforts made by a few NGOs are limited (Ahmed et al., 2003). Older people's healthcare has not been a major concern in both governmental and NGO entities (Young et al., 2006). Furthermore, most older people are not only excluded from the health services but also from economic development programs such as the microfinance program, which is considered to be an effective anti-poverty tool (HelpAge, 2000). Thus, this disadvantaged group of people remains invisible in most of the health and development programs available.

1.14 THE MODEL OF HEALTH PROMOTION IN THE PHILL PROJECT

This doctoral thesis is performed using data from the Primary Healthcare in Later Life: Improving Services in Bangladesh and Vietnam (PHILL) and Poverty and Health in Ageing (PHA) Projects. A description of these two projects is presented in the methods section. The hypothesis of this doctoral project is that exposure to health promotion activities will improve knowledge, attitude and practice of older persons, their caregivers, family members and healthcare providers about health and healthcare of older people. Older people are hence likely to participate in various health promotion activities such as physical activity and healthy dietary intake aimed at improving the certain modifiable risk factors of health and illness. This will have an impact on the prevalence of illness, healthcare expenditure as well as health-related quality of life.

A model is presented showing health promotion interventions activities in the PHILL adapted from Glanz, Lewis and Rimer (2002) (Figure 1). This model provides an overview of the links between various aspects in relation to compliance with health promotion activities. The key notion is that if individuals are well informed about the potential consequences of illness and ill-health, they are likely to take part in positive healthcare activities in order to avoid the consequences. For instance, increased awareness regarding the probable consequences of ill-health may influence individuals to take positive steps to prevent the onset of symptoms that may arise from certain medical conditions. Nevertheless, individual participation might be influenced by some underlying modifying factors such as age, sex, occupation, education, marital status, culture and self-efficacy. For instance, physical exercise may not be suitable for women in certain cultures, being able to afford healthy food items may be difficult for the poor or some medical conditions may make physical activity impossible. However, inclusion of caregivers, family members and adolescents in the intervention may help to increase self-efficacy as they are likely to provide help in performing health promotion activities.

A discussion of the PHILL intervention model in relation to the Health Belief Model (HBM) is presented in the discussion section, which may provide an overview of how the PHILL intervention is related to the theoretical perspective exemplified by the HBM. However, it is worth noting that the HBM is an analytical model used to analyze the behavior of individuals in relation to health and healthcare. This is why the HBM model has been chosen as the PHILL intervention also focused on behavioral changes

in individuals. A description of the Health Belief Model (HBM) is given in the next section.

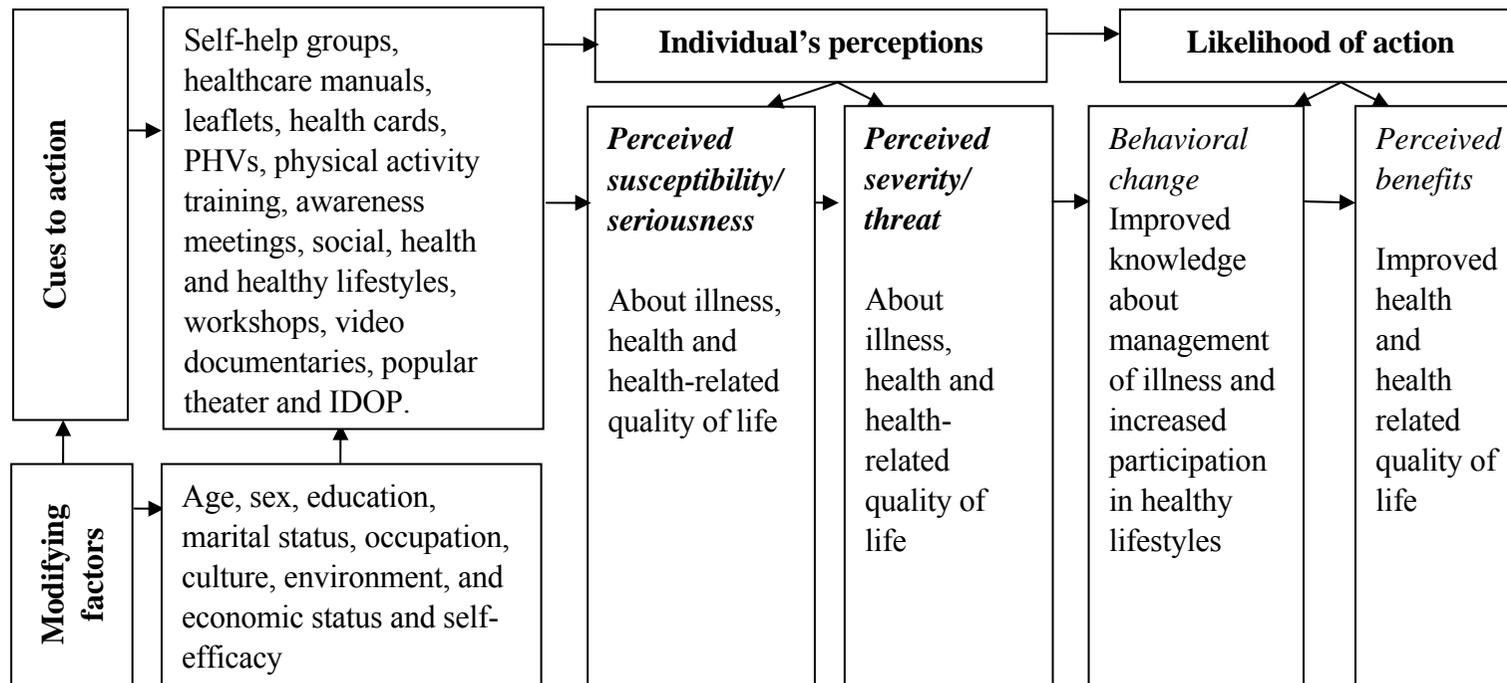


FIGURE 1. Adapted Health Belief Model for PHILL intervention

1.15 THE HEALTH BELIEF MODEL (HBM)

Several analytical models are used to describe the behavior of individuals in relation to health and healthcare. The Health Belief Model is one of the most commonly used. Research shows that this model relates a socio-psychological theory of decision-making to individual health-related behaviors (Harrison, Mullen and Green, 1992). The HBM is a common model and useful analytical framework for assessing individuals' behavior regarding illness, what measures they take to manage illness and any preventive care strategies they may employ. The Health Belief Model explains that whenever individuals are aware of the consequence of ill-health, they are likely to take related healthcare measures to avoid falling ill and to improve their health status.

The model was developed in 1950 by Hochbaum and colleagues and further modified (in the 1970s and 1980s) by Becker and colleagues. The later modifications were done in late 1980s to accommodate evolving evidence generated within the health community about the role played by knowledge and perceptions in modifying personal responsibility (Glanz, Lewis and Rimer, 2002). Basically this model was designed to explain behavioral responses to the treatment received by acutely or chronically ill patients. In recent years the model has been used to explain more general health behaviors (Ogden, 2007). Initially this model consisted of four domains. The first modified version included one more domain and the most recent version proposes six domains. The domains of HBM currently include i) perception about severity of illness and its consequences (perceived seriousness/susceptibility) ii) perceived threat iii) cues to action iv) perceived benefits v) perceived barriers and vi) self-efficacy.

Perceived susceptibility refers to perceptions of medical conditions or health statuses that can negatively affect individuals or families. Perceived threat refers to beliefs about medical conditions or health statuses that could affect people's lives. Perceived benefits refer to the individuals' perception of what the beneficiary will achieve by doing the recommended healthcare activities. Cues to action are factors that might encourage an individual to be active in order to modify the perception of susceptibility and seriousness in relation to health, illness and quality of life. Cues to action might be external and internal, and have an impact on behavior (Butraporn et al., 2004). Perceived barriers refer to potential constraints that may prevent an individual from participating in healthcare related activities. Self-efficacy relates to the ability to perform healthcare related activities that may improve health and prevent illness. Research also indicates that perceived severity motivates individuals to seek healthcare

(Biswas et al., 2006). Rosenstock (1988) found that socioeconomic indicators do not account for much variance in behavior, while various situational and attitudinal aspects, particularly the health belief model and self-efficacy, are better predictors of compliance to healthcare (Rosenstock, Strecher and Becker, 1988).

2 AIMS

The general aims of this thesis are: to evaluate the impact of health promotion on the health of older people; to examine the association between bone and joint diseases and health-related quality of life; and to examine the association between social capital and quality of life among older people in rural Bangladesh.

2.1 SPECIFIC AIMS

- I. To assess whether health education activities reduce the prevalence of arthritis-related illness and related healthcare expenditure and to examine the determinants of increased expenditure on the treatment of arthritis-related illness (Study I);
- II. To examine the association between self-reported and doctor-diagnosed bone and joint diseases and health-related quality of life (HRQoL) and its six dimensions among older people in rural Bangladesh, and to investigate disparities in the associations between doctor-diagnosed and self-reported conditions as well as differences between the sexes (Study II);
- III. To study the impact of health education interventions on overall HRQoL and its six specific dimensions, and to examine the association between demographic and socioeconomic indicators and changes in HRQoL (Study III);
- IV. To examine determinants of quality of life, and associations between both individual and community level social capital and quality of life among older people (Study IV).

3 METHODS AND MATERIALS

3.1 THE PROJECTS: PHILL AND PHA

Studies I, III and IV were performed based on the Bangladesh part of the “Primary Health-care in Later Life: Improving Services in Bangladesh and Vietnam” project known as PHILL. This research project was initiated in October 2002 and ended in December 2005. Researchers from Karolinska Institutet, Sweden, the University of East Anglia, UK, BRAC - a non-government organization in Bangladesh, and Health Strategy and Policy Institute (HSPI), Vietnam, joined hands together to implement the PHILL project which received financial support from the European Commission (EC). The field activities were done in Bangladesh and Vietnam. The other two collaborators, from high-income countries, Karolinska Institutet, Sweden and the University of East Anglia, UK, provided research training and technical support for the staff involved in implementing the project in Bangladesh and Vietnam.

In addition, data for Study II was derived from “Poverty and Health in Aging” known as PHA, a population based study, which is the result of a collaboration between icddr,b: Knowledge for Global Lifesaving Solutions (formerly known as ICDDR,B) and the Aging Research Center at Karolinska Institutet. PHA data were used because in the PHILL project clinical examinations among the study participants were not performed to detect the illness due to a lack of resources, while this was done in PHA. The inclusion of data from clinical examinations in PHA allows a comparison of self-reported and clinically diagnosed data on arthritis-related illness to be made.

3.2 MAP SHOWING STUDY AREAS OF PHILL AND PHA PROJECTS

Both research projects were conducted in the rural areas in Chandpur, which is one of the 64 districts (Figure 2a) of Bangladesh located southeast of the capital Dhaka. PHILL was conducted in the sub-districts Chandpur Sadar and Shahrasti, PHA was conducted in the sub-district Matlab (Figure 2b).

FIGURE 2. Map showing study areas of PHILL & PHA

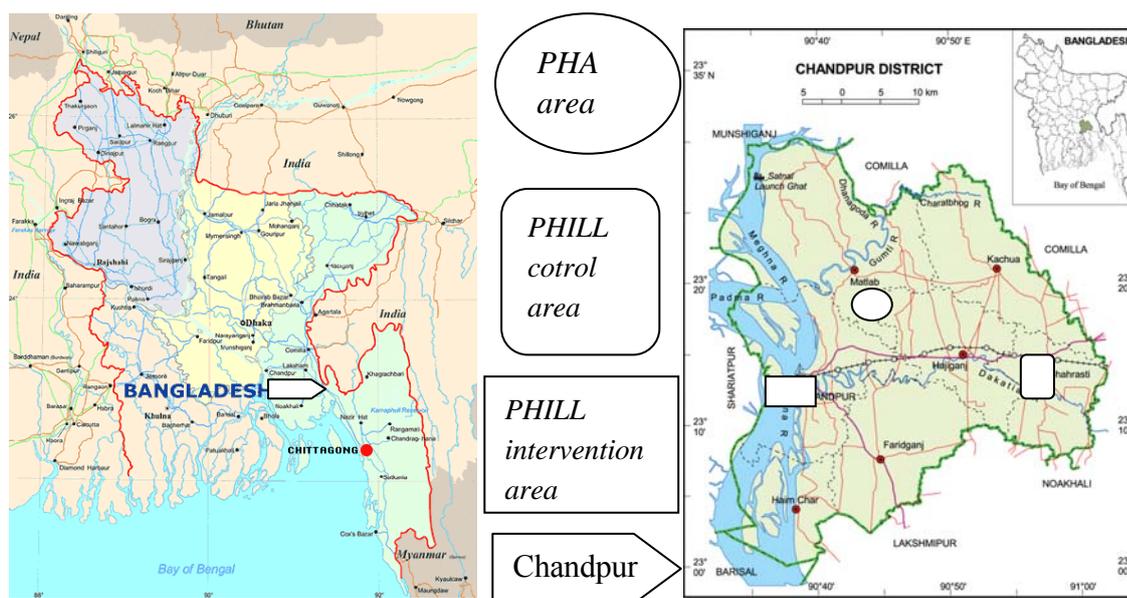


Figure 2a. Map showing location of Chandpur district, PHILL & PHA project site

Source:

<http://asian-university.org/image/map-bangladesh>

Figure 2b. Map showing study areas of PHILL and PHA projects

Source:

<http://Banglapedia.search.com.bd>

3.3 PRIMARY HEALTH-CARE IN LATER LIFE: IMPROVING SERVICES IN BANGLADESH AND VIETNAM (PHILL)

3.3.1 Aim of PHILL project

The aim of the PHILL project was to improve health and health-related quality of life among older people in low-income countries by providing community-based health promotion and social awareness interventions. These interventions focused primarily on three non-economic components. These were social awareness, healthcare management and health awareness education. Interventions were offered to older people themselves, their primary caregivers, local healthcare providers and community people. PHILL in Bangladesh focused in particular on arthritis-related illness as the tracer condition.

3.3.2 Data collection in PHILL

Using a structured questionnaire, baseline and post-intervention data were collected on socio-economic and demographic characteristics, knowledge, attitude and practice (KAP) in elderly care, morbidity and health-seeking behavior, functional ability, social network and support as well as health-related quality of life (HRQoL). A generic instrument was developed to assess HRQoL among older people that included 24 items covering six different dimensions: physical, psychological, social, spiritual, economic and environmental.

Data collected at the pre-intervention phase or baseline provided an opportunity to design the intervention activities and intervention tools. For instance, the baseline survey showed that arthritis-related illness was highly prevalent; about 80% of the older people reported that they suffered from some form of arthritis-related illness, referred to in Bangla as *bat* (Ahmed, Rana and Kabir, 2003). This information motivated the researchers to consider this illness as a tracer condition during the intervention phase. Thus, specific interventions are considered and provided for the management of arthritis-related illness.

3.3.3 Health-related quality of life (HRQoL) for older people

In the absence of suitable instruments for assessing health-related quality of life among older people in low-income countries, an initiative was taken to develop a new

instrument for assessing HRQoL (Nilsson, Zaman and Kabir, 2004; Nilsson, 2005). This instrument was developed based on a literature review of previously developed instruments and a qualitative study among older people in rural Bangladesh (Nilsson et al., 2005). Based on this review and qualitative research, an English version of an instrument was developed. Translation and back translation were then done to check whether the translation procedures yielded similar meaning for each of the selected items.

3.3.4 Use of local words in data collection

In extracting data, the selection of commonly used local words makes it easier to collect reliable information. To this end, the two Bangla words *bat* and *dinkal* were used to help extract relevant information appropriately. These words were used in labeling primary outcomes of Studies I and IV respectively. For instance, arthritis-related illness is commonly known in Bangladesh as '*bat*'. During data collection the use of this word made it easier for the participants to recognize the medical condition. Another important term used in this study was 'quality of life', an outcome of Study IV. It is worth noting that there is no direct equivalent expression in Bangla for quality of life. A qualitative study was conducted to explore an understandable and a meaningful expression for the concept of quality of life (Nilsson et al., 2005). This study found that the word '*dinkal*', a Bangla word, expressed the meaning of the concept of quality of life appropriately. Hence, this word was considered to be an appropriate word in assessing quality of life among older people (Study IV).

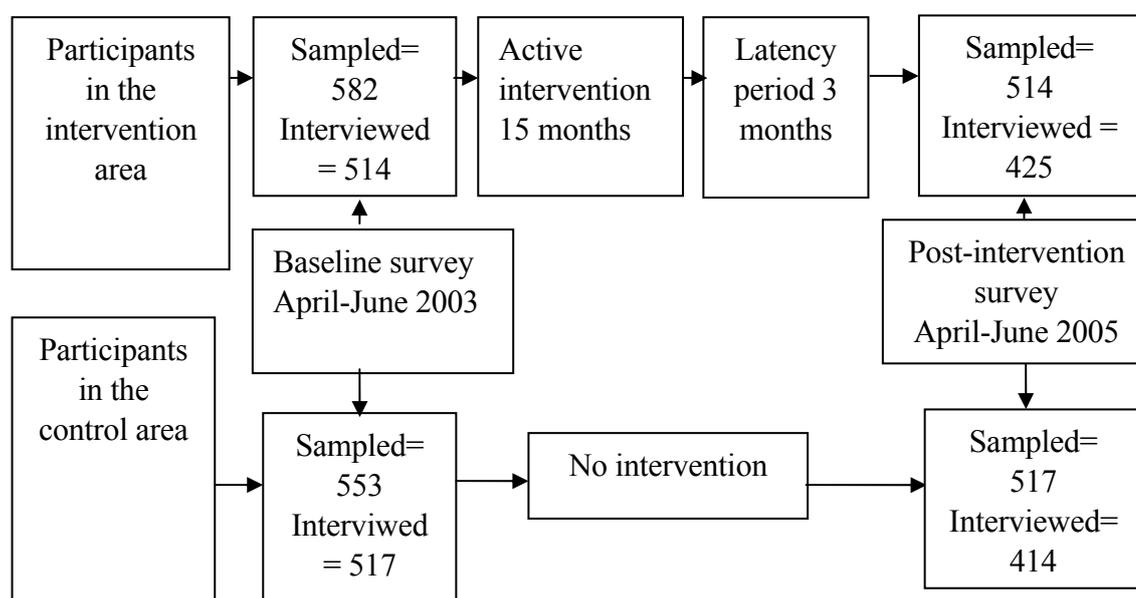
3.3.5 Sampling of Studies I, III & IV

Sample size was determined to detect differences between areas and groups of 9% or more with a power of 80% and 95% confidence interval. This yielded 800 older people for the study distributed equally into intervention and control areas. However, to take into account attrition, 1,135 older people residing in the selected eight villages were selected. The intervention and the control areas were located in two different sub-districts about 25 kilometers from each other, Chandpur Sadar and Shahrasti, where BRAC (a non-government organization) and the government offered primary healthcare services.

These two sub-districts were purposively selected as researchers involved in the PHILL project had past experience of them and both government and BRAC primary healthcare services were available. From each of the two sub-districts, four villages

were then randomly selected for study. All of the older people (age ≥ 60 years) living in these randomly selected villages were included. Figure 3 shows that 514 elderly persons from the intervention and 517 from the control area participated in the baseline survey. In the intervention area, intervention was provided from October 2003 to December 2004. At post-intervention, 425 elderly persons from the intervention and 414 from the control area took part in the survey with response rates of 83% and 80% respectively. Studies I and III included both baseline and post-intervention data while for Study IV only baseline data was used.

FIGURE 3: Flow chart of sampling of Studies I, III & IV



3.3.6 A description of the PHILL intervention activities and dissemination methods

Duration of intervention

The PHILL project lasted for 3 years including 18 months of intervention of which 15 months were active intervention followed by a 3-month latency period prior to post-intervention data collection.

The intervention

The three intervention components included social awareness, healthcare management and health awareness. Intervention activities were disseminated in different settings such as in small group meetings at the villages, workshops at the PHILL office premises, individual counseling at home, known as preventive home visits (PHVs), at self-help group meetings, by showing a video documentary, performing popular

theater, distributing leaflets and posters as well as celebrating the International Day of Older People (IDOP). Potential outcomes of this intervention were improved lifestyles such as healthier diet and more physical activity, resulting in less arthritis-related illness, less healthcare expenditure on arthritis-related illness and improved health and health-related quality of life (HRQoL).

Manual of health promotion intervention

A manual on healthcare management was developed and followed during the training and counseling sessions. It included all the necessary instructions related to management of various illnesses. This was a key source of information for the health workers who were involved in implementing the intervention activities. The manual was developed in consultation with different stakeholders such as health care providers, caregivers and older people themselves. A physician was assigned to develop the manual, which was seen as a reference book for health workers. The manual comprised basic instructions regarding the management of various illnesses. These included arthritis-related illnesses such as rheumatoid arthritis, osteoarthritis, gout and back and joint pain. Management of arthritis-related illness was the primary focus of the intervention as this type of illness was highly prevalent in the study population. In addition, management of gastric problem, diabetes, high blood pressure, and constipation were also included in the manual.

Physical activity

Training on home-based physical activity was provided to the older people, their caregivers and healthcare providers in different forums. Home-based physical activity included simple exercises such as: sitting down and standing up from a chair, rotating hands, and pushing hands against the wall. The participants were advised to perform these exercises based on their physical ability. Hence, the duration of physical activity was not determined. In addition, older people were encouraged to go walking and swimming. It is worth noting that most older people in rural areas of Bangladesh wash and bathe in a nearby open body of water such as pond or river (see also in Kabir, 2001), providing them with an excellent opportunity to take physical exercise.

Dietary and other aspects of health care management

Dietary instructions included advice to reduce salt and fatty food intake, and to increase intake of vegetables and fruits. Other health care management advice included not working for long periods sitting down, avoiding lying down on a soft bed, and not carrying water-filled pitcher on the waist. In rural areas of Bangladesh, fetching water from the tube well or pond by pitcher is common among women.

Preventive home visits (PHVs)

Preventive home visits were made once a week by the health workers who involved in implementing the intervention activities. Research indicates that preventive home visits play an important role in improving health and healthcare among older people (Vass et al., 2005) as well as cost effective and justified by the outcomes such as Quality-adjusted Life years or QALY (Sahlen et al., 2008). Information related to healthcare management was provided during the visits.

Formation of Self-help Groups (SHG)

Self-help groups were formed at several locations in the intervention villages to disseminate intervention activities. This also provided the older people with somewhere to meet. The idea of self-help groups came from Vietnam, one of the collaborators in the PHILL project, where the practice is common. These clubs allow older people to spend their leisure time with each other discussing life issues and various aspects of healthcare management. Formal meetings were conducted once a month in presence of a health worker involved in the PHILL project. He or she played a facilitating role during SHG meetings.

Various books, magazines and newspapers were provided to the SHG from the project. It is worth mentioning that daily newspapers are seldom available in Bangladeshi villages. Thus, the proportion of newspaper readers in rural areas is very low. A healthcare management manual prepared for the intervention activities was distributed at SHG meetings and served as a reference guide for the management of various illnesses.

Distribution of health cards

Each older person received a health card to record their day-to-day health problems, episodes of illnesses and information on healthcare management. Older people, the caregivers and younger members of the household were advised to note down the health-related information on the health card in the form of a short description about episodes of illness and the healthcare received. This card helped in identifying the healthcare needs of the older people. Health workers involved in implementing the intervention activities checked the health cards during their preventive home visits and provided necessary advice and counseling based on the recorded information on the health card and on their discussions with the older people and their caregivers.

Distribution of leaflets and posters

Information related to the intervention activities was also disseminated in the form of leaflets and posters. These materials were prepared at various junctures during the intervention period and distributed in the intervention villages.

Popular theater

Popular theater was considered as a way of disseminating awareness-related information in the intervention area. This involved local female and male theater performers raising awareness about older people's health and healthcare as well as the contributions made and challenges faced by older people in their household and in the local community. Popular theater is a performance art for raising awareness on various social and health issues by providing entertainment (Rafi, 2003). To extend coverage and increase participation in the theater sessions, the sessions were arranged at several locations in the intervention villages.

Video documentary

Another information disseminating tool was video documentary. A documentary was produced involving renowned television and film actors and actresses. This documentary highlighted the contributions made and challenges faced by older people in their household and local communities as well as their health and healthcare needs. The video documentary was shown to the older people themselves, their informal caregivers, other household members and the community people at various fora.

Workshops

A number of workshops were conducted with the government staff, government healthcare personnel and NGO staff working in the study area during the intervention period. Workshops were also conducted involving older people, their caregivers and community people. The objectives of the workshops were to sensitize the participants as regards the challenges faced and contributions made by older people in the household and the local community as well as their health and healthcare needs.

Celebrating International Day of Older People (IDOP)

Each year during the intervention period on 1 October, IDOP was celebrated in the intervention villages. This celebration included holding rallies, distributing posters and leaflets to raise awareness about aging issues. People from diverse backgrounds, such as students, professionals, workers, government employees and older people took part in the rallies. Following the rallies, a discussion session was conducted in the intervention villages. The agendas of the discussion sessions included the importance of health education in later life, the role of household members, the local community and

the government as regards older people in society. Besides, a token gift was provided to ten older people and ten caregivers who had performed the health education intervention activities as advised.

Participants in the intervention

The intervention activities were provided for older people, their informal caregivers, adolescents, household members and healthcare providers in the intervention area. The inclusion of caregivers, younger household members and healthcare providers was expected to maximize benefits from the intervention activities. Caregivers and adolescents in the household helped the older people to take home-based physical exercise, to ensure they followed dietary instructions and to write down information on the health cards.

A reason for including healthcare providers in the intervention was because non-qualified and semi-qualified practitioners of allopathic medicine constitute the largest group of healthcare providers in rural Bangladesh (Ahmed et al., 2005). These practitioners provide healthcare for a substantial number of patients across different age groups, and most of them lack formal professional training (Ahmed, 1993). As a result, healthcare services offered by unqualified practitioners may have adverse consequences for the health of the population. However, no systemic approach is in place to improve the professional skills of these healthcare providers. Hence, providing basic training is necessary to improve their professional skills. It is worth noting that in the absence of systematic monitoring and regulatory systems, the increase in untrained medical practitioners is substantial and is naturally of concern for population health in general. To improve basic knowledge on healthcare management of older people, this training was directed at the healthcare providers and the training sessions were conducted by a qualified physician.

3.4 POVERTY AND HEALTH IN AGING PROJECT (PHA)

3.4.1 Aim of PHA project

This project aims to explore how biological, environmental and social factors are interrelated in the aging process (Ferdous, 2007).

3.4.2 Data collection in PHA

In PHA, cross-sectional data were collected during 2003-2004. The data collection took place at two consecutive phases. In the first phase, face-to-face interviews were conducted at the homes older people. On a separate day, complete physician-led medical examinations of the older people were performed at a nearby health center. During the survey, data were collected on self-reported health, self-reported illnesses, HRQoL, physical and cognitive function, social activities, and role of the older people, depression, nutritional status, demographic, and socioeconomic information.

3.4.3 Setting of the PHA project

An international research organization known as icddr,b has been conducting a demographic surveillance system (DSS) in Matlab since 1966. Here the PHA project was implemented. DSS collects information on vital events such as birth, death, migration, illness episodes and prevalence of contraceptive use (Young et al., 2006). For administrative purposes all the villages in the DSS area are divided into seven blocks where icddr,b provides health services in four of the seven blocks and the government provides services in the other three blocks. In PHA, two blocks were purposively selected from the four blocks where icddr,b provides maternal child health services.

3.4.4 Sampling of Study II

Eight hundred and fifty older people (≥ 60 years) were randomly selected from the villages located in the two purposively selected research blocks. Of these, 625 were interviewed in their homes, so the non-response rate was 25%. The older people who took part at baseline survey were invited to attend for a clinical examination at a nearby health center, and 473 participated. The non-response rate at the clinical examination was 24%.

3.5 STUDY VARIABLES AND DATA ANALYSES

3.5.1 Categorization of independent and dependent variables

3.5.1.1 Independent variables

Economic status: A household owning <0.5 acre of land including homestead and depending on labor-selling activities for 100 days in a year was considered as poor otherwise non-poor.

Self-rated poverty status: The information was collected by asking about the status of the household's annual expenditure in relation to the total income. The information was categorized into two groups such as deficit and non- deficit households.

Individual income: Continuous (in Bangladesh currency).

Household food expenditure: Continuous (in Bangladesh currency).

Household size: Number of persons in the household.

Literacy: Those reporting ability to read and write Bangla language were considered as literate.

Some formal education: Some formal education represents those who attended school.

Occupation: Occupation held for the longest period by the individual was considered primary occupation of the individual and divided into paid and unpaid work.

Marital status: Marital status was categorized into currently married and single. The single group mainly represents widows, widowers, divorced and separated.

Bone and joint diseases: Bone and joint diseases indicated by all forms of arthritis, joint and back pain both doctor diagnosed and self-reported.

Based on the following questions arthritis, back and joint pain were determined during clinical examination:

Back pain: Do you have any back pain? And where is it exactly?

Arthritis: Have you been diagnosed as having arthritis? Do you have painful or stiff joints? And are your joints ever swollen? The three illnesses were dichotomies, i.e. present or absent.

Study group: Presence or absence of intervention and compliance or non-compliance within the intervention area.

Construct of social capital

Individual level social capital was constructed based on four questions: i) contact with children living in the same compound ii) whether the individual had decision making roles in the household iii) if the older people visited neighbors in their leisure time iv) whether the individual had friends with whom to spend leisure time.

Categories of individual level social capital

Low social capital: Those who responded any one of the above indicators positively.

Medium social capital: Those who responded any two of the above indicators positively.

High social capital: Those who responded three or four of the above questions positively.

Community-based social capital was constructed based on two questions i) whether the individual had membership in any community organizations, and ii) whether the individual voted in past parliamentary election in 2001.

Categories of community level social capital

Low social capital: Those who responded no positive answer on the above two questions.

Medium social capital: Those who responded one of the above questions positively.

High social capital: Those who responded two of the above questions positively.

3.5.1.2 *Dependent variables*

Study I

- i) *Self-reported arthritis-related illness:* Indicated by presence of all forms of arthritis, joint and back pain
- ii) *Health-care expenditure:* Both mean expenditure and change in expenditure on treatment of arthritis-related illness were considered as outcome variables. i) if the expenditure was reduced in the follow-up or remained the same in both periods were merged together and considered as positive outcome ii) an increased expenditure in the follow-up was considered as negative outcome.

Study II

- i) *HRQoL scores*: Scores of each of the six dimensions of HRQoL and the aggregate score of all the dimensions considered as overall HRQoL score.

Study III

- i) Change over time in health-related quality of life scores was analyzed based on mean scores as well as by that i) remained unchanged ii) increased or iii) decreased for the six individual dimensions i.e physical, psychological, social, spiritual, economic and environment as well as the overall HRQoL. These three categories were dichotomized into i) those with increased HRQoL scores, and ii) those with decreased or unchanged scores.

Study IV

- i) Quality of life was assessed based on a global question and four alternative response options such as very good, good, very bad and bad. Very good and good responses are merged together and considered as good quality of life. Similarly very bad and bad responses are merged together and indicated as poor quality of life

3.5.2 Data analyses

Bi-variate and multivariate analyses were performed. The statistical tests included chi-square test, independent t-tests, analyses of variance (ANOVA), logistic regression, hierarchical logistic regression and multiple hierarchical linear regression analyses (Table 1). Bi-variate (descriptive) statistical analyses allowed examining similarities and differences in socioeconomic and demographic profiles and outcomes of interest both between and within groups to be examined. The multivariate statistical analyses were done to examine associations between covariates and outcomes of interest and to examine determinants of outcomes of interest. Intra-cluster correlation analyses (ICC) were done to examine potential clustering effects.

TABLE 1. Independent variables, outcomes and statistical analyses in the four studies.

Study	Study design	Independent variables	Outcomes	Statistical analyses
I	Intervention	Age, sex, economic status, occupation, marital status, education, self-rated economic status, study groups	Arthritis-related illness, healthcare expenditure on arthritis-related illnesses	Chi-square test, independent t-tests, pair sampled t-tests, ANOVA and logistic regression
II	Cross-sectional	Age, sex, economic status, occupation, marital status, education, individual income, household expenditure on food items, household size, self-reported back and joint pain, doctor-diagnosed back and joint pain and arthritis	Health-related quality of life (HRQoL) i.e physical, psychological, social, spiritual, economic and environment dimensions and overall HRQoL	Chi-square test, independent t-tests and hierarchical linear regression
III	Intervention	Age, sex, marital status, literacy, economic status and study groups	Change in health-related quality of life i.e physical, psychological, social, spiritual, economic and environment dimensions and overall HRQoL over time	Chi-square test, independent t-tests, pair sampled t-tests, logistic regression and intra-cluster correlation coefficient
IV	Cross-sectional	Age, sex, marital status, education, economic status, individual and community level social capital	Quality of life based on a single global question	Chi-square test and logistic regression

3.6 ETHICAL APPROVAL

Ethical approval for the studies were obtained from the Bangladesh Medical Research Council (BMRC) and icddr,b in Bangladesh and Karolinska Institutet in Sweden (DNR 340/02 and 264/03). Informed consent was obtained from the study participants prior to the commencement of the study. The three fundamental domains of informed consent information, confidentiality and autonomy were ensured. This was confirmed by providing information about the aims of the study, assurance of anonymous data analyses and ensuring the right to withdraw from the study without further explanation. Furthermore, assurance was given that discontinuation from the study would not influence any benefits from the research project in the intervention area. Most of the study participants in the study areas were illiterate, hence verbal consent was solicited instead of written consent. However, it is worth noting that informed consent was obtained in two ways e.g., directly from the study participants as well as from the head of the households whenever this was felt to be necessary. This procedure was important in cases where older people live together with their children. Hence, sometimes consent was required from key household members, especially when collecting data from female respondents.

4 RESULTS

4.1 SOCIO-DEMOGRAPHIC PROFILE OF THE STUDY PARTICIPANTS BY STUDY AREAS IN PHILL

4.1.1 Studies I & III

A brief profile of the study participants, divided into intervention and control groups, of Studies I and III is provided in Table 2. Results show that between intervention and control groups a significant difference was observed in marital and economic status where a higher proportion of married persons belonged to the intervention area. Contrary, a higher proportion of non-poor participants belonged to the control area.

TABLE 2. Socio-demographic profile of the study participants by intervention and control areas (Studies I & III)

Indicators	Intervention Area N=425	Control Area N=414	p value
<i>Sex (%)</i>			
Men	57	54	ns
Women	43	46	
Mean age (sd)	70.6 (7.2)	71.3 (7.3)	ns
<i>Education (%)</i>			ns
Literate	38	38	
Illiterate	62	62	
<i>Marital status (%)</i>			
Married	65	57	<0.05
Single	35	43	
<i>Economic status (%)</i>			
Poor	44	31	<0.01
Non-poor	56	69	

4.1.2 Socio-demographic profile of the study participants by compliance (Studies I & III)

Note that in the following analyses participants of the intervention area were stratified into two groups e.g., compliant and non-compliant based on reported compliance with the intervention activities. Table 3 shows that the mean age of the older people in the compliant group was significantly lower than in the non-compliant and the control groups ($p < 0.05$). Illiteracy was significantly higher in the non-compliant group, and the majority of the older people were involved in unpaid work across all the three groups. The majority of older men reported themselves to be married and the majority of older women were single (mainly widowed). Further, the proportion of poor older people was significantly higher in the compliant and the non-compliant groups compared to the control group. Similarly, self-rated poverty status was distributed such that the majority of the older people from the compliant and non-compliant groups reported the economic state of their household as being in deficit compared to the control group.

TABLE 3. Socio-demographic profile of the study participants by compliance (Studies I & III)

Indicators	Compliant (1) n=315	Non-compliant (2) n=110	Control (3) n=414	p value (1) vs (2)	p value (1) vs (3)
Men (%)	63	42	54	<0.001	<0.05
Women (%)	37	58	46	<0.001	<0.05
Mean age (sd)	70.2 (7.1)	71.9 (7.6)	71.3 (7.3)	<0.05	<0.05
<i>Age group</i>					
60-64	26	20	18	ns	<0.05
65-69	28	24	29	ns	ns
70-74	26	21	28	ns	ns
75 and above	19	36	25	<0.01	ns
Illiterate (%)	57	74	63	<0.001	ns
Paid work (%)	35	23	19	<0.05	<0.001
<i>Married (%)</i>					
Men	92	80	86	<0.05	<0.05
Women	24	33	29	ns	ns
<i>Economic status</i>					
Poor (%)	42	52	31	<0.05	<0.01
<i>Self-rated household economic status (deficit %)</i>					
	56	56	42	ns	<0.001

4.2 IMPACT OF HEALTH PROMOTION ON SELF-REPORTED ARTHRITIS-RELATED ILLNESS (STUDY I)

4.2.1 Prevalence of self-reported arthritis-related illness (Study I)

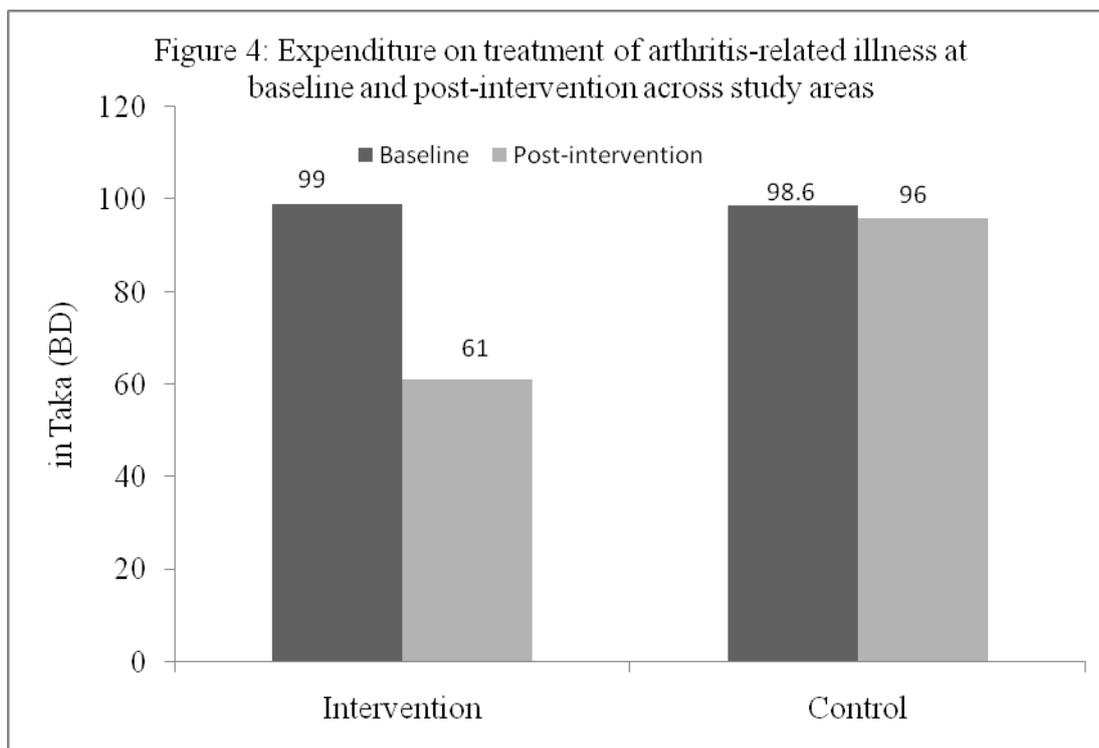
Table 4 shows that a majority of the older people reported that they had suffered from some form of arthritis-related illness (mostly joint pain) during the month preceding the interview at both baseline and post-intervention surveys. The prevalence was found to be significantly higher in the control area at both baseline and post-intervention periods. Further, at the post-intervention stage, the older people who adhered to any of the given health education instructions reported a significantly lower prevalence of arthritis-related illness compared to the older people in the non-compliant and control groups.

TABLE 4. Prevalence of arthritis-related illness at baseline and post-intervention across study participants

Study period	Intervention area		Control area n=414	p value	
	Compliant n=315	Non-compliant n=110		(1) vs (2)	(1) vs (3)
	(1)	(2)	(3)	(1) vs (2)	(1) vs (3)
Baseline, 2003	76	80	85	ns	<0.001
Post-intervention, 2005	71	81	83	<0.05	<0.001
p value	ns	ns	ns		

4.2.2 Change in expenditure related to self-reported arthritis-related illness (Study I)

In examining the impact of health promotion on expenditure related to self-reported arthritis-related illness, both bi-variate and logistic regression analyses were performed. In the bi-variate analyses, study participants were divided into intervention and control groups. Figure 4 shows that in the intervention area, expenditure on treatment of arthritis-related illness was significantly ($p < 0.001$) reduced at post-intervention. By contrast, in the control area, expenditure on treatment of arthritis-related illness remained unchanged at post-intervention.



US\$1= 65 Bangladeshi Taka in 2005

4.2.3 Determinants of increased expenditure on self-reported arthritis-related illness (Study I)

In logistic regression analyses the participants in the intervention area were stratified into compliant and non-compliant groups. Four models were constructed: individual models for each of the three groups, i.e compliant, non-compliant and control, and a combined model for all the groups. Table 5 displays the results of the combined model showing that the probability of increased expenditure on treatment was significantly higher (OR: 2.0, 95% CI 1.4-2.8) in the control group compared to the compliant group. No other factors showed any significant association in the combined model.

TABLE 5. Odds ratio of increased expenditure of arthritis-related illness across study participants

Study participants	OR	95% CI	p value
Compliant (reference)	1	-	-
Non-compliant	1.31	0.8-2.1	ns
Control	2.0	1.4-2.8	<0.001

Adjusted for age, sex, marital status, literacy, economic status and self-rated poverty status

4.3 ASSOCIATION BETWEEN BONE AND JOINT DISEASES AND HEALTH-RELATED QUALITY OF LIFE (STUDY II)

4.3.1 Profile of the study participants in PHA

Study II examined association between bone and joint diseases indicated by arthritis-related illness and health-related quality of life based on cross-sectional data. In Table 6, the study sample is described by the demographic and socioeconomic indicators. No significant age difference was detected between men and women. The proportion of study participants with formal education and involved in paid work was however significantly more common among men. A significantly higher proportion of men were married, and men had significantly higher incomes than women. Further, a significant difference between men and women favoring men regarding individual income was also noted among those involved in paid work.

TABLE 6. Demographic and socioeconomic characteristics of the study participants in the PHA project

Indicators	Men n=212	Women n=259	All N=471
Mean age in years (SD)	69.2 (6.9)	69.1 (7.1)	69.1(6.9)
<i>Education (%)</i>			
Formal education	58 ^a	22	38
<i>Present occupation (%)</i>			
Paid work	55 ^a	7	29
<i>Marital status (%)</i>			
Married	93 ^a	29	58
Mean household size (persons in household)	5.3 (2.6)	5.2 (2.6)	5.2 (2.6)
Mean income (all) (<i>in Taka</i>) (SD)	1,125(1,811) ^a	60 (354)	540 (1,350)
Mean income among persons involved in paid work (<i>in Taka</i>) (SD)	1,827 (2,141) ^b	508 (876)	1,642 (2,067)
Mean household expenditure (<i>in Taka</i>) (SD)	105 (82)	100 (81)	103 (81.7)

US\$1=60 Bangladesh Taka in 2003; ^a p<0.001; ^b p<0.01

4.3.2 Predictors of health-related quality of life (Study II)

The results of the hierarchical linear regression analyses are shown in Table 7. The first two blocks of self-reported and doctor-diagnosed pain and arthritis variables accounted for almost 20% of the variation in the overall HRQoL scores. In follow-up analyses, the entry order of blocks 1 and 2 were reversed. When the self-reported indicators were entered first, joint pain was a significant predictor of lower scores across the physical, psychological, social, environmental and overall dimensions, as was self-reported back pain for the physical, psychological, economic and overall scores. When these predictors were instead entered at the second step, the results were largely similar. Except for joint pain, the doctor-diagnosed arthritis and pain variables were unrelated to the HRQoL measures after accounting for the self-reported measures. Reversing the entry order, however, resulted in several significant negative associations. When entered first, arthritis predicted lower scores in the physical, psychological, and overall dimensions, back pain in the environmental score, and joint pain in the physical, psychological, economic, environmental dimensions and overall HRQoL scores. In the third and fourth steps, socioeconomic and demographic indicators were included but the results are not shown.

In the fifth step, the sex-by-self-reported joint and back pain interaction terms were entered. A significant effect was that women with joint pain scored lower on the environmental dimension, and women with self-reported back pain scored lower on the psychological and environmental dimensions and on the aggregate HRQoL score. In the step six, sex and doctor-diagnosed medical conditions were considered and the results are not shown as no significant association was noted. At the seventh and final step, the age-by-sex interaction term was entered. Finally, it was found that women of older age had lower scores in the physical, psychological, spiritual, economic and environmental dimensions and for the aggregate HRQoL scores. The total variation accounted for by the predictors varied by dimension from 7 to 36%.

TABLE 7. Results of hierarchical linear regressions examining association between bone and joint disease and health-related quality of life

Block and predictor variables	Health-related quality of life dimensions and aggregate measure													
	Physical β	R ² Change	Psychological β	R ² Change	Social β	R ² Change	Spiritual β	R ² Change	Economic β	R ² Change	Environment B	R ² Change	Overall β	R ² Change
1. Self-reported:														
Joint pain	-0.26 ^a		-0.18 ^a		-0.11 ^c		-0.03		-0.07		-0.16 ^b		-0.24 ^a	
Back pain	-0.38 ^a	0.28 ^a	-0.18 ^a	0.09 ^a	-0.07	0.02 ^b	0.02	0.00	-0.12 ^c	0.02 ^b	-0.03	0.03 ^b	-0.26 ^a	0.17 ^a
2. Doctor-diagnosed:														
Arthritis	-0.07		-0.08		0.00		0.10		-0.04		-0.08		-0.07	
Joint pain	-0.13 ^c		-0.06		-0.10		-0.03		-0.06		-0.13 ^c		-0.14 ^c	
Back pain	0.06	0.00 ^b	0.01	0.01	0.05	0.01	0.07	0.01	-0.03	0.01	0.05	0.03 ^b	0.05	0.03 ^b
5. Sex \times self-reported joint pain														
Sex \times self-reported back pain	-0.14		-0.12		-0.05		0.13		-0.07		-0.25 ^c		-0.17	
7. Sex \times age														
Total R ²	-1.10 ^b	0.01 ^b	-1.10 ^b	0.01 ^b	-0.45	0.00	-1.20 ^c	0.011 ^c	-1.10 ^c	0.011 ^c	-1.02 ^c	0.01 ^c	-1.46 ^a	0.02 ^a

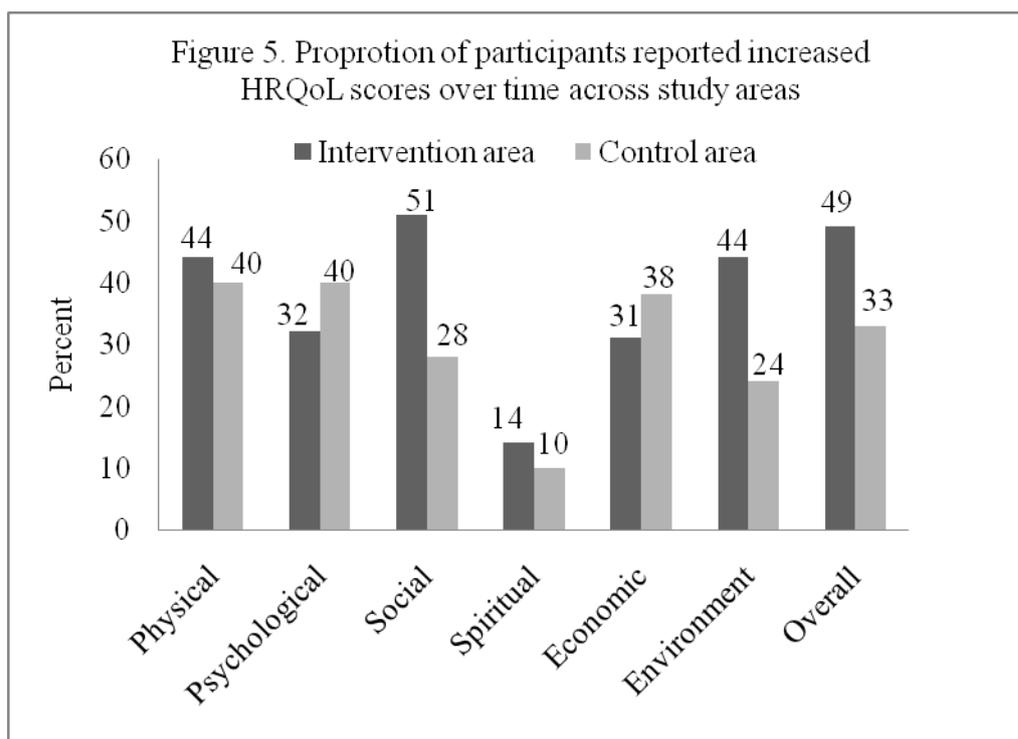
Significance levels: ^cp < 0.05, ^bp < 0.01, ^ap < 0.001

Adjusted for age, sex, education, marital status, family size, individual income, household food expenditure and occupation

4.4 CHANGE IN HEALTH-RELATED QUALITY OF LIFE AS A FUNCTION OF HEALTH EDUCATION (STUDY III)

4.4.1 Change in health-related quality of life (Study III)

Health-related quality of life was assessed based on six dimensions and overall HRQoL. These included physical, psychological, social, spiritual, economic and environment dimensions. In the bi-variate analyses, participants were divided into two groups - intervention and control. In the multivariate analyses, participants in the intervention group were further stratified into compliant and non-compliant groups as in Study I. Figure 5 shows that in the intervention group, HRQoL scores were significantly increased in social, environmental and overall scores. On the other hand, in the control group, HRQoL scores were significantly increased in the psychological and economic dimensions.



4.4.2 Determinants of increased health-related quality of life (Study III)

Multivariate logistic regression analyses were performed to examine the odds of reporting increased HRQoL scores. Results showed that, in the non-compliant group, the probability of increased HRQoL scores was less likely only in overall HRQoL. In the control group, the probabilities of increased scores were less likely in the physical, social, spiritual, environment dimensions and overall HRQoL (Table 8).

TABLE 8. Odds ratios of increased scores in the specific dimensions of HRQoL and overall scores

Dimensions	Compliant	Non-compliant OR 95% CI	Control OR 95% CI
Physical	1	0.65 (0.42-1.0)	0.73 ^c (0.54-0.99)
Psychological	1	0.61 (0.37-1.0)	1.2 (0.9-1.70)
Social	1	0.92 (0.59-1.4)	0.37 ^a (0.27-0.50)
Spiritual	1	0.92 (0.46-1.8)	0.60 ^c (0.34-0.94)
Economic	1	0.77 (0.46-1.3)	1.2 (0.9-1.70)
Environment	1	0.71 (0.45-1.1)	0.36 ^a (0.26-0.49)
Overall	1	0.52 ^b (0.32-0.82)	0.44 ^a (0.32-0.59)

Adjusted for age, sex, education, marital and economic status

^a p<0.001; ^b p<0.01; ^c p<0.05

4.5 ASSOCIATION BETWEEN SOCIAL CAPITAL AND QUALITY OF LIFE (STUDY IV)

4.5.1 Profile of the study participants

This cross-sectional study examined the determinants of quality of life for older people. Quality of life was assessed using a single global question. Furthermore, associations between individual and community levels of social capital and quality of life were examined (Study IV). The profile of the study participants is presented in Table 9. It shows that the mean age was similar between men and women. Illiteracy was higher among women compared to men. Nearly one fifth of the men and women reported having primary education. Only 2% of the women had secondary level of education compared to 30% of the men. A significantly higher proportion of men were currently married compared to women. About one third of the study participants reported low economic status of their households.

TABLE 9. Demographic and socio-economic profile of the study participants in PHILL

Characteristics	Men n=565	Women n=466	p value
<i>Age group (years) (%)</i>			
60-64	25	29	ns
65-69	26	28	
70-74	23	21	
≥75	26	22	
Mean age (in years)	70	69	ns
<i>Education (%)</i>			
Illiterate	47	81	<0.001
1-5 years of education	23	17	
> 5years of education	30	2	
<i>Marital status (%)</i>			
Currently married	89	30	<0.001
<i>Household economic status (%)</i>			
Low	30	35	ns

4.5.2 Determinants of quality of life (Study IV)

The study revealed that individual and community levels of low social capital emerged as significant determinants of poor quality of life. The odds of reporting poor QoL were significantly higher (OR: 1.7; CI: 1.2-2.4) among older people with a low individual level of social capital compared to those who had a high individual level of social capital. Among older people with a low community level of social capital, the odds ratio for reporting poor QoL was similarly significantly higher (OR:1.9; CI:1.1-3.3) compared to those with a high community level of social capital (Table 10).

TABLE 10. Odds of reporting poor quality of life in relation to social capital

Indicators	Level of social capital	Odds ratio (95% CI)
Social capital - individual level	High	1
	Medium	1.1 (0.8-1.6)
	Low	1.7 (1.2-2.4)
Social capital –community level	High	1
	Medium	1.4 (0.9-2.1)
	Low	1.9 (1.1-3.3)

Adjusted for age, sex, education, marital status and household economic status

5 DISCUSSION

The intervention studies included in this thesis indicated positive change in the health outcomes that were investigated, e.g., self-reported arthritis-related illness and its related healthcare expenditure, and health-related quality of life. The cross-sectional studies showed that bone and joint diseases were associated with health-related quality of life; and that low social capital, both at the individual and the community level is associated with poor quality of life in old age. The key findings and methodological aspects of the study are discussed below, followed by conclusions and comments on the necessity of future studies.

5.1 THE KEY FINDINGS

5.1.1 Impact of health promotion on health outcomes

Studies I and III revealed that compliance with health promotion activities, such as physical activity, and healthy dietary intake, helps to reduce arthritis-related illness and related healthcare expenditure, and improves health-related quality of life. Evidence from other research implies that exercise may help in improving arthritis-related and other chronic illness (Rafei, 2004), and that physical activity plays an important role in the prevention and management of this condition (Cyarto, Moorhead and Brown, 2004). Improvement in arthritis-related illness may also have an impact on health-related quality of life. Research shows that chronic diseases are associated with a negative impact on health outcomes, and improvement in chronic diseases is likely to impact on health-related measures (Tobiasz-Adamczyk and Brzyski, 2005). Molarius et al., (2007) found that adherence to lifestyle factors such as physical activity predicts good health outcomes. It also improves and maintains functional performance and body composition (Wong et al., 2008). Research on self-help programs demonstrates their effectiveness in reducing the burden of illness, and in improving health-related quality of life (Lorig, Mazonson and Holman, 1993).

The reasons why expenditure on the treatment of arthritis-related illness is reduced may be either because participants paid fewer visits to healthcare providers due to fewer problems or because they successfully managed their health problems through better-informed self-care management. Adherence to healthy lifestyles has the potential to increase perceptions of self-efficacy, to decrease pain, to alleviate depression and results in fewer visits to physicians (Barlow, Turner and Wright, 2000; Lorig,

Mazonson and Holman, 1993). Improvement in health-related quality of life due to adherence to health promotion activities is consistent with research conducted elsewhere (Discigil and Ozkisacik, 2007). Lobo et al., (2008) found that any physical activity is associated with good health-related quality of life and moderate physical activity is more beneficial than low levels of physical activity. Inoue et al., (2008) found that physical activity significantly reduces premature death from cardiovascular disease and cancer.

It is interesting to note that in Study III no significant differences were detected between the compliant and non-compliant groups in any of the dimensions of health-related quality of life except in overall HRQoL. Similarly, Study I also shows no significant differences between these groups in terms of expenditure on treatment of arthritis-related illness, but differences in prevalence of arthritis-related illness. This suggests that the non-compliant group may also have benefited from the intervention activities, which is indeed encouraging. An explanation for this might be that co-resident family members helped the older people with daily chores and that non-compliant participants also pursued intervention activities, albeit infrequently.

5.1.2 Predictors of compliance with health promotion activities

Studies I & III show that men, people who are literate and participants from younger age groups are more likely to comply with health promotion activities. Research conducted elsewhere indicates that both initiation and maintenance of physical activity is more pronounced among younger persons (Ammouri et al., 2007), among people who are literate (Shaw and Spokane, 2008; Park and Kang, 2008), individuals in moderate to excellent health, and among persons who believe that physical activity is important to their health (Burton, Shapiro and German, 1999; Panagiotakos et al., 2008). Yet more research shows that the strongest reason for not participating in health promotion programs is people's personal attitudes related to their own personal health (Dapp et al., 2007). Attrition from physical activity is also noted among people with lower socioeconomic status, those who are overweight and less physically active, people with lower self-efficacy scores and higher loneliness scores (Jancey et al., 2007). Cultural norms sometimes play a strong role in pursuing lifestyle related activities. For instance, Khanam and Costarelli (2008) found that Bangladeshi women who live in England do little exercise to improve their health, predominantly because of certain cultural beliefs and attitudes. Zimmerman and Conner (1989) argue that

maintenance of health behavior change in the long-term has often proved difficult. One of the reasons for this difficulty is that even if individuals' attitudes or behavior have changed, related support from the community has not necessarily changed to the same degree.

5.1.3 Association between the PHILL intervention model and the Health Belief Model

The Health Belief Model (HBM) suggests that if individuals are well informed about susceptibility and threat to health and illness, they are likely to adopt positive behaviors in order to avoid unwanted consequences. However, in order to change behaviors, cues to actions play important roles. Thus, strategies that enhance cues to action need to be in place. During the PHILL intervention, knowledge on susceptibility and threat to illness, health and health-related quality of life of older people was provided through various fora. To enhance cues to action, self-help groups were formed. The study provided information materials and disseminated information in various settings such as during preventive home visits, in group meetings and by holding workshops. Self-help groups help to improve social networks and encourage older people to participate in health-related activities. Mullen, Hersey and Iverson (1987) found that such networks increase participation in health-related activities. According to the HBM, perceived barriers and self-efficacy also play an important role in changing behaviors. Mullen, Hersey and Iverson (1987) found that self-efficacy is important in explaining participation in health-related activities.

In the PHILL intervention, in order to overcome perceived barriers, such as cultural barriers, home-based physical exercise was promoted. Promoting home-based physical exercises, such as sitting down and standing up from a chair, pushing hands against a wall, rotating hands, and walking around the home, may help to overcome these perceived barriers. The inclusion of family members in the intervention may increase self-efficacy as they are likely to assist health promotion activities. The fact that all these efforts may also have helped older people to pursue health promotion activities resulting in various benefits was indeed noted in the study. Motivation for taking part in healthy lifestyle programs is often influenced by various modifying factors such as age, sex, literacy, economic status, self-efficacy and culture (Glanz, Lewis and Rimmer, 2002). The influence of modifying factors such as sex, literacy and age was observed in the PHILL intervention. Hence, to increase compliance with physical activity

programs, early assessment of the profile of the participants is necessary in order to identify individuals at risk of attrition, to improve retention, and to avoid potential bias such as noncompliance (Jancey et al., 2007). Furthermore, friendly approaches are required towards various socioeconomic groups to increase compliance (Shaw and Spokane, 2008).

5.1.4 Health-related quality of life and bone and joint diseases

Study II indicates that bone and joint diseases predict health-related quality of life among older people, in particular physical, psychological and overall HRQoL. This is consistent with other research showing that health outcome is associated with the reporting of two or more chronic diseases (Asfar et al., 2007). An important feature of the presented findings is that, rather than arthritis, doctor-diagnosed or self-reported joint pain and self-reported back pain had a pronounced association with HRQoL (considering the number of dimensions with significant effects). It is at the same time likely that a diagnosis of arthritis leads to effective management of the condition and lessens its impact on HRQoL.

5.1.5 Social capital and quality of life

Study IV shows that having low individual and community levels of social capital is associated with poor quality of life. Agahi (2008) found that leisure activities such as visiting church or eating out with friends facilitate good health in old age in Sweden. Nilsson (2005) argued that having a meeting place in the community for older people may enhance health-related quality of life. This allows older people to spend their leisure time with people of the same age, share experiences and otherwise interact with one another. In the PHILL intervention, the creation of self-help groups gave older people exactly this kind of meeting place. Participation in self-help groups may help to improve the bonding, bridging and linking aspects of social capital during interaction with other older people, which might in turn have a positive impact on health and quality of life. Thus, intervention that leverages social capital might be promoted as a means of improving population health (Kim, Subramanian and Kawachi, 2006).

5.1.6 Socio-demographic factors, illness, health-related quality of life and quality of life

Sex: Study I indicates that, among the non-compliant, increased expenditure on treatment of self-reported arthritis-related illness was more likely among women. Study II indicates that episodes of bone and joint disease were significantly higher among women. Sex by bone and joint diseases and sex by age interaction effects also demonstrated that women were more affected by the illness and that their quality of life was poor compared to male participants. Study III shows further that increased HRQoL in the spiritual dimension was less likely among women. Study II shows that advanced age was negatively associated with health-related quality of life among women only. This might be due to the fact that a higher proportion of women in Bangladesh are illiterate and that women have less access to healthcare during illness. Other research indicates that women are less likely to report higher health-related quality of life scores compared to men (Szende and Németh, 2003), and that men report higher scores on successful aging than women (Chung and Park, 2008).

Age: Study III reveals that the probability of rating increased scores after the intervention is lower, in the physical dimension and overall scores of HRQoL, among the very old. Similarly, Study IV also indicates that, with advancing age, people experience poor quality of life. Other evidence also shows that health-related quality of life deteriorates with advancing age (Szende and Németh, 2003). However, in this thesis, the associations between age and various health outcomes need to be interpreted cautiously in Studies I, III and IV as there was no appropriate age-recording system available. Kabir (2001) also reported similar concerns regarding the association between chronological age and health measures in Bangladesh. The data used in Study II may however provide more precise chronological age calculations compared to the other sub-studies, since demographic surveillance has been performed in the study area for forty years.

Household size: Study II indicates that being a member of a large household was positively associated with obtaining higher scores in two dimensions of health-related quality of life, i.e. in the psychological and environmental dimensions. This may be because family members provide necessary support. A study from England also shows

that lone older people are prone to report more illness such as arthritis-rheumatism or glaucoma (Kharicha et al., 2007).

Literacy: In Studies II and IV, literacy status was found to be an important predictor of health-related quality of life and overall quality of life. The strong effect of education on the prevalence of illness, health status and health-related quality of life has been highlighted in many previous studies. This is probably due to the fact that education enables people to enrich their knowledge base regarding information about health and healthcare. A recent study in Western Europe showed that low literacy status is significantly associated with poor physical and mental health and mobility among both elderly men and women (Rueda, Artazcoz, and Navarro, 2008). Beyond such findings, literacy also impacts on other aspects such as the likelihood of getting a better job and increased income, and helps create a good environment. Khan et al., (1996) found that that women's education has a considerable influence on socio-demographic aspects and educated women are more aware of beneficial health practices and hygiene.

Marital status: All the sub-studies included in this thesis revealed that marital status was not significantly associated with illness or health-related quality of life except for the spiritual dimension of health-related quality of life. This result is in line with another study conducted in Bangladesh, which also indicated that marital status was not associated with health-related quality of life (Nilsson, 2005). It might be due to the fact that, in the absence of a spouse, other family members provide emotional, social and material support. This scenario is common in Bangladeshi society. Although this thesis indicates that marital status does not have much impact on health outcomes in old age, research in developed countries indicates that widowhood correlates with poor health-related quality of life among older people (Grimby and Wiklund, 1994).

5.1.7 Economic status, health-related quality of life, and quality of life in old age

Study III showed that the probability of reporting increased HRQoL in the psychological dimension was higher among the non-poor, and Study IV showed that the probability of reporting poor quality of life was more likely among the poor. In Hong Kong it was observed that self-rated economic status was positively associated with self-rated health status (Cheng et al., 2002). Similarly, research in Iran reveals that economic status is significantly associated with health-related quality of life (Tajvar,

Arab and Montazeri, 2008). However, in a society where most of the older people depend on their children (Kabir, Szebehely and Tishelman, 2002) personal income sometimes may not be associated with health and health-related quality of life. Study II shows that household expenditure is positively associated with health-related quality of life rather than the personal income of older people. As a result, instead of personal income of older people, economic status of the household, households' capacity to purchase at least basic necessities and accessibility to financial resources might be better predictors of quality of life in old age in low-income countries (Low and Molzahn, 2007).

5.1.8 Comparison of self-reported data with clinical data

The comparison of self-reported data on arthritis-related illness with doctor-diagnosed data gave a unique opportunity to examine the estimates obtained from the self-reported data. In the PHILL project, information about arthritis-related illness was collected by means of self-reports and included all forms of arthritis, e.g., osteoarthritis, rheumatoid arthritis, gout, swelling joint and back pain. However, in the PHA project these data were also collected separately for arthritis, and back and joint pain by means of clinical examination. All diagnoses were done by physicians in a clinical setting. A comparison of prevalence of these illnesses can be seen in Studies I and II. Furthermore, when analyses were performed by merging all forms of arthritis-related illness together in the PHA project, as done in the PHILL project, the prevalence of arthritis-related illness was found to be similar in both projects. This confirms the reliability of the data on arthritis-related illness. However, when self-reporting and clinical examination were compared within the PHA project, dissimilarities were observed. For instance, in the self-reported data, the proportion of back pain was higher compared to joint pain. By contrast, in the clinical examination the proportion of joint pain was higher than back pain. These differences might be due to the difference between patient's perception and clinical considerations. For instance, the medical condition that participants considered as back pain was clinically diagnosed as joint pain. This difference might be reflected in the prevalence of these conditions. However, when both back and joint pain were merged together for self-reported and clinical data respectively, the prevalence was similar for self-reported and clinical data.

5.2 METHODOLOGICAL CONSIDERATIONS

To evaluate the impact of health promotion on various health measures, a quasi-experimental design was chosen for this study. In this design, having a control group allows the secular trends in relation to the impact of interventions to be taken into account. The quasi-experimental design is easy to administer and provides convincing evidence for causal links between medical information, interventions and outcomes (Harris et al., 2006). Furthermore, the design is often the feasible option and may indeed provide valid evidence (Victoria, Habicht and Bryce, 2004). In Studies I and III, consideration of stratified analyses for participants in the intervention group allowed the effect of compliance to be estimated.

The following limitations of the thesis should be mentioned: i) The study participants were selected based on chronological age and no other inclusion or exclusion criteria were considered. For instance, bed-ridden and severely sick individuals were also selected for the study and uniform intervention was offered to all the participants irrespective of health condition; ii) Information about physical activity was collected at the post-intervention phase in the intervention areas only, but data on the frequencies and intensity of physical activity were not collected; iii) Similarly, information regarding the severity of illness was not collected; iv) The duration of intervention was too short to assess sustainable impact; v) Imbalance in economic status in terms of proportion of poor and non-poor between the control and intervention areas is another concern. All of these limitations may have had an impact on the results. Furthermore, due to the absence of any mid-term evaluation, the progress of intervention activities was not evaluated. If a mid-term assessment had been conducted, the intervention strategies could have been reshaped to increase the compliance.

The strengths of the studies include the selection of a control group from a far-off place, which allowed containment of spillover effects of the interventions to the control area. Post-intervention data collection following a three-month latency period made it easier to observe the stability of the intervention activities. Use of data from two independent research projects provided an opportunity to compare the reliability of the health data. Furthermore, during post-intervention data collection, the involvement of newly recruited staff for data collection instead of using the staff involved in implementing the intervention activities may have helped to avoid information bias. The selection of study participants through randomization at the village level also

allowed selection bias to be taken into account. Agabegi and Stern (2008) argue that bias is a systematic inconsistency in research that contaminates the primary comparison. To take into account the clustering effects, intra-cluster correlation analyses were performed in Study III. The analyses showed that intra-cluster correlations were negligible in this study. To minimize the influence of seasonal variations on various outcomes such as arthritis-related illness, baseline and post-intervention data collection were done at the same time of year.

5.2.1 Representativeness

The results of this thesis may not be representative for the majority of older people in Bangladesh as this study was done in one district of the country and also excluded older people in urban areas. However, as the selected study area is typical of other rural parts of the country in terms of socio-economic and demographic profile, it may indicate what the situation is like in other rural parts of the country as well.

6 CONCLUSION AND POLICY IMPLICATIONS

This thesis demonstrates that the provision of health promotion is a potential public health initiative to reduce the burden of arthritis-related illness and related healthcare expenditure, and to improve health-related quality of life in old age. The findings of the thesis have important implications. For instance, reducing episodes of arthritis-related illness may have an impact on the households in that individuals may as a result be more involved in earning activities or may create opportunities for other household members to do so by doing more household chores. These activities might make households less vulnerable to poverty due to a reduction in healthcare expenditure, which has important implications for the poor. Money saved from healthcare expenditure may be used for other activities, which in turn generate income. Improvement in health-related quality of life might also reduce the burden of caregivers. Furthermore, reducing the disease burden helps to lessen the burden on healthcare services. Organizations that offer public health activities might take steps to inform people about the benefits of health promotion in old age through available dissemination methods. Furthermore, taking steps to increase compliance with health promotion activities might be useful (Wannamethee, Shaper and Walker, 1998). Healthcare providers may provide advice regarding the benefits of physical activities and healthy dietary habits in managing arthritis-related and other illnesses as well as for improving health status.

Based on the findings, it might be concluded that this thesis provides valuable information for policy-makers and planners in developing national guidelines and allocating resources for health promotion activities for older people. Subsequently, such guidelines may contribute to improving the quality of life of older people by reducing the burden of various illnesses, in a resource-constraint country like Bangladesh as well as similar low-income countries.

As mentioned earlier, the Government of Bangladesh has introduced a small amount of lifelong, means-tested old-age allowances for poor older people. This has created an opportunity to combine health promotion activities with old-age allowance schemes, which may have even more of a positive impact on the lives of older people. Studies III & IV suggest that the economic status of the household is a significant predictor of quality of life and Studies I & III point to a positive impact of health promotion on health. Combining economic and health promotion activities might prove useful in

improving the health and health-related quality of life of older people. Since the household provides most of the care needed by older people in Bangladesh, strengthening family-based care is potentially therefore a very valuable course of action. This can be achieved through providing health promotion information to the informal caregivers and household members, which may enhance the healthcare of older people within households. Furthermore, sensitization of family members regarding the contribution made by older people through social awareness programs might also have positive repercussions on the lives of older people.

However, effective healthy ageing policies should focus on the entire life span in order to diminish a number of lifestyle risk factors (Peel, McClure and Bartlett, 2005). Indeed this is valuable since in low-income countries, many people do not have open and regular access to formal healthcare systems (Nugent, 2008).

7 FUTURE STUDIES

Due to limited resources, the impact of health promotion was assessed after a relatively short intervention period. This poses questions about the long-term effects of health promotion activities. Hence, a longer duration of intervention might be warranted to observe continuing effects of health promotion on the prevalence of illness, related healthcare expenditure and health-related quality of life among older people. As indicated, non-compliance is common in older age, among women and illiterate people. Hence, qualitative studies may further explore the dynamics of non-compliance with lifestyle-related activities. In future studies, the inclusion of an urban population might prove useful since the situation of older people in rural and urban areas is not identical with respect to socio-economic, demographic, environment and cultural circumstances.

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