PEER SUPPORT INTERVENTIONS TO PROMOTE PHYSICAL ACTIVITY AMONG SEDENTARY WOMEN IN THE EXPANDED PART OF THIRUVANANTHAPURAM CITY, INDIA

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Ph. D. THESIS

2015

SREE CHITRA TIRUNAL INSTITUTE

FOR

MEDICAL SCIENCES AND TECHNOLOGY, TRIVANDRUM

Thiruvananthapuram

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A THESIS PRESENTED BY

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THE SREE CHITRA TIRUNAL INSTITUTE FOR

MEDICAL SCIENCES AND TECHNOLOGY, TRIVANDRUM

Thiruvananthapuram

IN PARTIAL FULFILMENT OF THE REQUIREMENTS

FOR THE AWARD OF

DOCTOR OF PHILOSOPHY

2015

Declaration by the student

CERTIFICATE

I, Elezebeth Mathews hereby certify that I had personally carried out the work depicted in the thesis entitled, "Peer support interventions to promote physical activity among sedentary women in the expanded part of Thiruvananthapuram City, India". No part of the thesis has been submitted for the award of any degree or diploma prior to this date.

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The thesis entitled, "Peer support interventions to promote physical activity among sedentary women in the expanded part of Thiruvananthapuram City, India" was carried out under my direct supervision. No part of the thesis was submitted for the award of any degree or diploma prior to this date.

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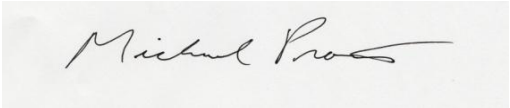

Date: 24 November 2014

Approval of thesis

The thesis entitled

Peer support interventions to promote physical activity among sedentary women in the expanded part of Thiruvananthapuram City, India

Submitted by

Elezebeth Mathews

For the degree of

Doctor of Philosophy

of

SREE CHITRA TIRUNAL INSTITUTE

FOR

MEDICAL SCIENCES AND TECHNOLOGY, TRIVANDRUM

Thiruvananthapuram

Is evaluated and approved by

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ACKNOWLEDGEMENT

First and foremost my heartfelt thanks to God, The Almighty for blessing me throughout my life and destined me to pursue PhD. “Every accomplishment in life is with the contribution of other beings, be it guidance, support; both financial and emotional, and unconditional presence throughout the journey”. My journey towards the doctorate is incomplete, if I forget to acknowledge those without whom this task would have been near impossible. I would like to express my special appreciation and thanks to my advisor Professor Dr. K.R Thankappan, you have been a marvelous mentor for me. Your constant guidance and support have inspired me throughout this journey and you have set a role model with dedication and hard work which has encouraged me to set my standards very high. Your advice on both research as well as on my career have been priceless. I would also like to thank my co-guide, Prof Michael Pratt, for his unconditional guidance, support and encouragement throughout. Thank you for being available always, though miles apart.

I would like to extend my gratitude to my Doctoral Advisory Committee (DAC) members, Dr T.K. Sundari Ravindran, Dr P. Sankara Sarma and Dr K. Vijayakumar for serving as my DAC members and offering me with valuable comments that shaped my study and the thesis. I also would like to thank all the faculty members of Achutha Menon Centre for Health Science Studies, especially Prof V. Raman Kutty for his valuable suggestions towards the study. I thank the data collectors for assisting me with the data collection and the study participants without whom the study would not have been possible.

I thank Prof Edwin Fischer and the Global Peers for Progress Foundation for the partial funding of my doctoral research. I also thank the Asian Collaboration for Excellence in Non-communicable diseases (ASCEND) Research Network funded by the Fogarty International Centre, National Institutes of Health for their partial funding to conduct the research and enhancing my research capacity through collaboration with its faculty. My special thanks to Prof Brian Oldenburg, Melbourne School of Population & Global Health, and Pilvikki Absetz, Adjunct Professor, University of Tampere, Finland for guiding me through the principles of peer support and implementation strategies of "real world" intervention.

A special thanks to my family. Words cannot express how grateful I am to my father, K.U. Mathews and my mother, Liziamma for their unconditional support, inspiration and for all of the sacrifices that they have made on my behalf. Your prayer for me was what sustained me thus far. I also would like to thank my sister (Anu Mathews) and sister-in-law (Priya Mary George) for their assistance in numerous ways. I would also like to thank my father-in-law, Dr Varughese George who supported me in writing, and incented me to strive towards my goal. At the end I would like express appreciation to my dear husband Pradeep M George who was my support in the moments when there was uncertainty and helped me accomplish my goal. I would like to extend my unconditional gratitude, love and affection to my dear sons Rohan and Mathew for being thoughtful of my work and travel schedules and still loving me as ever.

Table of Contents

List of Figures

List of Tables

.

List of Abbreviations

DALY	Disability Adjusted Life Years
GoI	Government of India
GPAQ	Global Physical Activity Questionnaire
IPAQ	International Physical activity Questionnaire
MET	Metabolic Equivalent Task
Mph	Miles per hour
min	Minutes
NCD	Non-communicable disease
PA	Physical activity
UNICEF	United Nations Children's Fund
USA	United States of America
UK	United Kingdom

SYNOPSIS

Non-communicable diseases (NCDs) were attributed to 35 out of 53 million deaths that occurred worldwide in the year 2008 with more than three quarters of these deaths in low and middle income countries. Nearly two thirds of women (65 percent) die every year due to non-communicable diseases.

Worldwide physical inactivity is found to be higher among women than men. The Indian State of Kerala, the most advanced in epidemiological transition reported the highest prevalence of overweight among women. One of the reasons for the higher NCD risk factors is due to culture and gender norms, and lack of social support in facilitating physical activity in the community.

Promotion of physical activity in the population as well as high risk groups is well advocated by several studies from developed countries. There is substantial evidence from developed nations on physical activity promotion intervention studies using informational, behavioral and social, environmental and policy approaches. Most of these interventions were delivered on a “one to one” or “group” basis with the responsibility of behavior change entrusted on individuals themselves. It is in this context that peer support plays an important role in assisting women in behaviour change by overcoming the gender and cultural barriers. There are intervention studies in India for lifestyle modification and diabetes prevention. But there are no studies in India with a primary aim of physical activity promotion among adults specifically women and hence this study was conducted. It was hypothesized that women make changes in their physical

activity based on multiple factors played at multiple levels namely at personal, interpersonal and community levels and if those factors were identified and addressed through well-developed intervention, the sedentariness among women could be reduced. The major objective of the study was to estimate the effectiveness of a community based peer support intervention delivered at three intensities to promote physical activity among sedentary women. Specific objectives were to understand the attitude and perception on physical activity and to identify the factors that influenced physical activity based on the socio-ecological model, to understand the correlates of physical activity among women, to validate the self- reported global physical activity questionnaire with an accelerometer and to increase the physical activity prevalence in intervention arm by at least 20 percent (absolute) when compared to the control arm at the end of twelve months of intervention.

The study was conducted in four phases namely; understanding the perceptions on barriers and facilitators of physical activity through focus group discussions, assessment of the prevalence and correlates of physical activity through a cross sectional survey, validation of the self-reported physical activity questionnaire using an accelerometer and an intervention trial in the expanded part of Thiruvananthapuram City. Out of five erstwhile *Panchayats* added to the City Corporation, two were selected based on the similar socio-demographic characteristics (literacy rate and scheduled caste/scheduled tribe proportion) and non-contiguous nature.

Physical activity intervention was developed using Intervention Mapping Protocol by Bartholomew. The intervention components were identified based on the behavioral theories and the findings drawn from formative research. This included understanding the perceptions on barriers and facilitators of physical activity through focus group discussions and assessment of the prevalence and correlates of physical activity through cross sectional survey. Any intervention implemented at population level will have to be cost effective and sustainable for long term effects and for policy changes. Hence the intervention trial was designed to be delivered at multiple intensities: three months of "intense intervention"; three months of "less intense intervention"; and six months of "no intervention. This was done to see whether there was any association between intensity of intervention and physical activity.

Intervention trial targeted sedentary women. Sample size for the intervention trial was calculated with a confidence level of 95 per cent and a power of 80 percent to detect a 20 per cent absolute difference in physically active women between the intervention and control arm and it was 94. Considering the loss to follow up and design effect of two due to the cluster sampling, final sample required was 400 with 200 each in the intervention and control arm. In order to identify 400 sedentary women for the intervention trial, a cross sectional survey had to be conducted among at least 1258 women based on an anticipated physical inactivity prevalence of 31.8 per cent. Correlates of physical activity were assessed using a structured interview schedule at the baseline. Modified Global Physical Activity Questionnaire and intervention effectiveness assessment schedule was used to

assess physical activity and intervention effectiveness respectively, at baseline, fourth, seventh and thirteenth months of the intervention. Validation of the self-reported Modified Global Physical Activity Questionnaire was done using Actigraph GT3X accelerometer. Data were analyzed by SPSS and STATA.

Focus group discussions revealed that women generally perceived household activities were adequate for physical activities although most of the activities carried out were of low intensity with each bout of less than ten minutes duration. Although walking was the most preferred activity for exercise, few women quoted on the cultural and social barriers inhibiting leisure time walking which was specified as not used to the culture of walking, also not seen among their parents. Social norming of the behavior was crucial for women to overcome the gender and cultural barriers elicited. Low levels of awareness on the recommended levels of physical activity for health among these women pointed out on the need for devising strategies to improve the cognitive aspect for behavior change. Women expressed their willingness to engage in walking for exercise in their own neighborhoods and safety of the roads was of limited concern. Majority of them insisted on having a company and support from friends and neighbors for walking which showed the importance of peer and social support in physical activity promotion. The findings from the focus group discussions suggested that for physical activity promotion among women, it was imperative to target the modifiable determinants of physical activity so as to improve self-efficacy, facilitate goal-setting and review, enhance social support, change perceived norms, increase perceived benefits and outcome expectations, as well as opportunities for

the enjoyment of health behavior through group-based activities. Interventions should ideally be tailored to individual schedules to maximize convenience for women and the probability of adoption and adherence to regular physical activity.

The cross sectional survey estimated the prevalence of physical inactivity of 26.6 percent and assessed the correlates of physical activity at intrapersonal, interpersonal and community level based on the socioecological model. Women who perceived themselves to be underweight, reported having an exercising member in the household, had access to exercise facilities, married women, those in the age group of 35-54 years, those who reported knowledge on the benefits of physical activity and those who reported support from friends and neighbors were more likely to report physical activity than their counterparts. These findings suggested that physical activity promotion among women in this area should focus on addressing men to encourage their spouses for physical activity, facilitating at least one member in a household to be physically active and providing access to exercise facilities.

The validation of self- reported physical activity using modified GPAQ with the accelerometer showed that the self -reports were fairly reliable. The modified GPAQ can be used for population studies given the high cost and feasibility issues of using an accelerometer in resource constrained settings.

"Intense" intervention involved risk factor assessment, educational workshop and counseling for choosing activities of preference. Peer leaders were identified from each group as nominated by the group with a purpose to lead the group members in

discussions and activities that facilitated physical activity behavior change. Peer leaders following the training conducted monthly meetings in their groups with the support of the investigator. Goal setting and review were done in group meetings with the peer along with group based activities such as aerobic dancing sessions and walking groups. “Less intense” phase involved only peer leader led meetings along with aerobic group activities in the group. Six months of “no intervention” phase was marked by no active intervention from the investigators part.

The highest proportions of active women were seen in the intervention arm at the intense phase (58.5 per cent) after which it declined (48.5 and 29.6 per cent respectively in the less intense intervention and no intervention phases). However, the mean physical activity level was more than the recommended levels of physical activity (more than 600 MET min/ week) during the intense and less intense phases. Following the “no intervention” phase, the mean physical activity level dropped below the recommended levels (524.9 MET min/ week). However, when compared to the control arm, the mean physical activity level was significantly higher in the intervention arm at all-time points and the difference in mean level of physical activity between intervention and control arm was 957, 539, 430 MET min/week at fourth, seventh and thirteenth months respectively. The improvement in physical activity levels between the intervention and control arms from baseline was significant at all-time points and was 992, 575 and 466 MET minutes per week respectively at fourth, seventh and thirteenth months of the study. The sustained effect of intervention in the intervention arm during the less intense and no intervention phase may be due to the peer and social support within the groups.

This finding showed that peer support from community or neighborhood groups would be effective in promoting population level physical activity with an initial input from higher levels. Intervention was effective with an absolute increase of 29 percent in the intervention arm when compared to the control arm at one year of the intervention thus demonstrating the feasibility of promoting physical activity among sedentary women through peer support in this area.

The findings from each phase of this study pointed out the gaps that need to be addressed in the community for physical activity promotion targeting women. The feasible strategies developed and implemented in the study for physical activity promotion guides the future development of physical activity promotion efforts in the City as well as other parts of India. The study evidenced that even in the intense phase of intervention; the behavioral and social aspects of behavioral change adopted in this study could only make 58.5 percent of sedentary women active. This suggests that apart from the behavioral and social approaches for behavior change, attention will have to be made to the environmental and policy determinants of physical activity such as creation of walking spaces and trails, more parks and recreational facilities. Mass media campaigns on physical activity would address the misperceptions and myths on physical activity among women and improve their knowledge on its importance. Efforts should be made to make policy level initiatives at City, State and National level on physical activity promotion that is enforced by all government sectors such as education, health, town planning and transport.

CHAPTER- 1

INTRODUCTION

Non-communicable diseases (NCDs) accounted for 36 million out of 57 million deaths that occurred worldwide in the year 2008 (WHO 2013). Four major diseases, cardiovascular disease (heart disease and stroke), many cancers, chronic obstructive pulmonary disease, and diabetes share common risk factors and contributed largely to the global burden of disease in low and middle income countries (WHO 2010a). More than three quarters of annual deaths due to NCDs occurred in low middle income countries (29 million) and majority of this burden was attributable to the behavioral, dietary, environmental and metabolic risk factors (Ezzati et al. 2003). Non-communicable diseases collectively caused 65 percent of all female deaths (18 million deaths each year), thus being the leading cause of death for women worldwide (WHO 2010a).

World Health Assembly in 2012 set a new goal to reduce the mortality due to non-communicable diseases (NCD) by 25 percent by 2025 (the 25 by 25 goal). Commitments were made by UN General Assembly in 2011 and thereafter by World Health Assembly in 2012 to set global priorities to address the rising burden of NCDs. The importance of prevention and control of NCDs was reiterated in the United Nations Conference on Sustainable Development, Rio+20 in the year

2012, where NCDs were referred to as an important challenge for development in the 21st century (United Nations 2013) thereby strengthening the linkage between health and development (Clark 2013).

India lost the highest potentially productive life years worldwide as of 2004 (Reddy et al. 2012) and the leading cause of death was cardiovascular disease in the age group of 35 to 64 years followed by diabetes mellitus, chronic obstructive pulmonary disease (COPD) and cancer. India has approximately 86.6 percent of out of pocket health expenditure with very low government spending on health care services (1.1 percent of gross domestic product in the year 2012), it is crucial to focus on prevention, early screening and intervention that reduce the burden of chronic diseases.

Evidence suggested that physical inactivity was a major attributable factor to death and disability due to non-communicable diseases (WHO 2010a; Lee et al. 2012). Worldwide physical inactivity causes six to ten percent of all deaths from NCDs such as coronary heart disease, type 2 diabetes mellitus, and breast and colon cancer (Lee et al. 2012). Physical inactivity was attributed to 5.8 percent of coronary heart disease, 7.2 percent of type 2 diabetes, 10.1 percent of breast cancer and 10.4 percent of colon cancer (Lee et al. 2012). Nearly one third of the world's population (31.1percent) is inactive and does not meet the recommended levels of physical activity.

Promotion of physical activity in the population as well as in the high risk groups has been well advocated worldwide. There is substantial evidence in developed

nations on community based interventions to promote physical activity using informational, behavioral, social policy and environmental approach (Baker et al. 2011). Most of the interventions that targeted behavior change among individuals provided information and support from health care providers on a “one to one” or “group basis”. But ultimately these techniques laid the whole responsibility of making a behavior change on the individuals themselves, whether it was diet, physical activity or quitting of alcohol and tobacco. Less focus was given on sustainability of the intervention. It is in this context that peer support plays an important role in chronic disease management as well as in assisting in making behavioral changes. Peer support enables people to share their experiences and to provide the practical, emotional, and ongoing support that is critical to sustained behavior change (Boothroyd & Fisher 2010). Several studies have utilized the concept of peer support in diabetes management (Tsimikasa et al. 2004), arthritis care (Barlow et al. 2000), mental health (Davidson et al. 2006) and self-directed behavior change (Keyserling et al. 2002).

Worldwide, physical inactivity was found to be higher among women (33.9 percent) than in men (27.9 percent) (Bauman et al. 2012). In the Indian State of Kerala, the most advanced in epidemiological transition women were reported to have higher prevalence of non-communicable diseases and their risk factors such as physical inactivity (Shah & Mathur 2010; Thankappan et al. 2010) and overweight (IIPS 2008). Culture and gender norms prevented women from engaging in leisure time physical activity such as brisk walking and other moderate intensity sports. Recent studies have shown a declining trend in physical activity at

work and transportation as well (Shah & Mathur 2010) among women due to increased mechanization and urbanization. There were no correlates of physical (in) activity studies in India, which informed the factors that influenced physical activity among women in India. Peer support could be considered as a viable strategy to promote physical activity among women in India where social support from peers play a crucial role in overcoming the individual level constraints and barriers related to the gender and cultural norms.

Research on physical activity is very limited in India. There are intervention studies conducted in India for lifestyle modification and diabetes prevention (Ramachandran 2001). However there are no intervention studies in India with a primary aim of physical activity promotion among adults specifically women. Given the higher risk for women than men in developing chronic diseases and the inherent nature of women having fewer opportunities to be active, a greater need was felt to develop an intervention study to promote physical activity among sedentary women in Thiruvananthapuram city, using peer support. As Kerala is very advanced in the epidemiological transition than the rest of the country (Peters 2003), we believe that any intervention effective in the State of Kerala can be adapted to rest of the country.

This dissertation describes the phases in which the study was developed and conducted for a duration of three years in Thiruvananthapuram city, Kerala, India. Phase one involved literature review on all available evidence pertaining to physical activity research globally and in India and formative research to

understand women's knowledge, perception and attitude towards physical activity and, the facilitators and barriers to being physically active. Phase two involved a cross sectional survey by multi stage cluster sampling to understand the correlates of physical activity among women and to identify sedentary women to be enrolled into the intervention trial. Phase three involved the validation of the self -reported modified Global Physical Activity Questionnaire (GPAQ) with the accelerometer (Actigraph GT3X). Phase four involved implementation of intervention at three levels of intensities; intense intervention in the initial three months, less intense intervention in the latter three months and no intervention phase thereafter for six months. Assessments were made at fourth, seventh and thirteenth month to understand the effectiveness of the intervention.

Chapter two of this dissertation gives an up to date review of literature on the latest evidence in literature on non-communicable diseases, physical activity and its concepts, measurement techniques, and interventions. Chapter three discusses the design and methodology adopted in the four phases of the study. Chapters four and five present the results and discussion respectively and finally the thesis is concluded with Chapter six.

This study is first of its kind in India to assess the correlates of physical activity among women and implement an intervention trial in a phased manner to promote physical activity among sedentary women.

1.1. Aims and objectives of the study

1.1.1. Major aims of the study

1. To develop evidence based strategies and assess its effectiveness to promote physical activity among sedentary women that are context specific, culturally and socially appropriate.
2. To estimate the effectiveness of a community based peer support intervention delivered at three intensities to promote physical activity among sedentary women

2.1.2. Major objective

1. To increase the physical activity prevalence in intervention arm by at least 20 percent (absolute) when compared to the control arm at the end of twelve months of intervention.

1.1.3. Specific objectives

1. To understand the attitude and perception on physical activity and identify the factors that influence physical activity based on the socio-ecological model which forms the theoretical framework for the intervention and its development.

2. To understand the correlates of physical activity among women in the expanded part of Thiruvananthapuram city, Kerala
3. To validate the modified global physical activity questionnaire with an accelerometer

CHAPTER- 2

REVIEW OF LITERATURE

2.1 Non communicable diseases –A brief overview

Non communicable diseases (NCDs) are described as diseases of longer duration which progress slowly leading to sizeable morbidity and mortality worldwide. Four major NCDs that contributed to increased mortality were cardiovascular diseases (heart disease and stroke), diabetes, some cancers and chronic respiratory diseases (chronic obstructive pulmonary disease and asthma). NCDs are due to modifiable and non- modifiable risk factors (Bloom et al. 2011). Non modifiable risk factors are that which cannot be changed by the individual such as age, gender and genetic makeup. However addressing the modifiable risk factors such as unhealthy diet, physical inactivity, alcohol and tobacco use would improve the health outcomes related to NCDs.

In addition to the ageing population, the NCD epidemic was driven by negative effects of globalization such as unfair trade and marketing of unhealthy foods, rapid and unplanned urbanization, social determinants such as poverty and low educational levels which increased the likelihood of behavioral risk factors such as smoking and alcohol consumption.

2.2 Burden of Non-communicable diseases

2.2.1 Global scenario

NCDs are attributed to be the largest burden on human health worldwide contributing to more than 60 percent of all deaths (Bloom et al. 2011). According to the Global Burden of Disease study (GBD) in 2010, two out of three deaths globally were due to non-communicable diseases (34.5 million out of 52.8 million deaths) (Lozano et al. 2012). "Population growth, increased average age of the world's population, and largely decreasing age-specific, sex-specific, and cause-specific death rates combine to drive a broad shift from communicable, maternal, neonatal, and nutritional causes towards non-communicable diseases"(Lozano et al. 2012). Disability adjusted life years due to NCDs rose from 43 per cent in 1990 to 54 per cent in 2010 which clearly indicated the extent to which the non - communicable disease pose to disability and after care (Lozano et al. 2012). There was a change in trend in the pattern of distribution of NCDs with more people of younger age affected and a shift in the occurrence of the diseases from wealthier nations to the developing countries (Bloom et al. 2011).

NCDs are a growing concern in both national and international arenas of health and development, due to which the major international health councils had set global priorities and targets pertaining to it. In 2011, a political declaration on non-communicable disease was adopted by United Nations General Assembly (United Nations 2011) and in May 2012, the World Health Assembly passed the

global target of reduction of NCDs associated premature mortality by 25 per cent by 2025 (WHO 2013).

The United Nations Conference on Sustainable Development (Rio+20) recognized NCDs as an impediment to sustainable development in 21st century and emphasized the linkages between health and development (United Nations 2013).

2.2.2 South Asian and Indian scenario

Nearly half of the adult disease burden in South Asia was attributable to NCDs and the proportion of selected deaths attributable to selected NCDs in this region ranged from seven per cent in Nepal to 40 per cent in Maldives in the year 1998 (WHO 2002). India has the second highest number of people with diabetes (IDF 2013). Nearly 52 percent of the cardiovascular deaths in India occurred below 70 years of age when compared to 23 per cent in established market economies (Ghaffar et al. 2004). Mortality due to coronary artery disease rose from 1.17 million in 1990 to 2.03 million in 2010 (WHO 2002). A study among Sri Lankan urban men aged 35 to 59 years reported a prevalence of 1.6 per cent for coronary artery disease (Mendis & Ekanayake 1994). The prevalence of hypertension in urban and rural areas were estimated to be 23 per cent and 18 per cent in Pakistan (Jafar et al. 2003), 17 per cent and eight per cent in Sri Lanka (WHO 2002), and 20-40 per cent and 12-17 per cent in India (Gupta et al. 2002; Rastogi et al. 2004). There was an emerging shift in the incidence of cardiovascular diseases, diabetes from high income to low income groups (Ramachandran et al. 2001).

The sixth edition of Diabetes Atlas estimated that 382 million people are living with diabetes and was expected to exceed 592 million in less than three decades. In South East Asia alone there were 72 million people living with type two diabetes mellitus in the year 2013 and is expected to increase to 123 million (70.6 per cent increase) by the year 2035 (IDF 2013). Majority (98.1 per cent) of the people with diabetes in the South East Asian region live in India, Sri Lanka and Bangladesh. Studies have reported a diabetes prevalence of eight per cent vs four per cent in Bangladesh (Abu Sayeed et al. 1997), 12 per cent vs eight per cent in Sri Lanka (Diabetes Association of Sri Lanka, 1999) and 15 per cent vs three per cent in Nepal (Singh & Bhattarai 2003) in urban and rural areas respectively. India had the second highest prevalence (9.1 per cent) of diabetes in the South East Asian region next to Mauritius. India has 65.1 million persons living with diabetes mellitus, second highest worldwide. Diabetes prevalence in Kerala was estimated to be more than 17 percent with more number of new cases emerging between the ages of 35 to 45 years (Thankappan et al. 2010).

Cancer is one of the major NCDs in South East Asian region with large proportion of disability adjusted life years lost. The age standardized cancer rates were 99 to 129.6 per 100,000 in males and 104.4 to 153.3 per 100,000 among females (Parkin et al. 2005). In 2002, the American Cancer Society estimated that the three most commonly occurring cancers (other than non-melanoma skin cancer) in men were prostate, lung, and colorectal cancers (30, 14, and 11 percent of all new cases, respectively); for women, they were breast, lung, and colorectal cancers (31, 12, and 12 percent of all new cases, respectively) (Jemal et al. 2002). However India's

first cancer atlas shows that parts of India have the world's highest incidence of cancers of the gall bladder, mouth, and lower pharynx (Mudur 2005).

Chronic obstructive pulmonary diseases resulted from indoor and outdoor air pollution and contributed to the major proportion of chronic respiratory diseases. In India, respiratory diseases accounted for 65 million cases and 580,000 million deaths (Jindal et al. 2001).

2.3 Risk factors for non-communicable diseases (NCDs)

Most of the non-communicable diseases have common risk factors which if modified could prevent the incidence of NCDs. These risk factors are mainly dietary and behavioral risk factors such as tobacco use, harmful use of alcohol and physical inactivity which lead to four key metabolic or physiological changes such as raised blood pressure, overweight /obesity, raised blood glucose and raised cholesterol (WHO 2014a).

2.3.1 Tobacco use

Smoking and exposure to second hand smoke together constituted 6.3 million annual deaths worldwide. Prevalence of smoking among age group of 15 years and above was 22 per cent worldwide (WHO 2014a). About 12 per cent of all deaths among adults aged 30 years and above globally was attributed to tobacco. Tobacco use was the leading cause of death in both communicable and non-communicable diseases. Among communicable diseases, tobacco use was responsible for seven per cent of tuberculosis deaths and 12 per cent of deaths due to lower respiratory infections. Among non-communicable diseases, tobacco attributed to ten percent of

all cardiovascular deaths, 22 per cent of all cancer deaths, and 36 per cent of deaths due to the respiratory system.

2.3.2 Unhealthy diet

Unhealthy diet includes consumption of energy dense food, high salt intake, high sugar intake, low fruit –vegetable intake and foods rich in oil and fat that contribute to the majority of burden in non-communicable diseases. Studies have shown that approximately 16 million disability adjusted life years and 1.7 million deaths worldwide were attributed to low fruit and vegetable intake in the year 2008 (WHO 2014a). Adequate consumption of fruits and vegetables has shown to reduce the risk for cardiovascular diseases and few cancers.

Dietary salt intake had been found to be an important determinant of high blood pressure and the World Health Organization has recommended an intake of less than five grams of salt per day for the prevention of cardiovascular diseases. Reduction in the intake of salt from the current global level of seven to 12 grams per day to less than five grams per day would have substantial impact on blood pressure and other chronic cardiovascular diseases (WHO 2014 a). Replacement of high consumption of saturated fats and trans-fatty acids to poly unsaturated fatty acids reduce the risk of cardiovascular diseases.

2.3.3 Alcohol consumption

Among the global risk factors, alcohol ranked eighth for mortality and third for disease and disability. Alcohol use was found to be the causal factor of over 60 major diseases and injuries. It had been estimated that 2.5 million people die each

year due to the harmful use of alcohol (WHO 2014 b). In 2004, alcohol was attributed to 14 per cent of deaths due to cardiovascular diseases and diabetes, 21.6 per cent to cancer, 12 per cent to intentional injuries, 16.6 per cent to liver cirrhosis, 29.6 per cent to unintentional injuries, six per cent to neuropsychiatric disorders and 0.1 per cent to prematurity and low birth weight (WHO 2014 b).

2.3.4 Physical inactivity

Physical inactivity is the fourth leading risk factor for mortality globally. Highest prevalence of insufficient levels of physical activity was found in the Americas and the eastern Mediterranean region (50 per cent among women in both the regions and 40 per cent among the men in the Americas and 36 per cent in the eastern Mediterranean region) (Lee 2012). South East Asian region reported the lowest levels of insufficient physical activity (15 per cent among men and 19 per cent among women).

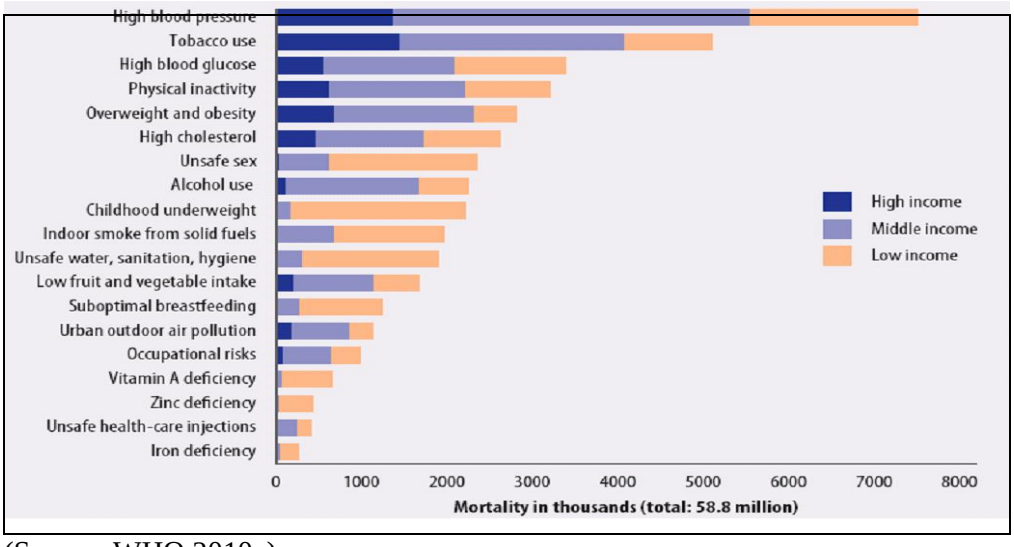
2.4 Physical Activity Epidemiology

Physical activity which is a basic need for sustainability of life had been viewed in different ways by different people. For example health professionals viewed physical activity as a health enhancing behavior while few others viewed physical activity as sports activity or leisure activities like trekking, jogging etc. Physical activity is a vital activity for humankind and was the major determinant for energy expenditure as the human body was evolved to move about to burn up the energy taken through food that is consumed. Physical activity was stated as “a global

public good", which was "non-excludable", had "nontrivial benefits that cut across borders, generations and populations" (Kaul & Faust 2001).

Physical inactivity (lack of physical activity) is an independent risk factor for chronic diseases (WHO 2010b). More than 5.3 million of 57 million deaths that occurred in 2008 (WHO 2010b) were due to physical inactivity and it continues to be the fourth leading cause of mortality in both developed and developing nations (Figure 1). Worldwide, physical inactivity caused six percent of the burden of disease from coronary heart disease, seven percent of type 2 diabetes, ten per cent of breast cancer and ten per cent of colon cancer (Bouchard & Després 1995). In India, physical inactivity was attributed to 2.6 per cent of the coronary artery disease, 3.2 per cent of type 2 diabetes, 4.8 per cent of breast cancer, 4.6 per cent of colon cancer and 4.2 per cent of all-cause mortality (Lee 2012).

Figure 1: Deaths attributed to 19 leading factors by country income level, 2004



(Source: WHO 2010a)

Chronic diseases, seven in particular have been associated with physical inactivity namely coronary heart disease (CHD), stroke, hypertension, breast cancer, colon cancer, type two diabetes mellitus (T2DM), and osteoporosis. Moreover there is convincing evidence on the role of physical inactivity in the development of obesity, sarcopenia, arthritis, physical disability, and several psychological disorders (Warburton et al. 2006). Overall, physical activity was thought to benefit over 25 chronic conditions (Bouchard & Després 1995).

2.4.1 Origin of physical activity epidemiology

Physical activity epidemiology is a new discipline which has emerged in over fifty years with a deeper understanding on the importance and role of physical activity in promoting health of the population. Role of physical activity was marked by the ground breaking study done by Jeremiah Morris in early 1950s on the incidence of coronary artery disease among the British bus conductors and drivers in a double decker bus. He found that the bus conductors had an incidence of 4.7 percent against drivers who had 8.4 percent for coronary artery disease. He attributed the higher coronary artery disease incidence among drivers to their sedentary nature of work thus emphasizing the role of physical inactivity to coronary artery disease. He also noted that the drivers had higher waist and chest circumference than the bus conductors, thus linking anthropometry to physical activity. Following his seminal work, more focus was given to explore the role of physical activity to health. Jeremiah Morris was considered as the “pioneer” in physical activity epidemiology. Later the 1996 release of the Surgeon General’s

Report was a landmark for the physical activity field. An exponential rise in the physical activity literature took place after that with greater focus on interventions to address physical inactivity.

2.4.2 Concept of "Physical Activity", "exercise" and "physical fitness"

Although the terms "physical activity", "physical fitness" and "exercise" are used synonymously they impart different concepts. Definitions of these terms are discussed here.

Casperson defined "**Physical activity** as any bodily movement produced by skeletal muscles that results in energy expenditure above the resting level" (Casperson et al. 1985)

"Exercise is a subset of physical activity which is planned, structured and repetitive and has a final and intermediate objective of improvement and maintenance of physical fitness."

"Physical fitness is a set of attributes that are either health or skill related."

"Health Enhancing Physical Activity is any form of physical activity that benefits health and fitness without undue harm or risk" (Foster 2000). This can be all daily activities and can, but does not necessarily, include sports. Not all physical activity is beneficial for health.

2.5. Patterns of physical activity

For the assessment of physical activity, surveys focused on intensity, frequency and duration of the activity. Intensity was an absolute expenditure relative to body mass or resting metabolism or a value relative to the peak performance. Frequency was the number of times a given activity was performed in a week and duration of each of the session of activity along with frequency gave the total number of minutes of the activity accumulated in a week.

Physical activity was often expressed as volume which was the product of intensity, frequency and duration and was mostly expressed in MET (Metabolic Equivalent of Task) -min/week.

2.6. Measures of Physical activity

Physical activity can be measured in Kilojoules (KJ), kilocalories (Kcal), Kcal per kilogram body weight, MET-minutes and MET-hours.

When expressed as rate (kilocalories per unit time), it is the amount of energy expended by each person during the activity per unit time. The most commonly used unit of time is week and day.

The most commonly used unit of physical activity measurement is MET (Metabolic Equivalents Task). A MET is defined as the ratio of work metabolic rate to a standard resting metabolic rate of 1.0 (4.184 KJ) $kg^{-1}h^{-1}$ which is considered a resting metabolic rate obtained during quiet sitting. Ainsworth et al, (2002) formulated a compendium of physical activity with an update on the

activity codes and MET intensities which had been widely used in several studies and substantiated.

2.7. Categories of Physical Activity (PA)

Although physical activity was categorized in many ways, the commonly used way was to categorize physical activity into identifiable portions of daily life. Based on the intensity of physical activity, a model had been proposed by Pate et al, (1995) where physical activity was classified based on the intensity as light(<3 METs), moderate (3-6 METs) and vigorous(>6 METs). This classification is used to classify activities based on intensity.

To be beneficial for health, physical activity should be 'moderate' or 'vigorous'. Moderate-intensity physical activity raises the heart-beat and leaves the person feeling warm and slightly out of breath. It increases the body's metabolism about three to six times the resting level (3-6 METs). Brisk walking (3.5 miles per hour) for example, has an equivalent of 4.5 MET's (Ainsworth et al. 2000). Vigorous-intensity physical activities are those activities that make the body warm and sweat and become out of breath. They usually involve sports or exercise, like running or fast cycling and raise the metabolism to at least six times its resting level.

2.8. Recommendations on physical activity for attaining health benefits

The American College of Sports Medicine/Centers for Disease Control issued a public health recommendation in the year 1995 which stated "Every adult should accumulate 30 minutes or more of moderate intensity activity on five or more days per week or 20 minutes of vigorous intensity activity, on three days or more per week in order to gain health benefits" (Pate et al. 1995). Countries like USA, Switzerland, Philippines, New Zealand, UK and European region nations had set guidelines and recommendations to promote physical activity with an objective to reduce hypertension, maintain musculoskeletal fitness, improve cardiovascular health and to reduce obesity.

World Health Organization (WHO) in 2004 passed a resolution on "Global strategy on diet, physical activity and health" with a vision to improve population health and published the global recommendation for physical activity for health in the year 2010 (WHO 2004).

For the 5- 17 year olds, it was recommended to accumulate at least 60 minutes of moderate to vigorous intensity aerobic physical activity daily. Adults 18 to 64 years should accumulate 150 minutes of moderate intensity aerobic physical activity in a week or at least 75 minutes of vigorous intensity activity in a week. Each time the activity should have at least ten minutes of duration and the benefits accrued increased with more physical activity. Adults 65 years and above were

recommended similar to that of 18 to 64 years and they should focus more on activities that strengthen the muscles and improve coordination (WHO 2004).

2.9 Physical activity and health

Ever since the pioneering work by Jeremiah Morris on the role of physical inactivity and coronary heart disease, there has been lot of research in the area of physical activity. Since early 21st century, there is mounting evidence to support the beneficial role of physical activity on health. Physical activity was called as a "miracle drug" that benefitted the whole of body and increases the life span (Pimlott 2010). Evidence suggests that physical activity has a role in the primary and secondary prevention of chronic diseases such as cardiovascular diseases, type 2 diabetes mellitus and few cancers. This section will briefly review the role of physical activity in risk reduction for all-cause mortality and chronic diseases.

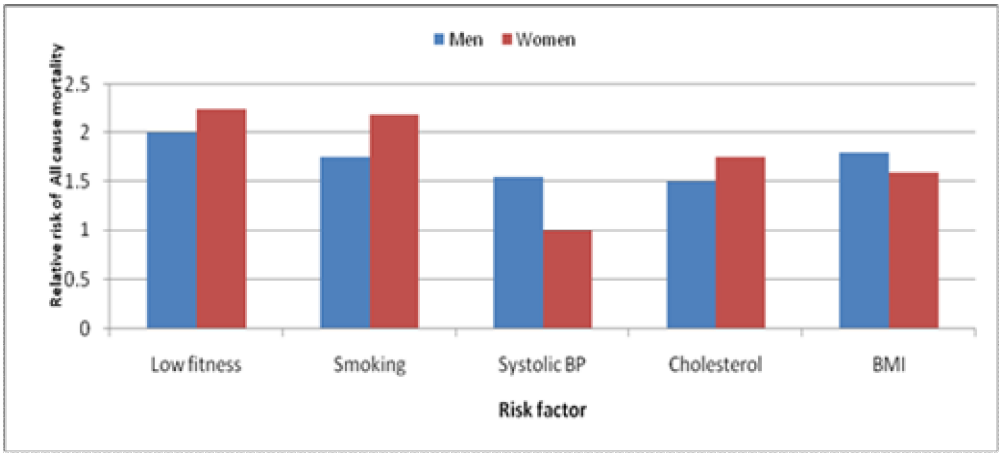
2.9.1 Physical activity and All-cause mortality

A systematic review and meta-analysis (Lollgen et al. 2009) on 38 prospective cohort studies with more than 2,71,000 participants and a median observation period of 12 years have shown linear inverse relationship between the intensity of activity and the risk for all-cause mortality. There was a dose response curve in mortality reduction from being sedentary to moderate –vigorous intensity activity and this risk reduction was less with further increase in the level of activity. The effect of sex was profound in this study with a stronger risk reduction among women than men and it was explained due to multiple factors. Women were protected from cardiovascular diseases and mortality up to the menopausal period

after which the risk increased. A decreased relative risk for all-cause mortality was found in active subjects over 65 years of age when compared to the younger group(<65 years) in the sub group analysis which strongly supported the beneficial role of physical activity among all age groups.

Blair et al argued that physical fitness was superior to physical activity and he conducted a prospective cohort study among 13,334 participants (10,224 men and 3120 women) and followed them for eight years. Participants were classified based on their fitness and he found that the age adjusted relative risk for mortality was highest in the least fit group among men (OR; 3.44:95% CI 2.05-5.77) and women (OR; 4.65: 95% CI 2.22-9.75) and the relative risk reduced with fitness. A 44 percent reduction in the risk for mortality was found among men who were fit during the second examination when compared to unfit individuals who remained unfit in the second examination also (Blair et al. 1989). Low fitness was found to have the highest all-cause mortality rate (Figure 2) when compared to other risk factors like smoking, high systolic blood pressure (>=140 mm of Hg), high cholesterol (>= 240 mg/dl) and higher body mass index (BMI>=27) (Blair et al. 1989).

Figure 2: Comparison of low physical fitness with other risk factors for the risk of all-cause mortality (Source: Blair et al. 1989)



An age adjusted interaction between fitness and activity, and the respective hazard ratio associated with being fit or active demonstrated that being comparatively fit or active would result in more than 50 percent reduction in the mortality. That means, among the least fit subjects (those achieving five METs), being relatively active (1500 kcal/wk.) was associated with a 68 percent reduction in mortality. Alternatively, among the least active subjects (those reporting no activity), being relatively fit was associated with a 55 percent reduction in mortality.

2.9.2 Physical activity and cardiovascular diseases

2.9.2.1 Primary Prevention

Earliest studies attributed sedentary work to the risk of developing cardiovascular diseases, and gradually as most of the occupations turned to be sedentary, there was a shift in the body of evidence to leisure time physical activity and sitting

time. Following the exploration by Morris on the sedentary behavior and risk for coronary artery disease, Paffenbarger et al (1975) investigated the relationship between work activity and coronary artery disease among the longshoremen of San Francisco. The study showed a higher risk among workers of low work related physical activity when compared to those with vigorous work related activity.

A meta-analysis on 30 studies among women showed a graded inverse relation between physical activity and risk of cardiovascular death with a relative risk of 0.67(95% CI: 0.5-0.85) among the most active women compared to the least active group and this protective effect was seen in as little as one hour of walking per week (Oguma &Tagawa 2004).

A study in India showed that 145 MET-minutes per day of leisure-time exercise, equivalent to 35–40 minutes per day of brisk walking was associated with over a fifty percent reduction in risk for coronary heart disease (Rastogi et al. 2004). Physical inactivity has been associated with a 1.5 to 2.4 fold elevation in CHD risk (Pate et al. 1995).

A Finnish twin cohort study was done on a large sample (over 15,000) of healthy men and women in the age group of 25 to 64 years of age on physical activity patterns and known predictors of mortality. Baseline survey was done in 1974 and the study participants were followed up for all-cause mortality from 1977-1994. Those who reported exercising at least six times in a month with an intensity corresponding to that of vigorous walking of a mean duration of 30 minutes were considered as conditioning exercisers, those who reported no leisure physical activity as sedentary and others as occasional exercisers. The hazard ratio for death

among twins who were healthy at the baseline and discordant for death was 0.66 (95% CI: 0.46-0.94) in occasional exercisers, 0.57 (95% CI: 0.45-0.75) in conditioning exercisers when compared with those sedentary. This study revealed the benefit of physical activity over genetic predisposition, age and childhood experiences as evidenced by lower mortality rate among most active ones (Kujala et al. 1998).

All these studies provided compelling evidence on the beneficial role of physical activity or physical fitness in reducing the risk of cardiovascular disease.

2.9.2.2 Secondary Prevention

Benefits of physical activity and fitness extended not only to healthy individuals but also to individuals with established cardiovascular disease. This was considered important because in earlier days, those with heart disease were advised rest and physical inactivity. However the role of physical activity on prevention of premature death in patients diagnosed with cardiovascular disease had been explored extensively. A review of 36 clinical trials (Jolliffe et al. 2001) showed a 27 percent reduction [OR 0.73 (95% 0.54 - 0.98)] in all-cause mortality in the exercise only group against usual cardiac rehabilitation group.

2.9.3 Physical activity and Diabetes Mellitus

2.9.3.1 Primary prevention of type 2 diabetes mellitus

Aerobic and resistance type of exercise had been found to be associated with decreased risk for Type 2 diabetes. One of the first large scale observational studies was conducted by Helmrich and his team among 5,990 male University of

Pennsylvania alumni aged 39–68 years at baseline, who were followed for an average of 14 years through which 202 cases of physician-diagnosed diabetes occurred during 98,524 man-years of observation. After adjustment for age, body mass index (BMI), hypertension, and parental history of diabetes, the investigators observed on average a six percent lower risk of diabetes for each 500 kcal/week. of self-reported leisure-time physical activity. He also found that the protective effect was highest among those with highest risk for non-insulin dependent diabetes mellitus (NIDDM) defined as having high body mass index, history of hypertension and parental history of diabetes mellitus (Helmrich et al. 1991).

The benefit of physical activity was not limited to healthy individuals but also to individuals with impaired glucose tolerance. A randomized controlled trial among 3234 people with impaired glucose tolerance in United States followed up for 2.8 years showed a 51 percent reduction in the risk of developing diabetes for those in the intervention of "lifestyle modification" and 31 percent reduction in the risk for those who received only metformin when compared to the placebo group. The diabetes incidence was 11.0, 7.8, and 4.8 cases per 100 person-years in the placebo, metformin, and lifestyle groups respectively. The lifestyle intervention included regular physical activity of approximately 150 min/week of moderate to vigorous intensity activities, modest weight loss (seven percent of baseline weight was targeted), reduction in fat intake, and increase in whole grains, fruits, and vegetables. The effect was found greatest among individuals with greater lifestyle modification (Knowler et al. 2002).

2.9.3.2 Secondary prevention of Type 2 diabetes mellitus

Exercise and fitness was also proved to be beneficial to individuals clinically diagnosed to be diabetic. A prospective cohort study among adults 18 years and older with diabetes showed that walking at least two hours per week was associated with a reduction in the incidence of premature death of 39 to 54 percent from any cause and of 34 to 53 percent from cardiovascular disease (Gregg et al. 2003). The mortality rates were lowest for persons who walked three to four hours per week (all- cause mortality hazard rate ratio (HRR); 0.46: 95% CI, 0.29-0.71; CVD mortality HRR; 0.47: 95% CI, 0.24-0.91) and for those who reported that their walking involved moderate increases in heart and breathing rates (all-cause mortality HRR; 0.57: 95% CI, 0.41-0.80; CVD mortality HRR; 0.69: 95% CI, 0.43-1.09).

2.9.4. Physical activity and cancer

2.9.4.1 Primary prevention

A meta-analysis of 52 studies (Wolin et al. 2009) revealed a 24 percent reduced risk of colon cancer among the most active compared to the least active individuals across all studies (RR:0.76, 95% CI: 0.72- 0.81). When men and women were separately examined, similar results were found for both men (RR: 0.76, 95% CI: 0.71, 0.82) and women (RR: 0.79, 95% CI: 0.71, 0.88). Reduced insulin resistance and hyperinsulinemia, anti-inflammatory action, direct immune action, decreased intestinal transit time or higher vitamin D levels were the mechanisms through which physical activity reduced risk for colon cancer.

Although individual studies have observed as much as a 70 percent reduction in risk for prostate cancer among most active when compared to the least active men, several studies also have reported increased risks of two fold and greater (up to 287 percent increase) (Lee 2003). A Norwegian study among 81,516 men and women followed up to 19 years reported 413 men and 51 women developed lung cancer. Investigators observed an inverse relation between the level of recreational physical activity and the risk of lung cancer. After adjusting for smoking and the number of cigarettes smoked, men who walked or bicycled for at least four hours per week had a 25 percent risk reduction compared with men who had sedentary leisure time hobbies. Men at the next higher level of physical activity (exercising for less than four hours per week to keep fit, regular hard training, or competing in sports) had a somewhat larger risk reduction of 29 percent (Thune & Lund 1997).

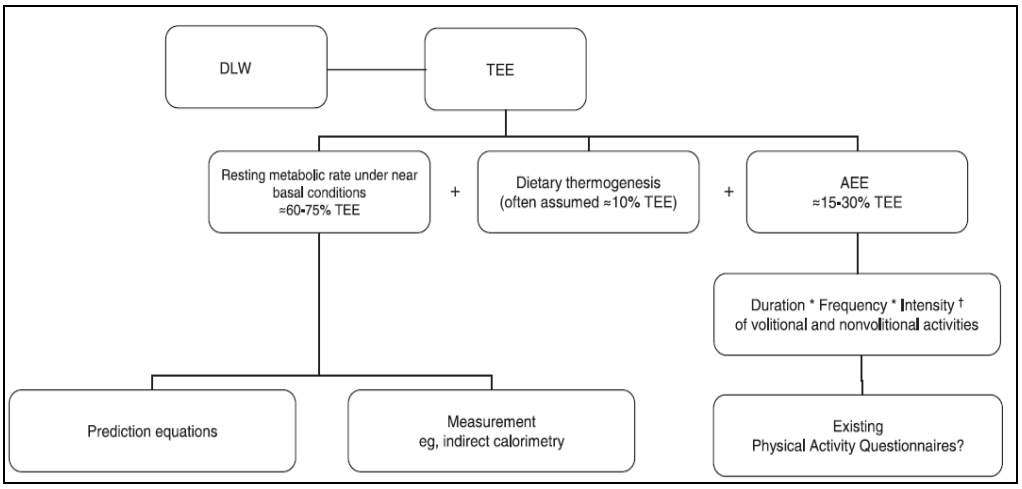
All the above evidences suggest strongly the influence of physical activity on prevention of breast, colon, prostrate and lung cancers.

2.11 Concept of physical activity energy expenditure (PAEE)

Physical activity energy expenditure (PAEE) also known as activity energy expenditure (AEE) is the most variable component of total energy expenditure (TEE), typically accounting for 15–30 per cent of TEE. However, in extremely active individuals, PAEE constituted 60 to 70 per cent of TEE. Although the physical activity energy expenditure is decreasing due to increased mechanization in all domains of life , but it is less understood as to which domain of life is contributing to the present PAEE.

Total energy expenditure (TEE) can be measured by doubly labeled water (DLW) or through direct or indirect calorimetry. The actual contribution of physical activity to energy expenditure is calculated by subtracting resting metabolic rate from TEE. The accuracy of this could be enhanced if a measure of resting metabolic rate was made rather than relying on estimates using standard equations (Warren et al. 2010). The figure below shows the parameter measurements that contributed to the total energy expenditure.

Figure 3: Total energy expenditure (TEE) and activity energy expenditure can be derived from DLW or possibly physical activity questionnaires. (Adapted from Warren et al. 2010)



2.12 Methodology for physical activity assessment

Assessment of physical activity had been an area of much research interest in the past decade as accurate and reliable assessment were required to establish the prevalence of inactivity at population level, identify individuals who do not meet the recommendations, to understand the patterns of physical activity by gender, age, geography, socioeconomic factors and other demographic factors, and to track physical activity trends overtime (Pratt &Fulton 2009). With the development of technology, physical activity assessment has progressed from questionnaires that assessed the individual behavior to assessment of the environment and built environment and several techniques that objectively assessed the energy expended through physical activity.

Several health related dimensions of physical activity such as caloric expenditure, aerobic intensity, weight bearing, flexibility and strength can make the physical activity assessment complicated (Casperson et al. 1985). Physical activity assessment was mostly compromised as poor measurements that often gave obscure associations to health outcomes.

Methods for measuring physical activity were classified into:

1. Subjective reports
2. Job classification
3. Physiological markers

4. Direct observation
5. Mechanical or Electronic monitoring

2.12.1 Subjective Reports

Subjective measures such as questionnaires were typically used to assess physical activity of populations in epidemiological studies. The advantages of the questionnaires are that they are nonreactive (does not alter the behavior of the individual), practical (reasonable study cost and participant convenience), applicable (instrument can be designed to use any group studied), and accurate (reliable and valid) (Montoye & Taylor 1984).

2.12.1.1 Survey

Survey was the most commonly used type of subjective report and it mostly sought to capture information from the participants about their physical activity on the following components:

1. **Time frame**-The respondents were asked to remember various activities which varied from five minutes to more than a year. The activity questionnaire asked the usual activity or activity done in the past week, month, year or even a lifetime.
2. **Nature and detail of physical activity**-Participants were asked to provide information on the frequency, intensity and duration of activity or group of activities. With the transition in the nature of the job over decades from more strenuous to less strenuous ones, questionnaires have shifted from asking job titles to enquiring about the type, duration and intensity of activities by individuals at work. Leisure time physical activity was

assumed to be the best representation of population physical activity as there was a drastic reduction in the work physical activity over decades. Recently developed questionnaires captured both leisure and on job physical activity for younger and healthier people. Among older or diseased, questionnaires with activities of daily living and leisure activity of low intensity best represented energy expenditure and physical activity (LaPorte et al. 1985).

Surveys are often conducted through personal interviews, telephone interviews, self- administration, mail surveys or combinations.

Surveys were usually classified into four general types-

Physical activity diary surveys were used for short time frame, mostly 24 hour period and were self-administered. Although this was an accurate method to measure the energy expenditure by physical activity, it cannot be applied for epidemiological research due to the high cost, time, and change in normal pattern of activity and acceptability constraints.

Recall surveys captured information about the last seven days of activity by means of personal and telephone interview or mailed questionnaire. Recall surveys were preferred over diary survey method as the latter imposed greater demands on the participants and therefore it was not highly recommended for assessing the physical activity participation. Bouchard et al, (1983) validated a three day recall and found it to be ideal for measuring energy expenditure for population studies. The study on heart attack among college alumni by Paffenbarger et al. adopted

recall method where he probed on distance walked, stairs climbed and sports and recreational activities undertaken in the previous week (Paffenbarger & Hale 1975).

Physical activity questionnaires are the most commonly used tool for recall surveys. For large epidemiological studies involving larger population a questionnaire was the only feasible method of assessing the habitual physical activity (Montoye 1971; Lamonte & Ainsworth 2001). Questionnaires captured physical activity pattern varied in detail like duration and intensity. Some questionnaires examined activities during the past seven days (Kohl et al. 1988), through the last month (Ainsworth et al. 2000) and some for the entire life time (Kriska et al. 1988).

Since there was an inherent recall bias in long term recalling of activity pattern, it was recommended to make the recall interval short (limited to three months). It was recommended that the accuracy of the questionnaire could be improved by asking questions about specific time of a day and open ended questions elicited better results than close ended ones (Shephard 2003).

Questionnaires captured the type of activity differently. Use of cue card or leading questions from the side of the interviewer was one strategy (Shephard 2003). Intensity of activity can be measured based on self -perceived intensity; or on specific energy expenditures known to be associated with specific activities (Ainsworth et al. 2000). Activities may be classified as light, moderate or vigorous based on their assigned energy expenditure values. In several studies, intensity was

often captured on a likert scale, but intensity was often perceived differently by individuals and was often subjective. Thune et al, (1997b) captured the intensity of occupational activities using a self-administered questionnaire where participants were classified as “mostly sedentary work”; “work with much walking”; “work with much lifting and walking”; and “heavy manual work”. Shepherd argued that these questions will only distinguish the activity between light and vigorous.

Another issue was the need to measure activities of low level as most of the questionnaires (seven day recall) captured only activities those were of moderate or vigorous intensities or having duration of more than ten minutes.

A few questionnaires tried to capture absolute rather than relative intensity wherein subjects were asked to specify the typical speed of walking, jogging or cycling and using the table of energy cost, most of the reported activities were converted to an approximate estimate of energy expenditure i.e. kilo calories or metabolic equivalents relative to the resting condition. However, the inter-individual and intra-individual variations in energy cost of activities depended on age, sex, body mass index, skill and level of fatigue (Shepherd 1968).

Domains or settings where the activity was performed included the places where the activity was carried out and was classified into leisure time activity, occupational activity, domestic setting, commuting or transportation.

Over 38 physical activity questionnaires are available and it is important to identify the appropriate tool based on the purpose and objective of each research. Validated instruments to assess individual physical activity behavior, physical environment

and surveillance have been compiled by Bauman et al based on a theoretical framework, evidence for associations with PA, and those that have demonstrated moderate to good scale reliability (Bauman et al. 2006).

Two commonly used physical activity questionnaires to assess the individual behaviors are the International physical activity questionnaire (IPAQ) and the Global physical activity questionnaire (GPAQ).

International Physical Activity Questionnaire (IPAQ) was developed to have a standardized measure for physical activity assessment globally and it has two versions: short and long. The short version was developed for national and regional surveillance systems and the long version gave detailed information which can be used for evaluation and research work.

Global physical activity questionnaire (GPAQ) was developed by World Health Organization with a need to have a standard measure for physical activity assessment across the globe for inter-country comparisons. GPAQ can be self-administered or can be given as an interview schedule and it tries to capture physical activity of a usual week over the domains of activity such as work/domestic, transport and leisure. Activities of moderate or vigorous intensities of more than ten minutes are captured. The composite physical activity score derived from the GPAQ assessment classifies individuals into light, moderate and high active.

Quantitative history surveys: These questionnaires use a time frame of more than one week and seek detailed information of various activities. A Tecumseh study

used this technique where each participant was asked in detail of the type of occupation, nature of work, nature of travel to and from work, duration of each activity through direct interview (Montoye 1971). Overall, the quantitative history surveys could be implemented on population studies, yielding enormous detail on the physical activity pattern. However the repeatability of the questionnaire would be an issue due to long recall periods.

General surveys: In general surveys, less information are captured. The Framingham study of heart disease employed a general physical activity survey for personal interviews that queried on hours per day spent in sleep, work, and extracurricular activities (Sherman et al. 1994).

Mostly recall surveys, general surveys, and quantitative history surveys had been increasingly used in epidemiologic investigations of physical activity because of their ease of implementation. Generally, short-term physical activity surveys measuring seven days are more likely to miss the physical activity behavior performed during other seasons. One way to tackle it is to repeat the survey at different seasons which would be labor intensive. To overcome the seasonal variations, quantitative history may aid, however, it has problems in repeatability and recall biases.

2.12.2 Job Classification

Another way of assessing physical activity is by classifying according to the job profile. Jobs are ranked according to the level of physical activity assuming that people in a job category expend more or less the same energy. It is used in large

representative populations with minimal cost. However it has limitations in validity and reliability and not recommended for epidemiological studies. Variability within job classification, job intensity misclassification, secular and seasonal changes in job requirement and possible selection bias may be a few limitations in using the job classification.

Job classification variability was often large within a job. For example within doctors, energy expended by a surgeon may be more than a physician due to long hours of standing during surgery. Nurses in patient care may expend more energy than the supervisors. Job intensity also varied across time as few jobs in earlier days required physical exertion was now eased due to mechanization.

2.12.3. Physiological Markers

Establishing a correlation for the questionnaire that measures physical activity with an objective measure (criterion measure) is a way of validating the questionnaire. Use of physiological markers gained importance in measuring maximum oxygen consumption to estimate physical activity which can be used as a proxy of the cardio respiratory endurance.

Indirect calorimetry or doubly labeled water is the gold standard measure in calculating the energy expenditure related to physical activity (Montoye et al. 1996).

2.12.3.1 Direct Calorimetry

In Direct calorimetry, physical activity is measured in relation to the overall energy expenditure. Here individuals are sequestered in special chambers and limited to

special tasks. It is highly accurate with less than one percent error, however highly expensive and impractical for population surveys.

2.12.3.2 Indirect calorimetry

Each participant has to wear a face mask or mouth piece with a nose clip and breathe into Douglas bags or a container for the collection of expired air. The exhaled air is carefully measured for the amount of oxygen and carbon dioxide in the sample. Even though electronic equipment measured the gas concentration, still it is time consuming. It measures the oxygen consumption related to the heat production (Dauncey 1989). The error rate is approximately two to three percent. Although both direct and indirect calorimetries are accurate, they cannot be used for population based studies as these measurements alter the normal physical activity patterns and is costly for large populations.

2.12.3.3. Doubly labeled water technique (DLW)

It provides an integrated measure of energy expenditure over time and the participant's ingested water containing isotopically labeled hydrogen and oxygen atoms of negligible health risk to the participants is used for measurement. Measurement of the relative proportions of non-metabolized water and water that has been incorporated into the energy cycle provides an overall estimate of energy expenditure (Schoeller 1988). The method is highly accurate, with error estimates ranging from two to ten percent when compared with calories from weighed dietary intake. It allows measurement in all age groups, not restricting free living activity and the procedure generally takes two to three weeks. DLW requires

minimal subject cooperation and usually costs 225 US dollars per person, thus restricting its applicability to small sample studies.

2.12.4. Direct Observation

Behavioral observation was a technique developed by behaviorists where the participants were observed to see the change in physical activity behavior. It was impractical for population based studies as the observation may alter the normalcy of the behavior and not every participant would consent to this method (LaPorte et al. 1985).

2.12.5 Mechanical or Electronic Monitoring

Mechanical and electronic instruments were another method to assess body movement or heart rate responses to physical activity.

2.12.5.1 Heart rate monitoring:

Recent advances in heart rate monitoring have made it feasible to obtain continuous heart rate recordings over an extended time. Studies in normal populations have assessed physical activity through the use of heart rate monitoring approaches (Brosh 2007) and it had been found to be attractive because it directly measured a physiological parameter known to be related to physical activity and provided a continuous record that may reflect both intensity and duration of daily activity.

2.12.5.2 Electronic Motion Sensors:

Assessment of physical activity by measuring "movement" has been used extensively. Motion sensors can be classified into instruments that only assessed the quantity of movement (pedometers) and instruments that assessed both the quantity and intensity of movement (accelerometers). Movement itself is highly complex and required in-depth analysis of type, frequency, and intensity to determine its physiological effects.

Pedometers are instruments used to evaluate walking behavior primarily measuring the walking pattern. The major limitation of the pedometer is that they are insensitive to non-locomotor form of movement and thereby unable to record the magnitude of the movement. They also lack real time data storage capability. The inter- and intra- instrument variability primarily associated with the mechanical fulcrum of the instrument had been reported to be responding inconsistently to a given force (Washburn et al.1980). Its applicability to diverse population is very limited and does not assess intensity or pace, but the total volume walked. The error rate for pedometer has been shown to be 30 percent.

The large-scale integrated (LSI) motor activity monitor or accelerometer is an instrument of pocket size and maybe placed in various parts of the body, which measures the body movements. Within the monitor is a cylinder with a ball of mercury and a three percent inclination or declination of instruments closed a mercury switch, which registers in an internal counter. It is more useful for characterizing the total volume of activity, and estimated energy expended, which is the number of minutes per day multiplied by the intensity of the activities carried

out (Welk 1998). Till date, several models of accelerometer are being developed and the most widely used ones are Caltrac, Tritrac-R3D, MTI Actigraph (formerly the Computer Science and Applications Inc 7164) and Actlife versions.

Accelerometers have been found to show low variability between units, thus concluding its safe use in studies and also among diverse groups. The error rate is less than two percent and it does not interfere with the normalcy of the activity. Accelerometers are considered as the best criterion measure for physical activity self- reports.

2.13 Reliability, Validity and Sensitivity of Measuring Instruments

Ample number of questionnaires have been developed to measure physical activity of individuals, however many were found not to be reliable and valid. In behavioral risk factor surveillance, the prevalence of moderate intensity activity assessed by different methods ranged from 20 per cent to 38 per cent (Brownson et al. 2000b) and the proportion meeting the health related guidelines varied from four per cent to 70 per cent (Sarkin et al. 2000). Factors contributing to this wide variability included personal characteristics (age, sex, socio-economic status), use of prompting or cue cards and number of items included in the estimate such as leisure, occupation, household and transportation.

Reliability (reproducibility) is the stability of a measure, which should classify people's PA in the same way on repeat administration of the measure. The same

time period of recall was recommended to be used in repeatability studies, as PA behavior may differ across weeks (Booth et al. 1996).

Validity ensures a measure assess that is intended to measure. It was often in the form of "criterion" ('gold standard') validity, comparing a measure such as a questionnaire to a closer representation of the true underlying phenomenon. Validity studies explored the relationship between self-report PA measures and more objective phenomena such as cardio-respiratory fitness tests, motion sensor monitoring, and more intensive reports through PA logbooks and diaries.

Application of energy expenditure values from the compendium of physical activities (Ainsworth et al. 2000) was a commonly used methodology. The investigators corrected for the age mismatch to some extent by using a more age-appropriate estimate of resting energy expenditure.

Prince et al in her systematic review of comparison of PA questionnaires with direct measures found that studies which categorized physical activity by level of exertion (e.g. light, moderate, vigorous) showed an increased trend of mean percent differences between the self- report and direct measures with the higher category levels of intensity (i.e. vigorous physical activity). Another limitation stated in the paper was that most of the studies tested the relationship between self -report and direct measures by using a correlation coefficient, and suggested that Bland-Altman method was more useful in providing the level of agreement between self-report and direct measures by deriving the mean difference between the two measures and the limits of agreement (Prince et al. 2008).

Many self-report instruments (such as the seven day physical activity recall) did not have the ability to account for activities of less than ten minutes in duration or those with a level of exertion lower than brisk walking (Tudor-Locke et al. 2001), whereas some of the direct methods (such as DLW) captured all forms of physical movement. However, one of the limitations of direct measures such as accelerometers is that they are unable to capture certain types of activities such as swimming and activities involving the use of upper extremities. So there was always a possibility of mismatch in the energy expenditure calculated from self-reports and direct measures. The compendium improved the comparability of results between self-report and direct measures (Prince et al. 2008).

2.14 Questionnaires Validated in Indian Settings

Indian Physical activity questionnaire estimated 24 hour energy expenditure as well as components of occupation and discretionary leisure time activities. Estimates of physical activity were highly repeatable when the questionnaire was re-administered within a four week period. Relative validity was assessed by comparing energy intake (using repeated 24 hour dietary recalls) and expenditure (using the physical activity questionnaire) over the same period. A correlate of $r = 0.33$, $P < 0.05$ between the two measures were also observed. The discriminatory power of the questionnaire was assessed by comparing the physical activity patterns of young (18-30 years) and older (> 60 years), free living healthy subjects (Bharathi et al. 2000). Subjects were asked to report the average time spent at

work and average frequency of activities related to leisure or recreation, household chores, as well as sedentary and daily activities over the last month.

Global physical activity questionnaire(GPAQ) was developed by the World Health Organization captures physical activity over a usual week in three domain of activities such as work/domestic, leisure and transport for activities of moderate and vigorous intensities and this has been validated in India and other countries (Bull et al. 2009).

International physical activity questionnaire captures the physical activity by seven day recall at work, leisure and transport and has been validated in India (Bauman et al. 2009).

2.15 Correlates of Physical Activity

Although it is well acknowledged that physical activity has the "public health potential" in preventing deaths attributed to chronic diseases, very few people have been found to be meeting the recommendations of 30 minutes moderate intensity activity on five or more days a week. Understanding the correlates or determinants of physical activity is crucial for identifying effective interventions for all subgroups of the population. Correlates of physical activity are well studied in developed nations and a review on correlates revealed that there were very few studies on correlates from developing nations and amongst them, two thirds were from Brazil and China (Bauman et al. 2012). The available evidence on the correlates can be categorized under the following groups

1. Demographic and biological factors
2. Psychological, cognitive and emotional factors

3. Behavioral attributes and skills
4. Social and cultural factors
5. Physical environmental factors
6. Underlying morbidities
7. Policy attributes

2.15.1 Demographic and biological factors

a) Age: Age had been found to be the most consistent demographic correlate of PA. Studies that had examined on the age trends showed an inverse association with PA (Leslie et al. 1999; Lian et al. 1999; Booth et al. 2000; Brownson et al. 2000a; King et al. 2000). However older age has shown a positive association with physical activity among women in Asian countries such as China and Vietnam (Jurj et al. 2007; Cuong et al. 2007).

b) Gender: Physical activity participation was consistently higher among men than women (Clark 1999; Leslie et al. 1999; Lian et al. 1999; King et al. 2000; Booth et al. 2000). This could be due to the gender roles of activities at work, transportation and leisure. A study from India showed that although women have higher levels of activity at household, their overall level of physical activity was lower than that of men (Vaz & Bharathi 2004).

c) Socioeconomic status: It was positively associated with physical activity in several studies in the developed nations (Sternfeld et al. 1999; Brownson et al. 2000a). A recent study compared the influence of

socioeconomic status with healthy lifestyles in two countries, China and United States and it showed an opposite trend in both the countries. As the socioeconomic status increased the relative odds for being healthy in the highest socioeconomic group was 0.19 for China when compared to 3.81 for the United States (Kim et al. 2004). This trend may be applicable for all countries of emerging economies including India.

d) **Educational status:** It was positively associated with physical activity (Clark 1999; Lian et al. 1999; Brownson et al. 2000a).

e) **Employment:** It was positively associated with physical activity in most of the studies. However in a study among diverse population of women, employment was found a barrier for PA. Constraints in time may be the reason for employment to be a barrier and it forced more to sedentariness if the occupation was sedentary. Less skilled workers were less likely to be engaged in leisure time physical activity (LTPA) (Salmon et al. 2000).

f) **Marital status**: Studies that explored relationship between marital status and PA showed mixed findings. A few studies reported on the positive association with the PA (Pettee et al. 2006; Salmon et al. 2000), while a few others reported no association (Booth et al. 2000; Brownson et al. 2000a; King et al. 2000). King et al (2000) examined the effects of marital transitions on changes in physical activity among a cohort of men and women from the Stanford five city project. The change from single to married status was found to have positive association unlike single individuals. Transition from married to single did not influence physical

activity. Spouse support has been found to be of great influence in clinical adherence programs (Oldridge 1982) which may be the contributing factor of positive association with the marital status. However in one of the studies "being married" was found to have negative association with physical activity (Sternfeld et al. 1999). Having young children at home had been negatively associated with recreational physical activity. However, household physical activity was highest among employed women with young children at home. Similar pattern of high household activities among women had been reported in India (Vaz & Bharathi 2004). It could be assumed from these findings that the gender dynamics would have attributed its association with the physical activity patterns in most countries although more pronounced in developing countries.

g) Overweight and obesity:

Biological trait of being overweight or obese was consistently negatively associated with PA (Martinez-Gonzalez et al. 1999) especially among women who were overweight (Brownson et al. 2000a). It would rather be that obesity could be considered as an "effect" rather than a predictive factor.

2.15.2 Psychological, cognitive and behavioral factors

Role of various behavioral theories in framing the activity pattern of individuals has been studied across globe. The application of each model has been found to

have either an association or no association in promoting the physical activity in different subgroups.

These factors included intrapersonal variables such as attitudes, barriers to PA, expected benefits, intention, self-efficacy for PA, normative beliefs, knowledge of health and exercise, perceived health, motivation, and stages of change.

a. **Self- efficacy**: It is a person's confidence in his/her ability to be physically active on a regular basis and it was found to be a consistent predictor of PA. Self -efficacy was found to have positive association with adult physical activity (Booth et al. 2000) and adherence to structured PA program (Duncan & McAuley 1993). Self -efficacy was two to four times more among women with high levels of PA (Sternfeld et al. 1999).
b. **Perceived barriers:** Lian et al in a population based sample of elderly men and women found a negative association with the barriers and leisure time physical activity. Lack of time, too tiring, too weak, fear of falling, bad weather, lack of facilities and lack of exercise partners were the barriers to physical activity (Lian et al. 1999). In the US women determinants study, which was conducted among women older than 40 years, the perceived barriers of fatigue, ill health, lack of energy and self-consciousness about appearance were significant correlates of PA (Brownson et al. 2000a).

c. **Perceived benefits**: Knowledge on the benefits of exercise was found to be positively associated with PA behavior (Lian et al. 1999).

2.15.3. Behavioral attributes and skills

Behavioral attribute and skills developed in the life course have a role in modifying the behavior. Some of the attributes were smoking, past exposure to sports, school athletics, sports media use, type A personality etc. The behavioral attributes found significantly associated to physical activity are discussed.

a) Past exercise participation had emerged as a consistent predictor of the current activity status (Oldridge 1982; Clark 1999).
b) Healthy diet consumption was a positive predictor to PA (Lian et al. 1999; Brownson et al. 2000a).
c) A positive attitude to physical activity in the early years of life was found to contribute to the active living of older individuals when compared to their sedentary counterparts. Other factors that contribute to it were the parental attitude towards sports and their influence on children. Participation in school athletes was an important predictor of physical activity in later life (Harris 1970).
d) Smoking was found to be inversely related to physical activity (Oldridge 1982; Lian et al. 1999; Brownson et al. 2000), however a study among the diverse population of women revealed the positive association of PA with smoking (Sternfeld et al. 1999).

e) Alcohol consumption was positively associated with PA in a cross sectional study among urban Chinese women with an odds ratio of 1.26 (99%CI: 1.13, 1.40) (Jurj et al. 2007).

f) Watching television for more than four hours per day was negatively associated with participation in sports and exercise (Jurj et al. 2007). Among adolescents exceeding two hours of total screen time in television, gaming and personal computer was negatively associated with moderate intensity physical activity among boys and girls of 39 countries in Europe and America (Melkevik et al. 2010).

2.15.4. Social and cultural factors

Social support emerged as a consistent predictor for physical activity among the adults. Lian et al studied the effect of social support among elderly persons where family encouragement and exercising among the family members was a strong predictor for PA (Lian et al. 1999). A study among Australian University students revealed that those reporting low level of social support from either family or friends were 23-55 percent more likely to be insufficiently active for health benefits than those with social support (Leslie et al. 1999). Women with social support were approximately twice as likely to be active with at least 30 minutes on five or more days a week compared to women with low support (Eyler et al. 1999). Social isolation was inversely related to walking behavior among disabled women (Clark 1999).

2.15.5. Physical environment factors

Importance on the role of physical environment on physical activity behavior was little recognized until recently when greater focus was laid on environmental correlates.

King et al examined the environmental determinants of physical activity in a US national sample of women aged above 40 years and found that enjoyable scenery while exercising, and frequently observing others exercising were positively associated with physical activity participation (King et al. 2000). However he found no association with physical activity for perceived safety and heavy traffic. Neighborhood safety strongly predicted the activity pattern (Brownson et al. 2001). Access to facilities such as parks, exercise gyms was positively associated with PA (Addy et al. 2004). A study in urban America compared exercise habits of vigorous exercisers with the pattern of free and paid facilities for aerobic exercise, excluding private facilities such as tennis courts and swimming pools and public facilities such as walking and bicycle trails. Existence of more exercise facilities in the neighborhood was associated with higher levels of physical activity after controlling for age, education and income (Sallis & Hovell 1990). Urban location of residence was found to be a positive predictor of PA when compared to rural peers (Wilcox et al. 2000).

Presence of sidewalks and foot paths was a strong predictor of walking behavior among older Australians (Booth et al. 2000) while it had no association among US women (King et al. 2000).

2.15.6. Underlying morbidities

Healthy lifestyle habits were mostly acquired by individuals only once they were diagnosed with morbidities such as diabetes or hypertension. Presence of chronic disease history and having hypertension had been positively correlated with walking behavior (Jurj et al. 2007).

2.15.7. Policy attributes

Policies on physical activity and health promotion were another key driver in promoting the physical activity levels in the population. Finland was a country which had for the past two decades been marked by a shift in emphasis from competitive and elite sports to health-enhancing physical activity for all, as evident in two successive sports acts and a government resolution. One of the main reasons was the multi-sectoral policy change towards physical activity promotion involving education, health and transport sector. In 2002, Government took a resolution on health- enhancing physical activity promotion for health which translated inclusion of physical activity promotion in all government programs.

Finland had promising and positive trends of physical activity over the past two to three decades, with decreased proportion of completely sedentary individuals and increased participation in leisure-time physical activity during the past 25 years (Barengo et al. 2002).

Physical activity research worldwide highlighted the need to understand the factors that influenced physical activity at multiple levels and the most sustainable strategies of behavior change was the ones which considered factors at more than

one levels and addressed the high risk groups. Although there were mixed findings, factors that positively affected physical activity included self-efficacy, social support, neighborhood safety, environmental facilities for activity, favorable policies and perceived benefit of physical activity. Policies that altered the availability of facilities have made a small effect on individuals while having a substantial effect on the population (Sallis & Howell 1990).

2.16 Health Promotion and its theories

The current era of public health is the era of health promotion. Era of health promotion focuses on advocacy for health, where individuals and communities are assisted by educational, economic and political access to increase control over and improve their health through attitudinal, behavioral, social and environmental changes (Awofeso 2004).

Health promotion interventions are mostly theory based. The most widely used behavioral theories mediating interventions in PA domain are social cognitive theory, trans-theoretical model, self- determination theory and theory of planned behavior (Duncan 2012). The behavioral theories are briefly discussed below:

2.16.1. Social Cognitive theory

Social cognitive theory combines the aspects of social and psychological theories with components of both social learning theory and cognitive behavioral approaches. It focuses on the demand side, and promotes effective self - management of health habits that keep people healthy through their life span. The

core factors include knowledge of health risks and benefits of different health practices, perceived self-efficacy, outcome expectations, knowledge on the expected costs and benefits for different health habits, the health goals people set for themselves, the concrete plans and strategies for realizing them, and the perceived facilitators, and social and structural impediments to the changes they seek (Baranowski 2002).

2.16.2 Trans-theoretical model (TTM)

Prochaska and Di Clemente's 'Trans-theoretical model' emphasizes on the psychological "readiness to change" by identifying preparatory psychological change that precede behavior change. The TTM model is a model of intentional change focusing on the decision making of the individual. A key characteristic of the model is its multidimensional design including the facets of the stages of change, the processes of change, self-efficacy, and decisional balance.

Pre-contemplation is the stage where individuals are not intending to take action in the foreseeable future, usually measured as the next six months. Individuals may be at this stage because they are either uninformed or under informed of the health behavior. It can also be that they would have tried several times and became demoralized. Most of the traditional health promotion methods do not address this group of individuals and they are often categorized as "resistant" or "unmotivated". Contemplation is the stage in which individuals are intending to change in the next six months. These individuals are well aware of the advantages of health promotion as well as disadvantages. The ambivalence between the cost

and benefit of changing the behavior tend to make individuals struck in this stage for a longer period.

Preparation is the stage in which individuals are intending to take action in the immediate future, usually measured as the next month. These individuals have a plan of action, such as joining a health education class, consulting a counselor, talking to their doctor, buying a self-help book or relying on a self-change approach. These are the people that are mostly recruited for action- oriented behavioral change strategies. Action is the stage in which individuals have made modifications in their life-styles within the past six months. Maintenance is the stage in which individuals work to prevent relapse but they do not apply change processes as frequently as individuals in action do (Prochaska 1997).

2.16.3 Motivational theories

Motivational interviewing is a ‘directive, client centered, counseling style for eliciting behavior change by helping clients to explore and resolve ambivalence. It was first described by Miller in 1983. The concept of motivational interviewing was derived from the experience of treating alcoholics. The strategies of motivational interviewing were more persuasive than coercive, more supportive than argumentative, and the overall goal was to increase the client’s intrinsic motivation so that change arises from within rather than being imposed from without. It has been used and evaluated in relation to alcohol abuse, drug addiction, smoking cessation, weight loss, adherence to treatment and follow-up, increasing physical activity, and in the treatment of asthma and diabetes.

Interventions developed using motivational counseling as a technique to promote physical activity has proved to be effective and will be discussed in the review of interventions that utilized counseling techniques.

2.16.4. Learning theories

Learning theories emphasize that learning a new, complex pattern of behavior, like changing from a sedentary to an active lifestyle, normally requires modifying many of the small behaviors that compose an overall complex behavior (Skinner 1953). Behaviors that are steps to the final target have to be reinforced with some rewards at the initial stage. It was argued that such simple change in the behavior as "segments" can finally be shaped to a complex behavior of being active. Reinforcement described the consequences that motivated individuals either to continue or discontinue a behavior.

2.16.5. Health Belief model

The Health belief model was more commonly used theory in health education and health promotion. It was developed in 1950's, as to why the screening of US Public Health service failed especially for tuberculosis. The health belief model states that a person's health-related behavior depends on the person's perception of four critical areas: the severity of a potential illness, the person's susceptibility to that illness, the benefits of taking a preventive action, and the barriers to taking that action (Rosenstock 1974). Personal risk or susceptibility was a contributing factor and as the risk was more, individuals were likely to change behavior.

2.16.6. Relapse prevention model

Relapse prevention model helped the exercisers to anticipate problems with the adherence (Marlatt and Gordon 1985). Principles of relapse prevention included identifying high-risk situations for relapse (e.g., rainy season) and developing appropriate solutions (e.g., doing exercise at home using skipping rope).

2.16.7. Theory of reasoned action and planned behavior

The theory of reasoned action stated that individual performance of a given behavior was primarily determined by a person's intention to perform that behavior. This intention was determined by two major factors: the person's attitude toward the behavior (i.e., beliefs about the outcomes of the behavior and the value of these outcomes) and the influence of the person's social environment or subjective norm (i.e., beliefs about what other people think the person should do, as well as the person's motivation to comply with the opinions of others). The theory of planned behavior was an addition to the theory of reasoned action with emphasis on the perceived control over the opportunities, resources, and skills necessary to perform a behavior (Ajzen1991).

2.16.8 Socio-ecological model

Most of the theories and models have been limited to within an individual until recently when greater attention was given to the role of the environment where the person lives. Researches over past few decades have recognized the importance of the influence of multiple factors influencing behavior at multiple levels and this led to the development of ecological approaches to increasing participation in physical

activity (McLeroy et al.1988). Ecological approaches emphasized on the role of supportive environment for physical activity along with the health messages. Mc Leroy and colleagues (1988) have proposed a model that encompassed several levels of influences on health behaviors: intrapersonal factors, interpersonal and group factors, institutional factors, community factors, and public policy. The underlying theme of ecological model was that the most effective interventions occurred at multiple levels.

Collaborating with the community based organizations for health promotion activities would have multiple influences on the individual to make a positive influence on behavior more than on a "one to one basis". It is important to understand the community from the systems perspective so as to understand the people, their socio economic status, geographical boundaries, shared interests and risks, motivating factors and power relationships in order to effectively engage with the community for any behavioral change interventions.

2.17 Implementation Science: Implementing evidence into practice by utilizing theory informed behavior change interventions

Implementation interventions are interventions designed to make behavior change to translate evidence into practice; however these have limited and varied effects either due to choice of intervention without substantial rationale or inappropriate design methodology (Iceberg 2006). The implementation intervention design should be developed using a systematic approach with strong explicit rationale and methods for reporting intervention development progress. One of the best ways is

to use a theory based design for interventions (Eccles et al. 2005). Several theories and frameworks exist on intervention development and its processes however there are no systematic evidence on which theory actually predicts behavior change (Noar & Zimmerman 2005).

2.18. Evidence review on physical activity promotion research

Ever since the pioneering work on the role of physical activity in coronary artery disease, several studies focused on the association of physical activity in disease prevention. Of late, Surgeon General's Report in 1996 on the benefits of physical activity led to the surge of intervention studies that promoted physical activity across the globe. Nevertheless the mounting evidence, very few studies were done in low and middle income countries. The evidence on the efficacy and effectiveness of interventions elsewhere threw light on what strategies were successful and guided to possible cultural adaptation to other settings as well. A review on the community based intervention studies to promote physical activity has well documented physical activity intervention studies into three approaches (Kahn et al. 2002).

• Informational approaches to change knowledge and attitude about benefits and opportunities of physical activity within community.

• Behavioral and social approaches to teach people the behavioral skills necessary for adoption and maintenance of physical activity practices and creating an enabling environment that facilitate behavioral change.

• Environmental and policy approaches to promote physical activity such as maintenance of parks, safe, traffic free locations etc.

2.18.1. Informational approaches to increasing physical activity

Studies reviewed under this approach used the techniques that provided information to motivate and assist people to change behavior over time as well as sustain it lifelong. It focused on the cognitive skills which were thought to precede behavior. These interventions used educational approach wherein audio visual materials as well as counseling sessions provided information on benefits of physical activity, its role in primary and secondary prevention of diseases, ways to overcome the barriers and negative attitude to regular activity and opportunities within the community to participate in regular activity.

The origin of these programs was based on the medical model of disease management by involving the communities to understand the cognitive antecedents of behavior. Interventions that utilized behavioral approach used different strategy and are discussed under the following heads:

i. Point of decision prompts

ii. Community wide campaigns

iii. Mass media campaigns

2.18.1.1. Point of decision prompts:

Points of decision prompts are signs placed in front of cardinal places such as elevators and escalators to motivate people to use stairways to accrue health benefits. Signs are thought to be effective in reminding people to be more active about an opportunity at hand or by informing them the health benefit of taking the stairs.

A study by Brownell et al showed that a sign placed between stairs and an escalator could successfully encourage commuters to walk up the stairs instead of riding the escalator in an urban subway station. The sign read "Your heart needs exercise . . . here's your chance" and displayed a caricature of a healthy heart running up a staircase and an unhealthy heart riding an escalator. He found that stair use more than doubled for both obese and non-obese persons during two-week periods when a colorful sign encouraging use of the stairs was placed at the stairs/escalator choice point. Stair use remained elevated for 15 consecutive days while the sign was present, decreased during a one month follow-up period, and returned to baseline by three months (Brownell et al. 1980).

The evidence suggested that point of decision prompts may be useful to increase stair use provided the messages displayed are simple and appropriate for each setting.

2.18.1.2 Community wide campaigns

Community wide campaigns involved multiple sectors in the community and the common means of delivery was through diverse media such as television, radio,

newspapers, daily mailing, billboards and web or internet based. Most of the interventions were focused to reduce cardiovascular risk factors. These interventions were found to be cost-effective and reduced the incidence of the disease (Roux et al. 2008).

The Stanford Five-City Project was a six year integrated community-wide multi-factorial risk reduction education program. The program studied the effectiveness of community-wide health education on physical activity knowledge, attitudes, self-efficacy, and behavior that began in 1980 and targeted all residents of Monterey and Salinas who were aged 12-74 years. The physical activity intervention covered multiple targets through multiple channels and settings. The first two years of the intervention focused on creating awareness and knowledge on the need to exercise regularly, the benefits of regular physical activity, and ways of carrying out a safe and effective physical activity program. The activities included distribution of print materials, a weekly newspaper column that contained periodic information on physical activity, talks, seminars, and workshops conducted by health professionals who supplied relevant information on physical activity. During the third and fourth year, focus was made on population such as women, minority ethnic groups and older people with message being delivered through television channels. Although there was no change in the knowledge, attitude and perceptions of physical activity among the study groups, significant differences in physical activity behavior were found among men in one city alone (p value< 0.006)(Young et al. 1996).

2.18.1.2. Mass Media campaigns

Mass media campaign was one of the strategies to improve awareness on the benefits of physical activity on a large scale and it has been proved to be cost effective. Several large scale campaigns to promote physical activity suggested higher rates of message recall by the target groups, with very little effect on change of behavior. One of the examples of success was the Australian mass media campaigns that took place in 1990-91 which contributed to the change in walking behavior. Bauman evaluated the impact of Australian mass media campaign conducted in New South Wales in 1998 using quasi experimental and cohort study designs (Bauman et al. 2001). He assessed pre and post campaign differences of physical activity campaign on message recall, knowledge, motivational readiness and reported behavior through telephonic survey. The campaign was conducted with the support of State Health Department, State and National Sports and Recreational Department as a part of "Active Australia Initiative". Media components included paid television advertising, paid advertisements in metropolitan and rural print media, multilingual component for minority community and community level support from sports and recreational staff. Compared to all others, those in the target group who recalled the media message were 2.08 times more likely to increase the activity by at least one hour per week (95% CI: 1.51-2.86).

2.18. 2 Behavioral and social approaches

Behavioral and social approaches recognized the importance of modifying the social environment by providing support to individuals to make behavior change using behavioral theories.

Interventions that used behavioral and social approaches are reviewed and discussed below under following headings:

i. Individually adapted stage targeted self- help materials

ii. Behavioral modification education

iii. Behavioral modification counseling

iv. Social support interventions in community settings

v. Family/Home based intervention

2.18.2.1 Individually adapted, Stage targeted self- help educational materials

The trans- theoretical model of behavior change was used in several studies that used individually tailored intervention which delivered stage specific health education. Marcus et al have used stages of change construct to develop and test self-instructional physical activity interventions in work site, primary care and community setting (Marcus et al. 1998) and found that stage targeted physical activity interventions were more effective than the standard educational materials.

Marshall et al examined the effects of a mailed stage targeted print interventions designed to promote physical activity in a random sample. The intervention

consisted of a single mailing of a letter and a full color stage targeted booklet targeting each stage participants. Follow up was done at second and sixth month post baseline. After two months of intervention, it was found that significantly higher number of people in the intervention group met the recommendations than the control group with an adjusted odds ratio of 2.4 (95% CI: 1.44-3.99). At six months, among individuals who received and read the mail materials, the odds of meeting the recommendations were higher than the control (adjusted OR-2.03 (95% CI: 1.16-3.56)(Marshall et al. 2003).

2.18.2.2. Behavioral Modification Education (lectures)-Multiple Intervention Approach

Project Graduate Ready for Activity Daily (Project GRAD), a randomized controlled physical activity intervention trial evaluated a generalized intervention to promote adoption and maintenance of physical activity intervention among young adults transitioning from university to adult roles. The intervention included sessions that addressed the benefits and potential risks of physical activity, current recommendations on required type and intensity to improve fitness and health and methods of behavioral self- management. Behaviorally oriented phone call and mail follow up was delivered for 18 months post-graduation. Assessment of physical activity outcomes and mediating variable was done at baseline, one and two years. It was observed that there were no significant effects of intervention among men and women at two years. However behavioral processes of change had improved significantly for women at two years (Calfas et al. 2000).

Project Active was another randomized clinical trial that targeted healthy, sedentary men and women of 35 to 60 years of age. It was designed to evaluate two different physical activity interventions; a standard structured exercise and a lifestyle modification program. Participants assigned to standard exercise group engaged in supervised exercise at a well-equipped fitness center. Participants in the lifestyle group participated in a behavioral, group process intervention designed to help them integrate more physical activity in their daily routine. Participants in the lifestyle modification group were randomized to small groups of not more than 13 participants wherein, behavioral specialists helped participants use problem solving approaches to learn cognitive and behavioral skills appropriate for behavioral change for one hour one night each week for 16 weeks. Assessment for the stage of motivational readiness was made and materials tailored to each stage were given to the participants. After six months of intervention, it was observed that participants in both the intervention groups increased their activity levels ($p>0.0001$), however the lifestyle group increased by 4.6 percent and the structured group increased by four percent. There was no significant difference between the groups for change in energy expenditure (Dunn et al. 1998).

Taken together, Project GRAD and project active had shown that group based, theoretically grounded intervention education sessions had a powerful effect on promoting physical activity among adults.

2.18.2.3. Behavioral Modification Counseling

At an individual patient level, healthcare practitioners were encouraged to view exercise as medicine and recent public health intervention guidance from the National Institute for Health and Clinical Excellence (NICE) in the UK recommended that primary care practitioners should take every opportunity to identify inactive adults. Physicians were considered to be in the unique position to influence large number of people and recommend healthy lifestyle. However one study (Glasgow et al. 2001) showed that only 28 percent of the patients reported having received advice from a physician. Studies suggested that motivational counseling using trans-theoretical stages of change model, delivered by primary care providers have been helpful for stopping smoking (Curry et al. 2001) and healthy eating (Beresford et al. 1997). Interventions that used behavioral counseling techniques such as physician based, telephone based and web based counseling to promote physical activity are described below.

Physician based counseling

Studies which used physician based counseling have been found to have short term effects in increasing the physical activity of the individuals. These interventions were effective in a developed country setting where primary care was systematic and well established. In a developing country setting like India, physician counseling has very limited opportunity due to heavy patient load and less number of physicians in public primary care setting. It also has implications for the cost effectiveness of these interventions.

A randomized controlled trial known as “green prescription study” was done in New Zealand on 491 sedentary individuals to assess the impact of the written (n=239) versus verbal advice (n=252) on physical activity from general practitioners over six weeks. It was found that 73 percent of the participants increased total physical activity such as walking, sports or other recreational activity in the green prescription when compared to 63 percent in the verbal advice group (Swinburn et al. 1998).

Patient Centered Assessment and Counseling for Exercise plus Nutrition (PACE+) was another primary care based computer program to promote physical activity and nutrition behavior. The computer assessed four target behaviors and guided participants to develop tailored “action plans” for one nutrition and one physical activity behavior. The computer summarized the participants behavioral change goals and printed results for both patient and provider. After completing the computer program, the patients met the provider on a scheduled appointment. The provider reviewed the printed material during a two to five minute counseling session and made suggestions or modification as required. One week after the assessment, subjects were asked to complete the satisfaction survey on provider counseling and computer program. Following the assessment, patients were classified into four groups-1) Control group with no intervention following provider visit, 2) the mail only group, which received eight bimonthly, behaviorally based mailing on physical activity and nutrition, 3) The infrequent phone and mail group received up to three counseling each of ten minutes duration and mailing every six weeks, 4) The frequent phone and mail group received

weekly phone calls (up to eight), alternating between counseling calls and prompt calls. After four months follow up, participants in all groups improved on nutrition and physical activity behavior over time suggesting the computer and provider counseling components were enough to make behavioral changes in relation to nutrition and physical activity (Calfas et al. 2002).

Telephonic counseling system

Although face to face interventions were recognized as an optimal means of changing health related behavior, considering the high cost, physician time constraints for counseling, researchers found another strategy that was sustainable and cost effective.

Green et al studied the effectiveness of a telephone based intervention to increase the physical activity of patients who exercised less than 15 minutes daily and wanted to increase the activity over six months. A randomized controlled trial was done among 316 patients aged 18 to 65 years from 1997-1998. Baseline survey and post intervention survey was done using PACE (Provider-based Assessment for Counseling on Exercise) score. Intervention included reading materials on fitness, including workbook that contained self- help materials on how to get 30 minutes of moderate intensity physical activity a week, setting targets, ways to overcome barriers, and measuring progress. The intervention group also received three phone calls lasting for 20-30 minutes every month for three months where behavior specialists gave motivational counseling based on trans-theoretical stage of change model. Also the behavioral specialist used scripted material to assess participants

exercise status and motivational stage, to identify already accomplished behavior change, to assist in making reasonable and measurable goal, identify and solve barriers and also to identify resources for support. After six months of intervention, it was found that there was significantly higher level of self -reported physical activity (PACE score) among participants in the intervention group (5.37) when compared to the control group (4.98, $p < 0.005$)) (Green et al. 2002).

Web based physical activity counseling

Computer-tailored physical activity and nutrition education provided people with individualized feedback and advice on personal performance levels (i.e., activity or intake), and awareness of their own performance, as well as personal motivation to change goals, outcome expectations, subjective norms, self-efficacy, and other possible behavioral determinants (De Vries & Brug 1999).

A systematic review of 16 intervention studies that used computer tailored physical activity intervention showed positive effects on behavior change; however the findings were inconclusive of the generalizability and sustainability of the intervention (Neville et al. 2009).

2.18.2.3. Social support interventions in community settings

Use of social networks that provided supportive relationships for behavior change was the common theme in interventions that used social support as a strategy. This was achieved by creating social networks or working within pre- existing networks in social settings outside the family. Physical activity levels among individuals with social support through friends and neighborhood were higher in men (68.9

percent versus. 49.3 percent) and women (79 percent versus 69.8 percent) when compared to no social support in the urban areas of Pelotas in South Brazil (Amorim et al. 2010).

Peer support or support from friends has been found to be an influential strategy in motivating individuals and promoting behavior change as they offered opportunities for companionship and recreation (Bukowski et al. 1995). A study on the effect of peer on physical activity among youth showed that with a peer an overweight youth exercised more and bicycled a longer distance than done when alone (Salvy et al. 2009).

2.18.2.4. Family/home based interventions

Family based interventions attempted to change health behavior by involving family members to support behavioral change. Family was considered as a major source of influence for children, as well as adolescents and was found appropriate as a target for interventions. Spouse support has also been found to be positively affecting physical activity (Oldridge 1982). Many disease risk factors, behavioral and physiologic tend to have originated within the family and in countries where families played a crucial role in behaviors, it was important to incorporate the family to have sustainable effect. Programs typically included joint or separate educational sessions on health, goal setting, problem solving or family behavioral management. A few studies have incorporated home centered physical activity sessions. Studies have revealed that most people prefer moderate intensity activity like brisk walking than vigorous ones (Stephens et al.1985).

2.18.3. Environmental and Policy Approaches to Promote Physical Activity

It has been recently recognized that individual factors alone were not sufficient to increase physical activity and sustain behavior change. Intervention programs organized with ecologic framework have been found to have a large potential to improve health on a population basis (Breslow 1996). Environmental and policy approaches provided environmental opportunities, supported and cued to help people to develop healthier behavior. Correlational studies have found that physical activity levels were associated with neighborhood and environmental factors such as density of places, safety lighting, weather, air pollution, neighborhood participation etc.

Interventions in this category were not directed to individuals but rather to physical and organizational structures, and were implemented over a longer period. The goal was to increase physical activity through changing social networks, organizational norms and policies, physical environment, facilities and laws.

Interventions that used environmental approaches used different strategies and they are discussed under the following heads:

i. Creation of or enhancing access to places for physical activity along with activities using informational approach

ii. Community scale urban design and land use policies

iii. Transportation policy and infrastructure change

iv. Community wide policies and planning

2.18.3.1. Creation of or enhanced access to places for physical activity along with activities using informational approach

These interventions included efforts in worksites, agencies and communities to enhance or provide access to places where people can be active such as creation of walking trails, walking pathways, access to aerobic and fitness centers.

Brownson et al developed intervention with community input and included individually tailored newsletters, interpersonal activities that emphasized social support in six rural intervention communities. With community coalition and local governments, walking trails were developed with asphalt (83 percent) or gravel (17 percent) and trail lengths varying from 0.13miles to 2.38 miles. At two trail heads, electronic counting devices were installed that allowed the team to monitor trail-use using infra beam technology. Intervention materials were developed with social and community support, through five focus group discussions among the community residents on perceived benefits of walking and trail- use, social factors that encouraged or discouraged walking and trail-use and other facilitating and inhibiting factors. Monthly or bimonthly meetings were held with volunteers of heart health coalition who provided inputs on topics related to intervention, perceptions on the priorities of various communities, creative ideas for specific interventions and input on what incentive may best encourage participation. Walking clubs were formed to build social support for physical activity and provided participants with incentive such as water bottles, shirts etc. It was observed that among persons who used trails at the baseline (16.9 percent of the total population), 32.1 percent reported increase in physical activity following the

trail-use. However a community wide change in walking rates were not observed. The author mentioned a few limitations in the study such as self- reported physical activity through telephone would have excluded people without telephone and objective measurement was not employed. He suggested allowing sufficient time for intervention development as it was complex and time consuming. Moreover he emphasized on measuring social and physical environment such as ease of walking in a particular environment (Brownson et al. 2004).

The Chennai Urban Population study (CUPS) showed that, the construction of the park in ASIAD Colony gave rise to a 300 percent increase in the number of people who exercised in that community (Mohan et al. 2006).

2.18. 3.2. Community scale urban design and land use policies

Urban containment policies were brought in to manage the location, character, and timing of growth to support several goals such as compact development, green space preservation, and efficient use of infrastructure. It also directed development within designated urban areas, encouraged efficient use of infrastructure, promoted social equity, preserved farmland, and set aside land for public green space.

Aytur et al examined the effect of these policies on leisure time and transportation physical activity patterns based on secondary data from 63 large metropolitan areas in United States from 1990 to 2002. Strong urban containment policies were associated with higher levels of leisure time physical activity and walking/bicycling to work at population level during the study period. To add on to that, residents of States with legislation mandating urban growth boundaries

reported significantly more minutes of leisure time physical activity per week compared to residents of states without such policies. Weak urban containment policies showed inconsistent relationships with physical activity (Aytur et al. 2008).

2.18.3.3. Transportation policy and infrastructure change

Active Community Environment (ACE) program was initiated by US CDC to promote policy and environmental interventions that created more accessible places for physical activity. Activity-friendly environments depended on appropriate integration of land use and transportation infrastructure including a mix of residential and commercial use and connected sidewalks, bikeways, greenways and transit (Aytur et al. 2007).

Studies from Germany (Rietveld & Daniel 2004) and Netherlands (Schwanen et al. 2004) have shown that policies related to urban form and transportation infrastructure were associated with bicycling. In Netherlands, the four components of this policy were the concentrated decentralization of the 1970s and 1980s, the strict compact-city policy of the 1980s and 1990s, the A-B-C location policy and the spatial retailing policy.

2.18.3.4. Community wide policies and planning

Curitiba in South Brazil which is the seventh most populous city in the country had problems associated with urban development such as traffic congestion and loss of public space. Physical activity interventions developed in Curitiba were similar to the city's characteristics as a result of policy and environmental changes

implemented in urban planning. In 1970, there was less than one meter square of green space per person which gradually increased to 52 meter square for each person. Flood waters were diverted to new lakes in parks which created recreational value to persons who used parks. Moreover there was an integration of public transportation and land use regulation providing access to several recreational facilities where PA services were provided. Curitiba Ativa program was created and implemented by the Municipal Secretary of Sports and Leisure in response to the rising prevalence of chronic diseases to inform and educate the residents on the potential benefits of physical activity. The activities under the Curitiba Ativa program included distribution of printed educational material addressing physical activity, assessment of lifestyle practices and physical fitness examination. Physical activity services were mostly provided in public parks free of charge and mostly included sports and leisure department units with gymnasium, exercise room and swimming pool, bicycling and walking paths. Participation in and knowledge of these physical activity programs were evaluated through a telephonic survey among adults living in Curitiba, Brazil. It was observed that the knowledge of physical activity programs was high (91.6 percent) and 5.6 percent of the population participated in the programs. Exposure to Curitiba's physical activity program was associated with increased leisure time physical activity (OR=2.9, 95% CI-2.9-3) and walking for leisure (OR=2.4, 95%CI-2.3-2.4).

Ciclovia Recreativa was another community based program in Colombia where streets were temporarily closed to motorized transport allowing access to walkers,

runners and cyclists only for recreation and socialization. Ciclovia has been recognized as a mass recreational program with promising effects on promoting physical activity (Hoehner et al. 2008) which goes beyond advocating healthy lifestyle to providing supportive environment and policies to promote physical activity. Implementation of Ciclovia required public and political support with multi-sectorial involvement such as transportation, police, sports, recreation and health. The Ciclovia of Americas were a potential setting for effective promotion of physical activity among families as they were free, conveniently scheduled and often connected with parks and they complemented existing physical activity programs (Sarmiento et al. 2010). Similarly in San Francisco, 44 percent of visitors to Golden Gate park reported being more likely to visit the park on Sunday when the central JFK drive was closed to the traffic and 28 percent of those arriving the park on Sundays reported that the main reason for being there was wanting to exercise (Golden Gate Park Transportation Act 2006).

In the developed world and particularly the United States, a substantial body of research suggested that built environments are significant predictors of non-motorized travel (Handy 2005). A study in the San Francisco Bay Area, for example, found that factors like density, land-use, and street connectivity had moderate effects in promoting walking and bicycle travel for trips less than five miles in length, although personal and household attributes were stronger predictors (Cervero & Duncan 2003). A recent analysis in North Carolina revealed that communities designed for ‘‘active transportation’’ had the strongest influence on bicycling and walking for at least 150 minutes per week among lower-income

individuals (Aytur et al. 2007). Studies showed that poorer individuals tend to walk less for leisure and recreation in developing countries such as in Brazil (Hallal et al. 2005), however, few studies have examined factors that influence walking and cycling for utilitarian activities (e.g., going to work or shopping) in developing countries.

A classic example of built- in environment in developing country is Bogota in Colombia where world-class bicycle facilities were even found in open agricultural fields on the city's fringes, introduced to promote cycling over motorized travel in soon-to-urbanize settings and to ingrain a ''bicycle consciousness in the minds of the young and carless" by the mayor Penalosa. From 1996 to 2003, the share of trips made by bicycle in Bogota increased from 0.58 percent to 4.4 percent (Cervero 2005). To further promote cycling and leisure activities, the city closed 121 km of main roads for seven daylight hours on Sundays and holidays. Called Ciclovia (''cycle way''), these car-free corridors were reserved exclusively for cyclists, runners, skaters, and strollers. Bollards have also been installed throughout the city core to physically prevent motorists from parking on sidewalks and bikeways. To enhance access to trans- milenio bus way stations, a network of pedestrian overpasses, sidewalks, and bikeways, with attractive landscaping and brickwork, have been built (Cervero et al. 2009).

2.19. Conclusion

Evidence from systematic literature reviews have demonstrated that population based interventions may be effective to promote increases in physical activity levels (Kahn et al. 2002).

Review of interventions to promote physical activity worldwide showed that interventions were effective when used with behavior modification theories, were home based and when focused on low intensity activity. However these effects were studied for a shorter duration. Interventions to promote physical activity can function at three levels. First level involve improving their awareness on the need for physical activity, the recommended levels, activities that can be incorporated and the opportunities for it. Second level of assistance involves assisting the individuals in translating the knowledge into being active in real world setting. Third level involves accustoming the environment and the circumstances of living activity-promoter and activity-friendly. Interventions that used informational approaches to a greater extent improved the knowledge of the participants with limited assistance in making modifications in physical activity. Behavioral and social approach interventions to an extent assisted individuals in making some changes in physical activity. But these interventions required an expert skill and more resources for intervention delivery. And the changes in physical activity made by the individuals were mostly short term and required periodic assistance.

Interventions that utilized the environmental and policy approaches assisted individuals at the third level and it required high political commitment, initial investment in infrastructure and inter-sectorial coordination. These interventions assisted the individuals to be active with new opportunities for leisure activity and active transportation modalities. Such interventions were found to be sustainable transforming the communities better.

Most of the interventions to promote physical activity were done in developed country setting where there is excellent infrastructure and human capital for it to be effective. However in resource poor setting such as India, interventions can focus on the social capital which could drive force for behavioral modification and group based community interventions may overcome cultural barriers prevailing in the community.

CHAPTER -3

MATERIALS AND METHODS

3.1 Study type

The study adopted a mixed methods approach and was conducted in four phases with each phase described briefly below.

Phase 1: Formative research: Understanding the perceptions on barriers and facilitators of physical activity

Four focus group discussions were conducted using open-ended approach in an emergent study design among individuals between 25 and 60 years of age from June 2011 to July 2011 in the expanded part of the Thiruvananthapuram City Corporation limits, Kerala. Focus group discussions (FGDs) were conducted in a locally available facility among 26 women and two men using a thematic framework to know the attitude towards physical activity, factors that positively and negatively influence physical activity and potential interventions to promote physical activity.

Phase 2: Formative research: Assessment of the prevalence and correlates of physical activity

The findings from the FGDs and systematic literature review on correlates of physical (in) activity informed the identification of the variables for the cross sectional survey. A cross-sectional survey was conducted among 1303 women

aged 18 to 64 years to estimate the prevalence of physical activity, understand the correlates of physical activity among women and to identify the sedentary women for the intervention trial.

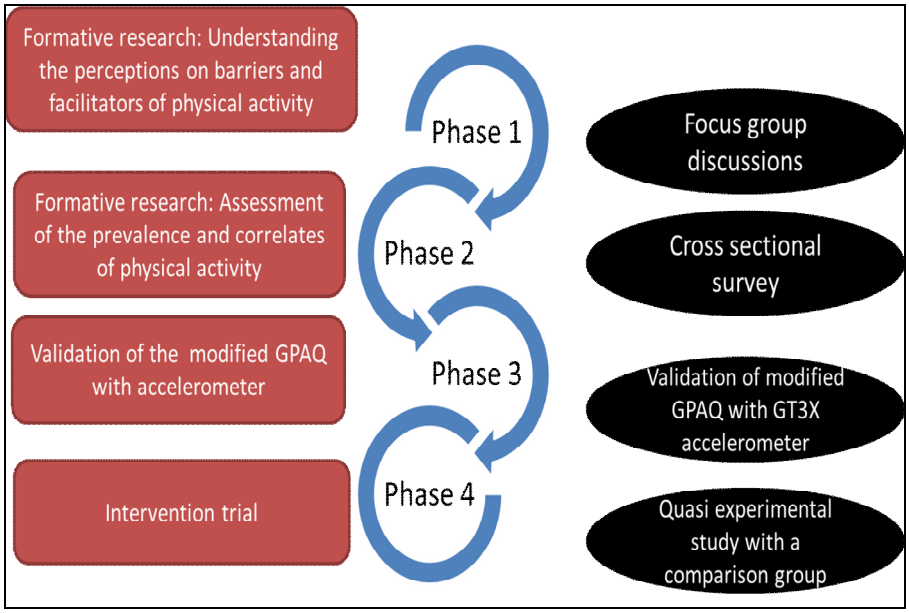
Phase 3: Validation of the modified GPAQ with the accelerometer

The modified global physical activity questionnaire (GPAQ) used for assessing physical activity in this study was checked for concurrence using Actilife 5 version 5.10.0.0 (GT3X) in a subsample of 47 women from the baseline survey.

Phase 4: Delivery of peer support based intervention of multiple intensities

Community based physical activity intervention using peer support adopted a quasi- experimental controlled study design delivered at three intensities, namely intense, less intense and no intervention. Intervention was developed using the Intervention Mapping Protocol (Bartholomew et al. 1998).

Figure 4: Diagrammatic representation of the four phases of the study



3.2 Study setting

Thiruvananthapuram District, Kerala had a similar human development index and literacy rate to that of the State (Government of Kerala, 2005). The study was conducted in the expanded part of the Thiruvananthapuram City Corporation which constitute the five erstwhile "Panchayats" (lowest administrative unit of local self –government) added to the city.

Five *Panchayats* located in the periphery of the city were included to Thiruvananthapuram Corporation in the State of Kerala in the year 2010 (Government of Kerala, 2013). As these five erstwhile Panchayats were recently converted peri-urban areas to city, it may attract more urbanization which would result in increased household and vehicle density, with less importance given for

walkways and pavements and more accessibility to unhealthy behaviors. It was therefore the appropriate time to carry out physical activity interventions in these erstwhile *Panchayats* which were considered as an ideal setting for the study. This sample frame had an added advantage of being more feasible in the implementation of the interventions than more urbanized city corporation wards. The expanded part of the city constituted 14 wards out of the 100 wards in the Thiruvananthapuram City Corporation.

3.3. Sample selection procedures

3.3.1.1. Identification of study population

The five erstwhile Panchayats namely, Kudappanakkunnu, Kazhakootam, Sreekariyam, Vattiyoorkavu and Vizhinjam were the sample frame of the study. The demographic details of the study sample frame are presented in table 2.

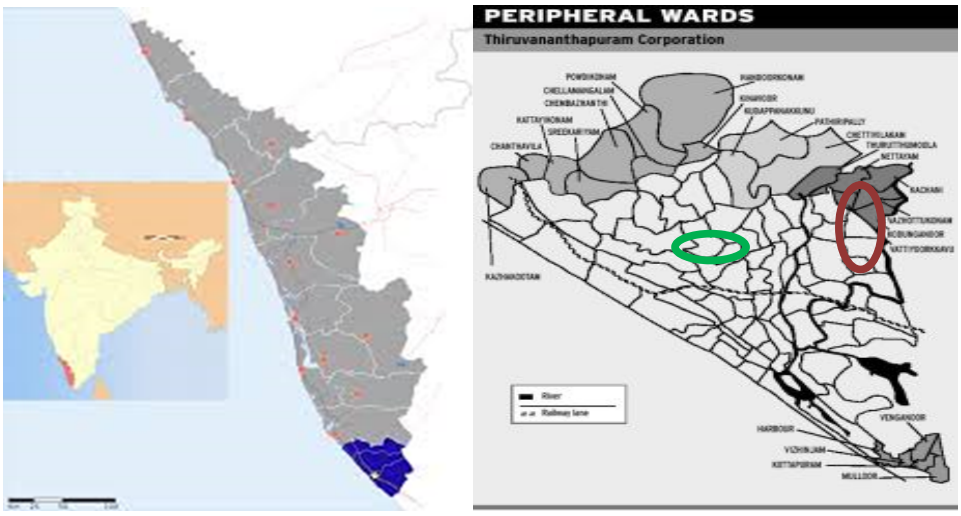
Table 2: Demographic details of the study sample frame

Sl No.	Name of the erstwhile Panchayats	Area (sq. km)	No. of wards	No. of households	Literacy rate	Proportion of SC/ST population	Total Population
1	Kudappanakkunnu	7.69	17	9263	85.4	10.2	38175
2	Kazhakootam	5.03	15	3310	81.9	13.6	14410
3	Sreekariyam	8.87	13	5251	85.4	10.3	21431
4	Vattiyoorkavu	11.1	17	9996	82.5	9.9	41890
5	Vizhinjam	12.62	15	7876	74.6	8.0	47170

(Source: Registrar General of India 2001: Census of India 2001)

The five panchayats were distributed in three locations. Four of them were located in two locations with two each. We selected one each randomly from each of the two locations to conduct the study as they were noncontiguous. Kudappannakunnu (No.1) was selected as an intervention area and Sreekaryam (No.3) as the comparison area. The selected panchayats had similar literacy rate (85.4 per cent), SC/ST proportion (10.3 per cent).

Figure 5: Map of study area



Intervention group, Control group

3.4. Sample size estimation

The intervention trial was targeted to sedentary women. Sample size was calculated with the assumption that after the intervention trial 30 percent of the women in the intervention arm would meet the physical activity recommendations

when compared to ten percent in the control arm. Sample size required to detect the 20 percent difference in the proportion of people achieving the recommendations between the intervention and control arm with a confidence level of 95 per cent and a power of 80 percent was 94 (Smith 1996).

Taking loss to follow up into account, the sample size was increased to 100 per arm. Considering the design effect of two for the cluster sampling it was decided to take 200 women in each arm.

In order to obtain 400 sedentary women for the intervention trial, a survey had to be conducted among at least 1258 women based on an anticipated physical inactivity prevalence of 31.8 per cent [(100/31.8)*400=1258] among women aged 15-64 years (Thirunavukarasu et al.2010).

3.5. Selection of study sample

Residents Association is a formal community organization of the residents in the city corporation limits and their major role is supporting each other within the association on issues that are of public concern, including health. Residents associations in these erstwhile *Panchayats*, Kudappanakunnu and Sreekaryam enrolled more than 95 per cent of the households as their members. Each Residents Association had a number of households varying from 25 to 250. Altogether there were 71 Residents Associations in these two Panchayats and the average number of households in these associations was 93. In order to get the sample size of 1258 women, fourteen Residents Associations (1258/93=14) were randomly selected (seven each in the intervention and control arms) (wave one of the survey). In the

fourteen residents associations, there were 1735 households (919 in the intervention and 816 in the control arm). From these households 1303 women (660 in the intervention and 643 in the control arm) who met the inclusion criteria were surveyed. If there were more than one eligible woman in a household, one woman was selected randomly. Only 346 women out of 1303 women (179 out of 660 in the intervention arm and 167 from 643 in the control arm) were identified sedentary. Therefore it was decided to survey (wave two) one more residents association each in the intervention and the control arm in order to get the estimated sample size. However the assessment of correlates was limited to the 1303 women surveyed in wave one. In the additional Residents Association, 22 sedentary women out of 74 households were identified in the intervention arm and 34 sedentary women out of 109 households were identified in the control arm. Thus altogether 201 women were recruited in the intervention arm and 201 women in the control arm. In the intervention arm, before the commencement of the trial one woman had a fall and was excluded from the study and therefore the final sample size at baseline in the intervention arm was 200 and 201 in the control arm.

3.5.1. Inclusion criteria

i. Women between 18 to 64 years of age
ii. Women who were insufficiently active i.e. spending less than 600 MET minutes per week as assessed by the self-report.

3.5.2. Exclusion criteria

i. Women with physical deformity and those who were bedridden.

ii. Women who were less likely to reside in that area during the study period.

iii. Women who had disease conditions where physical activity was contraindicated or advised not to exercise such as serious cardiac or respiratory diseases, rheumatoid arthritis, neurological disorders and mental illness.

iv. Pregnant women.

3.6. Data collection techniques

Data collection techniques used for the study at four phases is described below.

3.6.1 Phase 1: Formative research: Understanding the perceptions on barriers and facilitators of physical activity

Presuming the mediation of psychosocial correlates to the changes in physical activity, focus group discussions (FGDs) among the individuals from the study population were conducted to inform intervention development. Four FGDs were conducted in a locally available facility among 26 women and two men using a thematic framework to know the attitude towards physical activity, factors that positively and negatively influenced physical activity and potential interventions to promote physical activity. Accredited social health activists (ASHAs) from each of the community identified, were asked to invite men and women for the focus group discussion in a locally available facility. Accredited social health activists (ASHA) are community health workers assigned by the Government of India's Ministry of Health and Family Welfare (MoHFW) as part of the National Rural Health

Mission (NRHM). The overwhelmingly high proportion of women was based on the fact that the intervention was aimed at women, and conducted in the daytime when men were generally unavailable for participation. In addition, men were invited to offer inputs as representatives of the social environment of women, rather than from men themselves as the target audience of the intervention. Discussions were directed by an FGD guide, which facilitated discussion on the following broad themes: participants' perceptions of physical activity, importance of and reasons for engagement in physical activity, perceptions of active sections of the community, barriers to and facilitators of physical activity, judgments on the adequacy of the amount of physical activity obtained by them, and their daily activities classified as physical activity, and opinion of the value of a physical activity intervention in their community (Figure 6). Each of the focus group discussions lasted for 30- 45 minutes and was facilitated by the investigator and in addition a note taker (woman) was present at the FGDs. The FGDs were audio taped and recorded with the women's permission.

Figure 6: Theme of focus group discussion

(i) What is physical activity?

(ii) What are the goals and reasons to be active? Which group of people tends to be active?

(iii) Do you think it is important to be active? If so,why?

(iv) Do you think that you are physically active / do you think that the activity that you engage in currently is adequate? What are the activities that you do currently that you think give you physical activity?

(v)What are the activities that women can engage in order to obtain physical activity?

(vi) What are the different barriers to physical activity?

3.6.2 Phase 2: Formative research: Assessment of the prevalence and correlates of physical activity

Data collection for the cross sectional survey was done by trained data collectors using a pretested structured interview schedule which consisted of two sections: physical activity assessment and the assessment of correlates. Physical activity was assessed using a previously validated Global Physical Activity Questionnaire (GPAQ) (Bull et al. 2009) which captured physical activity participation in three domains such as work, leisure and transport (GPAQ). Low, moderate and high physical activity levels were defined as <600, 600–2999, and >= 3000 metabolic equivalent task (MET) minutes per week respectively. Recent advances in physical

activity research have further classified “low active” into “sedentary” (<40MET/minutes per week) and low (40- 600 MET/minutes per week).However in this study we have considered “low active” women, also classified as “inactive” by World Health Organization as “sedentary” women. GPAQ protocol recommends inclusion of locally specific activities in order to capture an accurate estimate. Original GPAQ was supplemented by a physical activity chart with locally specific activities identified through interviews and discussions with the community members and a few experts in the research field. Correlates to physical activity were assessed at intrapersonal, interpersonal and community/environmental level based on the socio-ecological model in both intervention and control areas using a structured pretested interview schedule. Variables studied in the cross sectional survey at each level were identified from the findings of the focus group discussions based on the socio-ecological model. Correlates studied at intrapersonal/individual level were age, occupation, marital status, educational status, perceived body weight, previous participation in sports, child care responsibility, knowledge on the benefits of physical activity, advice from health professionals and presence of diabetes mellitus or hypertension. At interpersonal/family level the factors assessed were support from household member or spouse, support from friends and neighbors, presence of an exercising member in the household and household member having a chronic disease. At community level, factors assessed were access to facilities, frequent observation of others exercising, enjoyable scenery, and neighborhood safety.

3.6.3. Phase 3: Development and validation of the modified global physical activity questionnaire with an accelerometer

3.6.3.1. Development of the modified version of the Global Physical Activity Questionnaire (GPAQ)

The modified version of the GPAQ was developed by supplementing original GPAQ with a physical activity chart. The physical activity chart was made in two steps. Initially more than 95 per cent of the activities that were done by women at work were identified through interviews, observations and opinion from experts. These activities were later classified in the physical activity chart to light, moderate and vigorous based on their intensities as per the compendium of physical activity (Ainsworth et al. 2000). Activities at work, transport and leisure were incorporated into the physical activity chart which supplemented the GPAQ.

3.6.3.2 Validation of the self –reported modified global physical activity questionnaire with the accelerometer

The modified global physical activity questionnaire was validated using the accelerometer, Actilife 5 version 5.10.0.0 (GT3X). The study participants for the validation were a subsample (N=47) from the phase two cross sectional survey (n=1303). For the purpose of validation of the modified GPAQ with accelerometers, women from four residents associations where the baseline survey was conducted (two each from the two study arms) were invited to a local

community facility. These associations were selected as they were more interested in carrying out the study related activities and the women were more receptive. The purpose and the procedure of the study was briefed, those who were willing to wear the accelerometer for seven consecutive days a week and consented for the study were included. Altogether 47 women from four residents associations participated in this study (23 women from the intervention arm and 24 women from the control arm). Women wore the accelerometer on their right hip for seven consecutive days during waking hours. The devices were initialized in front of the participant and programmed to start collecting data from 4 am the following day for seven consecutive days. Data were collected using sixty second epochs. Women were oriented to the data collection procedures and were demonstrated on fastening the accelerometer to the waist on the right side using a waist band which was provided along with the device. Weight and height were taken again on the first visit using the standard equipment and protocol (WHO 2005). The local resource person reminded the women on wearing the accelerometer every day. The accelerometers were collected back after seven days of data recording.

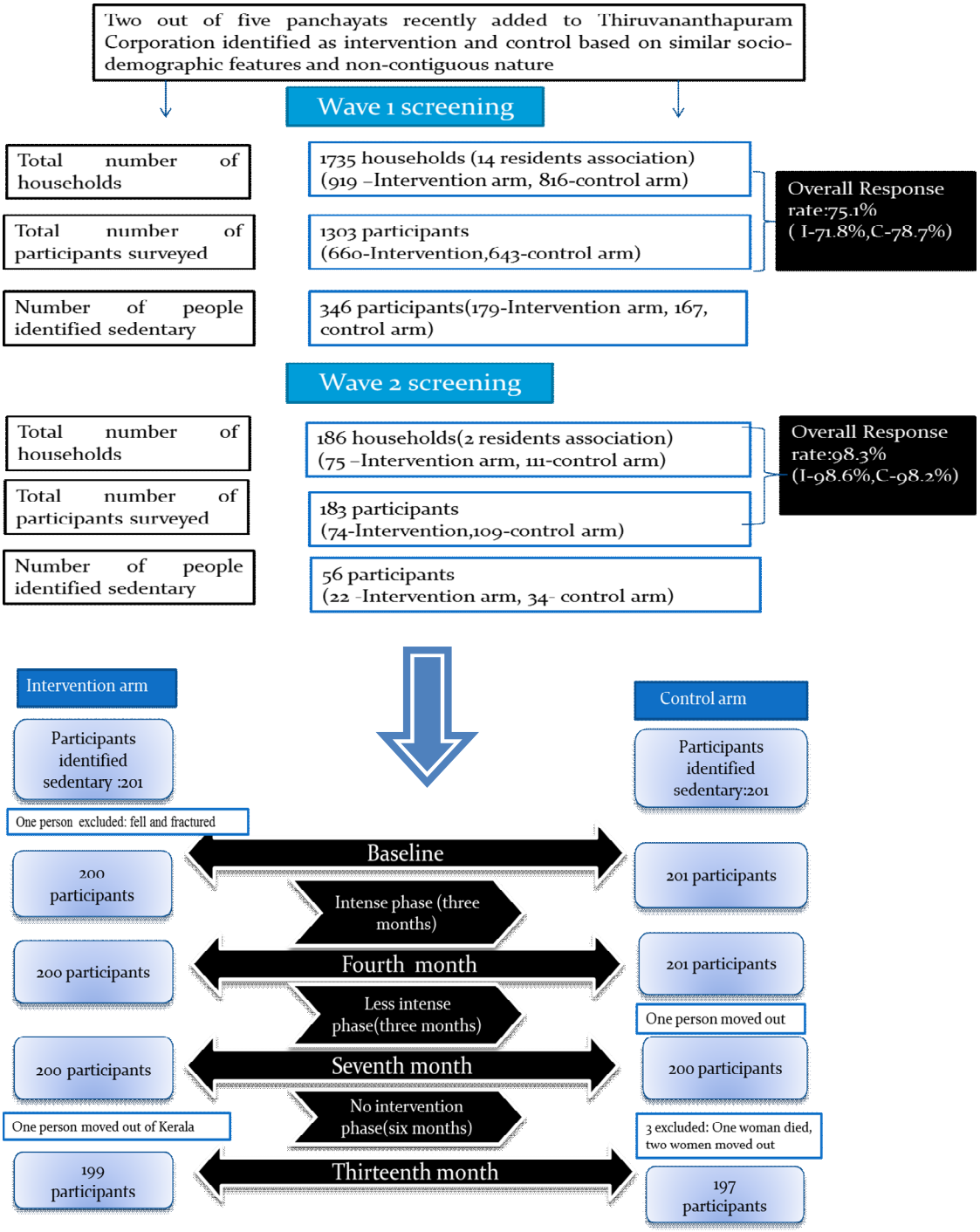
3.6.4. Phase 4: A controlled quasi experimental intervention trial

Following the baseline cross-sectional survey, those women identified as "sedentary" as per the self- reported physical activity assessment (modified GPAQ) were enrolled into the intervention trial after their written informed consent. Sedentary women in the intervention arm were intervened with adoption and maintenance strategies using peer supporters for a period of six months. Women identified sedentary in the control arm were given informational booklets

on health topics other than physical activity at baseline and on physical activity after the thirteenth month post intervention survey. Assessments were made at the baseline, fourth, seventh and thirteenth months of intervention to assess the pattern in behavior change and effect of different intensities of the intervention on the physical activity behavior. The physical activity goal was derived from the WHO global strategy for diet and physical activity, to attain at least 150 minutes of moderate intensity aerobic activity a week for sedentary women, equivalent to 600 MET-minutes/ week or more.

Data collection was done by trained data collectors to assess the effectiveness of the intervention using a structured interview schedule which included intervention effectiveness assessment and physical activity assessment to classify women into sedentary, moderate and vigorous at the baseline, fourth, seventh and thirteenth month of the intervention. Anthropometric measurements such as height, weight and waist circumference were taken at baseline, fourth and thirteenth month using standard equipment and protocol (WHO 2005).

Figure7: Schematic representation of the sample selection procedure for the phase 2 and 3 of the study



3.7 Ethical clearance

Ethical clearance for the study was obtained from the Institutional Ethics Committee of Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum and the trial was registered in the clinical trials registry of India (CTRI registration number: CTRI/2011/12/002222).

3.8 Data analysis

3.8.1 Formative research: Understanding the perceptions on barriers and facilitators of physical activity

The focus group discussions which took place in Malayalam, the local language, were translated and transcribed. The translations and transcripts were read and analyzed with both Malayalam and English versions. Data were manually coded and organized into themes. The findings from the focus group discussions formed the basis of the theoretical framework for the study which was based on the socio-ecological framework (Mc Leroy 1988).

3.8.2. Formative research: Assessment of the prevalence and correlates of physical activity

Data analysis for the cross sectional survey was done using SPSS Version 17.0 (SPSS Inc., USA). Analysis on level of physical activity was performed according to the GPAQ analysis protocol. Stepwise multivariate logistic regression analysis was performed for finding the correlates of self-reported physical activity.

3.8.3. Validation of the self- reported modified GPAQ with the accelerometer

Actilife accelerometer analysis was done using Actilife 6.0 software. The raw accelerometer data were inspected for wearing compliance. For data analysis, standard criteria based on the "recommendations for wearing compliance and reliability of physical activity variables derived from free-living accelerometry" were adopted (Freedson et al. 1998). The participant data which fulfilled the following criteria were included in the analysis (1) Participant should have worn the monitor at least four full days during the specified wearing period, (2) At least ten hours of activity data per day from the start and end of data capturing was considered as "full day monitoring" (3) Days with less than ten hours were not considered in the analysis.

A valid day was defined as having at least ten hours of wear-time, while non-wear time was defined as having sixty consecutive zeroes (one hour) or more. The data were scored using Freedson's cut-points for adults (Freedson et al. 1998). Minutes per week of total and bouted moderate-intensity physical activity, vigorous-intensity physical activity, and moderate-to-vigorous intensity physical activity were derived. Bouted physical activity was defined as that occurring within bouts of at least ten minutes in duration, for which at least 80 per cent of the bout corresponded to moderate-to-vigorous physical activity, thus allowing for break periods of less than 20 per cent of the total bout duration. Bouts were calculated using Mat Lab 7.7 (The Math Works Inc., Natick, and M.A., U.S.A.). The data on physical activity through self- report was analyzed in minutes per week instead of MET-minutes /week, so as to compare with the accelerometer data which provides

only in minutes per week. Level of agreement between the self -report and accelerometer based physical activity was assessed using intra-class correlation coefficient. The cut-off used for the measures of agreement between the modified GPAQ and accelerometer based PA, were 0–0.19 no relationship, 0.20–0.39 low, 0.40–0.59 moderate, 0.60–-0.79 moderately high, and 0.80–1.0 high (Safrit &Wood, 1995)

3.8.4. Intervention trial

Intervention effectiveness was assessed using statistical software STATA version 11.2 and SPSS version 17. Bivariate analysis was done using SPSS to estimate the proportion of individuals who became active at each time point. Chi-square test was done to examine whether the baseline parameters such as age, educational status, occupation and marital status were significantly different between intervention and control arms. Multiple comparisons were made between the mean physical activity level at each time point in the intervention and control arm using one way ANOVA bonferroni post hoc test. The intervention components that women considered “very important” and “extremely important” in facilitating physical activity were analyzed using bivariate analysis. Multilevel mixed model analysis was done using STATA to assess the intervention effectiveness in terms of physical activity energy expenditure during the study time period after considering the effect of time, cluster effects and groups. Data analysis for the longitudinal data using the multilevel modeling considered individual, cluster, group and time point at four levels. Individual was referred to the study participants. Cluster sampling design was adopted in the study and there were eight

clusters each in the intervention and control arm. Group was referred to the intervention and control arms of the intervention trial. Time referred to in the model was the multiple time points at which assessments were made namely baseline, fourth, seventh and thirteenth months. Physical activity was modeled using multi- level linear models at the above mentioned four levels i.e. individual, cluster, group and time point. Mean level of physical activity at each time point was estimated from linear mixed effects model after considering the variables in the model. The effect of interaction was ruled out considering “time point” as the variable of “interaction “or “effect modifier”. Physical activity with the effect of time interaction was estimated in the model. The effect of intervention was analyzed at two levels in the model. Firstly the difference in the mean level of physical activity between the intervention and the control group at each time point was estimated. Secondly the improvement in physical activity level from baseline due to effect of intervention at each time when compared to the control group was estimated. The effect of confounding for age, educational status, occupational status and marital status was eliminated in the analysis by including those variables in the model with the level of significance of 0.1 between the intervention and control group. Distribution of age and occupation was significantly different between the intervention and control groups with a p value of 0.1 and hence was considered in the model.

3.9 Main study outcomes

A 20 percent absolute increase in the proportion of people meeting the physical activity recommendation by World Health Organization i.e. attaining 150 minutes of moderate/vigorous intensity activity per week) in the intervention group when compared to the control group at the end of the intervention.

3.10. Intervention development

Intervention was developed in a stepwise manner, informed by a comprehensive theoretical framework. Intervention development followed the steps of intervention mapping protocol such as needs assessment, specifying change objectives, selecting theory-based methods with practical strategies, development of program components, specifying adoption and implementation strategies and generating and evaluation plan (Bartholomew et al.1998). The physical activity goal was derived from the WHO global strategy for diet and physical activity.

Intervention components were identified based on the findings from the formative research which included focus group discussions and cross sectional survey, and was supported by a few theories of health promotion. The details on intervention development are discussed in the beginning of the results section of the intervention trial (Section 4.4.1, Page number 127). Based on the formative research, it had been hypothesized that people make a healthy behavior change by increasing physical activity based on the interaction between various factors such as social (spouse/family support, peer support, walking group among neighbors),

physical factors(opportunities for physical activity in terms of places to walk free of traffic congestions that are safe as well as convenient time), environmental factors(recreational spaces such as parks, walkways) and personal factors (such as health status, motivation and skills). Findings from the cross sectional survey revealed that factors influencing physical activity at personal level were being in the age group of 35 to 54 years, being married and having knowledge on the benefits of physical activity. Factors at interpersonal level were having an exercising member in the household, and having support from friends and neighbors. At the community level, having access to exercise facilities was a factor that influenced physical activity. Lack of awareness on benefits of physical activity added the importance of addressing the cognitive aspects for a behavior change.

3.10.1 Intervention components

Intervention was delivered to the women in the intervention arm at three intensities. Table 6 describes the components of the intervention at each phase. The first three months of intervention involved one day educational workshop on physical activity and health, individual counseling with goal setting, educational booklet, identification of peer leader from each cluster, two day peer leader training and close monitoring of activities by the peer supporter and group facilitator.

The educational workshop was based on a comprehensive curriculum developed with a participant handbook wherein the women can record the goals they set and list down their challenges and get suggestions and support from peer members in the subsequent sessions with the group members.

Individualized counseling was given after the workshop to identify the nature of activity preferred by the individuals and to assist in setting realistic goals so as to achieve the physical activity recommendations for health benefits.

Group facilitator was identified within the cluster whose primary role was organizing fortnightly meetings according to the convenience of the group members and the peer leader.

Peer leaders were women residing in the same locality or nearby selected by the group themselves and who were willing to lead the group. The role of the peer leader was to chair the sessions within each cluster and assist the individuals to revisit the goals set, identifying the barriers and help in problem solving. Both peer leader and group facilitator were given a two day training prior to the sessions in order to build their capacity in communication and motivational skills and to lead a group. The sessions were supervised by the investigator in the initial three months so as to ensure the progress.

From the fourth to sixth month, intervention was led by the peer leaders with technical support whenever needed from the investigator. Monthly sessions were organized for the peer supporters and facilitators during this period to discuss among themselves the challenges faced in leading the group and strategies for better implementation.

From the seventh to twelfth month, there was no active intervention from the investigator except for the naturally occurring peer support within the clusters. Assessment was made at each stage to know their effectiveness and sustainability.

Table 3: Intervention components

	Intense phase	**Less intense phase**	**No intervention phase**
Community	✓ Community mobilization ✓ Engagement with the stake holders ✓ Community ownership of the program	✓ Participation in community events such as annual day ✓ Advocacy at events	Community initiatives for sustainment
Participants	✓ Individual NCD risk assessment through medical camps ✓ Educational workshop ✓ Individual counseling ✓ Goal setting and goal review ✓ Participant handbook ✓ Peer group meetings	✓ Goal setting ✓ Goal review ✓ Peer leader led meetings within the group ✓ Supporting and motivating the participants to sustain the behavioral change ✓ Group walking ✓ Aerobic dance sessions	Self-monitoring of the behavior
Peer leaders	✓ Peer leader selection ✓ Peer leader training and capacity building to assist the group in behavioral change ✓ Peer leader and participant workbook	✓ Organizing meeting within and outside the group ✓ Organize walking groups ✓ Support the participants in making behavioral change	

3.10.2. Steps of intervention

3.10.2.1 Step 1: Community engagement and mobilization

Community engagement is the process of working collaboratively with and through groups of people affiliated by geographic proximity, special interest, or similar situations to address issues affecting the well-being of those people. It was a powerful vehicle for bringing about environmental and behavioral changes that will improve the health of the community and its members. It often involved partnerships and coalitions that help mobilize resources and influence systems, change relationships among partners, and serve as catalysts for changing policies, programs, and practices (Fawcett et al. 1995).

Residents associations were identified as an entry point to implement the intervention as they actively engage with the community in activities of social importance. After selecting the residents associations randomly, preliminary meetings were held with the governing authorities of the association on the background of the project, the importance of addressing physical inactivity highly prevalent in the community and the need of community involvement with the intervention.

3.10.2.2. Step 2: Individual NCD risk assessment

Women identified sedentary were invited for a medical checkup where the women were examined for the NCD risk factors and anthropometric measurements such as

height, weight, blood pressure and waist circumference using standard equipments. Women were informed on the NCD risk factors and educated on the risk factor modification strategies with emphasis on physical activity promotion.

3.10.2.3. Step 3: Educational workshop and booklet "Being Active"

Educational workshop was conducted following the individual NCD risk assessment based on comprehensive curriculum which aimed at sensitizing the women on the rising NCD burden and its associated risk factors and identifying ways of being active by utilizing the community resources and adhering to the cultural norms of the community.

A comprehensive curriculum was developed and a booklet "Being Active" had been developed with the following discussion points:

a. Self- realization of the transition in lifestyle from ancestors

b. Facts about NCD prevalence in Kerala

C Susceptibility to the diseases and perceived risk

d. Health risk associated with physical inactivity from research evidence

e. Health benefits of physical activity

f. Recommendations on physical activity by World Health Organization (WHO)

g. Types of activities based on the intensity as per the compendium of physical activity (Ainsworth et al. 2000)

h. Identifying facilitators for physical activity and ways to overcome barriers

I. Enlisting on various activities locally prevalent that can be performed based on the intensity (Ainsworth et al. 2000)

j. Mapping of the local area to identify alternative forms of travel and exercise

k. Identifying individual specific activity that can be performed

l. Skill development to prepare for a change

m. Goal setting and goal review

3.10.2.4. Step 4: Individualized Counseling

Following the educational workshop in each cluster, women were sub grouped with five to eight people in each group based on the geographical proximity of their residences. Individual counseling was done within each group to identify the activities that are convenient for each person. The group reviewed the activities of various intensities and enlisted the activities that could be done individually or in a group. Goals were set based on the individual activity of choice. Women interested in group based activity decided on the duration, time and place of activity with their counterparts.

3.10.2.5. Step 5: Peer leader selection and training

Peer leaders were identified by the group members based on their willingness to lead a group, social acceptability and ability to read and write Malayalam.

The identified peer leaders were given two day training on leading a group, communication skills, goal setting and review and ways of overcoming barriers to physical activity and identifying facilitators.

Peer leaders organized group sessions with the assistance of the group facilitator based on the convenience of the group and assisted the group members in making goal setting and review.

3.10.2.6. Step 6: Peer leader led sessions

Following the training, it was planned that the peer leaders organized meetings in each of the groups fortnightly in the initial three months with the support of the investigator and monthly in the latter three months of intervention. However during the initial three months it was possible only to conduct sessions once a month in seven out of eight clusters due to the inconvenience cited by the women to attend fortnightly meetings. There were no peer leader meetings conducted in one of the groups as the women were not willing to participate or attend any group meetings organized in their residents association. This was attributed to the poor functioning of the residents association in that locality. Peer leaders conducted sessions based on the peer leader workbook which was developed to assist the peer leader to lead the discussion with the group as well as to assist the group members in making the decisions related to physical activity promotion.

In the latter three months of less intense phase, six out of eight clusters organized two meetings and were engaged in aerobic dancing sessions. Most of the women in these groups either engaged in aerobic dancing session or walking groups or did

individual walking. During the no intervention phase, peer leader led sessions were not organized, however group activities were carried out intermittently in some of the groups.

CHAPTER-4

RESULTS

Phase 1: Formative research: Understanding the perceptions on barriers and facilitators of physical activity

Focus group discussions (FGDs) were done using a thematic approach to understand the perception, attitude and knowledge on physical activity, its facilitators and barriers and the usefulness of an intervention to promote physical activity. The findings that emerged from the FGDs are given below under the themes explored.

A. Conceptualizing physical activity

Physical activity was conceptualized as a function maintaining, disease prevention and promotion of wellbeing. Most of the participants especially women perceived physical activity as doing household activities and their physical activity comprised daily household activity. Few of them mentioned walking in the morning and evening. Men perceived physical activity differently from women. They considered activities such as walking, running and jogging equivalent to physical activity. One person mentioned that only manual laborers were engaged in physical activity and all others were inactive by nature. A few women mentioned

physical activity as those activities that were done after work in order to avoid tiredness.

B. Rationale for physical activity

Participants felt that those who do not obtain adequate physical activity from their work, as well as those suffering from non-communicable diseases such as diabetes needed to engage in exercise in addition to their activities related to their occupations. They reported that overweight or obese persons and diabetics were often seen walking for exercise. It was known that doctors prescribed regular physical activity, particularly walking, to control diabetes and high blood pressure. They opined that persons between the ages of 15 and 25 years tend to be most active. Inadequate time was cited as a constraint to physical activity, which was seen as something to be engaged in when one was free from household and other responsibilities.

"Exercise is needed if you have diabetes"

"Nobody does any activity other than household work"

"We all do not do such things because we are not free of household work, but there are people who are free during day time after sending children to school and husbands to work".

"Doctors say that physical activity controls diabetes and blood pressure, so I think walking is good for health"

One of the women participants responded that only women who do not do any household activities needed exercise; all the rest got enough physical activity from domestic chores. When probed on the intensity of the activity pattern, it was agreed that household electronic appliances were used mostly and there was minimal chance of engaging in moderate or vigorous intensity activities.

C. Importance of physical activity

Physical activity was considered important by the majority, as a disease-preventive strategy and was believed to relax the body and to stimulate appetite. One of the participants opined that physical activity was not good for health, as it was tiring and harmed the body. This view was opposed by some other women participants, who averred that despite the initial tiredness brought about by engagement in physical activity, it was good for health, as it would make a person more energetic and capable of work.

"*Even though you get tired while doing physical activity it is good because after few minutes, tiredness will disappear and you will feel more energetic and much easier to do work again.*

"*I am only 43 years and I have lot of health problems like a hole in the disc, and my uterus is removed. After my uterus removal only, I had put on weight but now I*

walk one hour every morning, wash clothes with my hand, cook food on earthen vessels. I feel good now"

"*It helps to protect your body from all recent diseases like if you have blood pressure, walking will reduce it, even diabetes is said to get controlled with walking. I have read it from the local magazine "arogyamasika" and watched television talks on this".*

"It is important nowadays, because of more diseases around".

D. Perceptions of adequacy of own physical activity

The majority of the participants felt that they were adequately active. Most of them reported that engaging in household work such as cooking, hand-washing clothes, mopping the floor once a week and sweeping the floor was sufficient physical activity. In addition, some women engaged in child care, or looked after cattle, tailored clothes, or went grocery-shopping several times a week, in the course of which they walked to and from the market and carried their purchases home, all of which added to the volume of physical activity performed.

"Although we use food processor (mixie) and other things, still I think I have adequate activity and it is sufficient"

"I have cattle at home, so there is lot of work and I don't get time to go for walking"

"I stitch clothes for two hours a day, do cooking and other household cleaning work"

"I go to buy vegetables twice a week, carry around five kilograms and come by walking"

"I have cholesterol and doctor told me to walk, but I am not going because I have a grandchild at home. I have not taken it seriously"

"I have a small child to take care of and nobody else is there at home."

Women were asked to quote few examples of activities that they considered "light", "moderate" and "vigorous". Most women reported carrying water, washing clothes, shopping by carrying groceries, walking for shopping and cleaning the home with a mop as "vigorous", and cutting the vegetables, cooking, grating coconut, child care as "moderate" intensity activity. Women were probed on the duration of the activities done as household chores and most of them reported of engaging in activities of each bout less than ten minutes duration. None of the participants were aware of a recommendation on physical activity for health benefits and the recommended levels.

E. Preferred physical activity

Strategies to be active besides engaging in household work were discussed and walking was clearly the most popular physical activity for women. A few mentioned yoga as a good option for physical activity. They reported that activities

such as jogging, cycling and running for exercise could only be done by men and not women.

Public transportation was mentioned as an option of commuting to work to promote physical activity if there is lack of time for exercise and most of the participants reported that the use of public transportation was very inconvenient. Cycle use was not commonly preferred among women, due to the inconvenience caused by the local dress (sari) and men, as they were associated with low social status over motorized transport. Women reported preferring to travel by motorized private vehicles, such as scooters, motorcycles, auto rickshaws and cars even for short distances.

F. Barriers to PA

Those who were not engaged in any physical activity besides domestic chores reported lack of time, motivation and interest as the most important barriers. There was also some discouragement from the widespread perception that people who engaged in exercise were the ones who does not carry out any household work or responsibilities. The lack of a social norm that supported walking for exercise dissuaded many women from taking up walking. Participants reported that their family members never walked for exercise, and they never saw many apparently healthy others doing so either. Besides these social and motivational factors, participants cited the physical discomfort occasioned by walking, particularly in arthritic persons, as a deterrent to walking for exercise.

"We have cooking, cleaning, washing at home and so there is no time for walking or exercise. Moreover the household work is sufficient for us. We are not used to that culture of walking"

"Nobody does any exercise other than household work. My daughter who is 23 years old does exercise for half an hour. She does it because she sits in the office and work. Moreover she does not have any other work at home.

Walking by women for exercise or other physical activity promoting activities was not seen as a part of the culture as they were not done by the parents or other members in the society.

"I do not do any walking because my parents did not do that and I am not used to that culture. I don't see anybody around doing exercise or walking".

"I am not motivated to do walking/exercise" "I am very lazy to do"

"Doctor in the medical college told my mother to walk for her arthritis, but she cannot walk because of the pain. She has time to walk and all but cannot walk because of pain. But she does all cooking at home and climbs stairs, even I cannot climb stairs."

Built environmental barriers, such as neighborhood safety and road safety were not perceived as barriers in this community. Those who walked preferred their own residential lanes. Narrow roads were of concern, and led to a preference for

walking in pairs to walking in groups. Stray dogs were cited as a deterrent for women engaging in morning walks.

"Safety is not an issue on these roads as there are houses here, we don't go to main roads."

"Those who walk do it in pairs and not more than that as the roads are very narrow"

"Walking in the morning is discontinued by few because of the stray dogs."

Use of cycles or public transportation for commuting was considered as low in social status and thus many travelled by motorized vehicle such as car and motorbikes.

G. Facilitators of physical activity

Infrequent walkers reported that having company to walk greatly promoted the habit of regular walking. Pleasant walking routes and the sight of other walkers were also reported to be motivating. A corollary to this was a statement from some regular walkers that others had taken up walking after seeing them walk regularly.

"I walk and get the bus from the next bus stop"

"Good walking routes are available here especially around civil station and in our lanes. I have seen a few people walking in the civil station area in the morning

when I go to buy milk. Seeing another person walking is a motivation. I will walk if there is company"

"After seeing us walking, some more people have started walking"

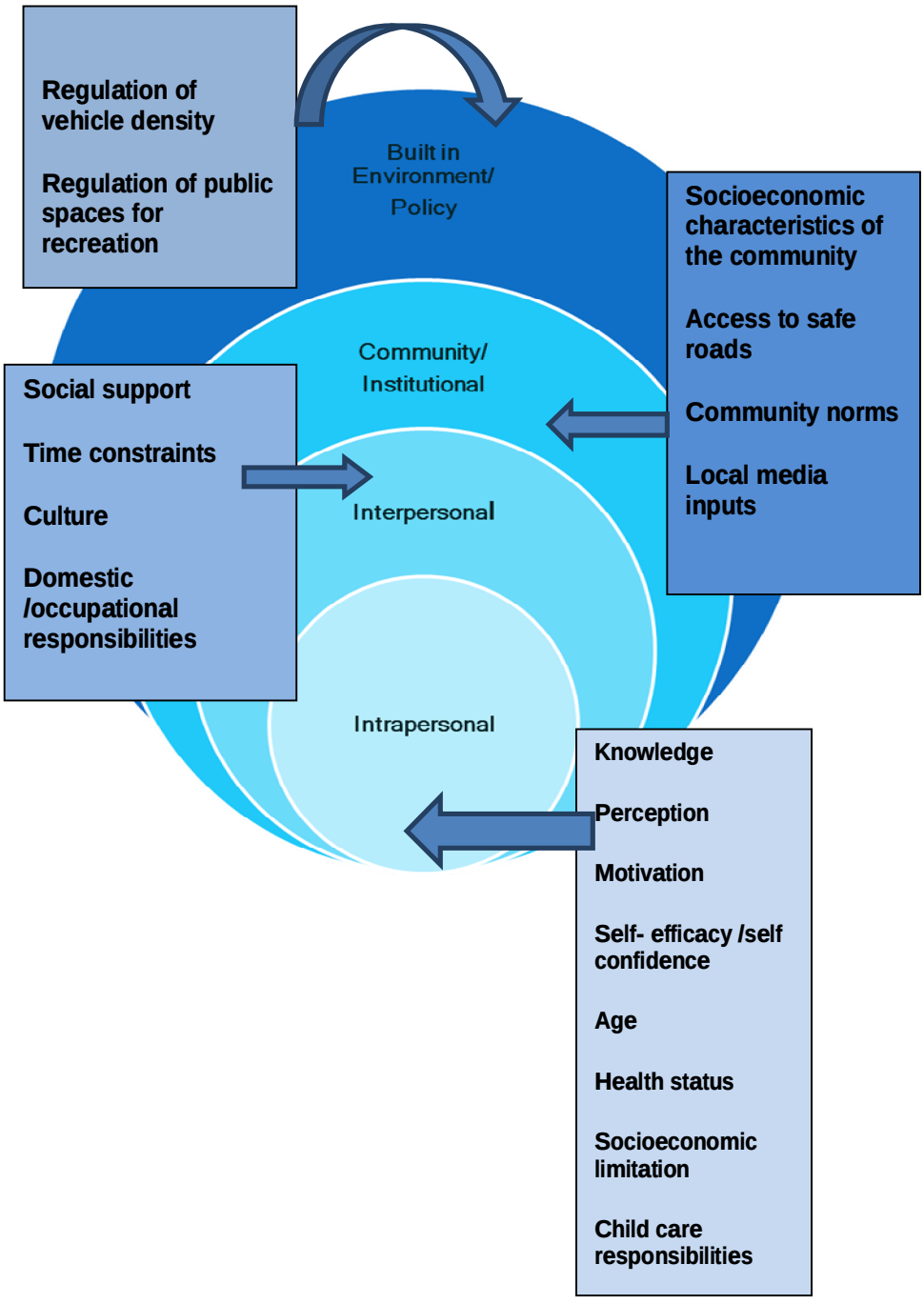
"I never thought of such a thing. Walking alone is difficult; I can walk if there is somebody else"

"If we go in pairs, we will go because she will call me for walking, otherwise I feel lazy. During the day time afternoon we can go as we are free of work and otherwise sleep during that time."

H. Utility of a PA intervention

The majority of the participants admitted that their physical activity levels were lower than those of their ancestors, although they were aware of the benefits of physical activity. However, they estimated that their engagement in physical activity, via their performance of domestic activities, was adequate. The role of regular physical activity in the prevention of chronic disease was not fully understood, and it was felt that some awareness creation on this issue would be beneficial and motivating. The figure 8 given below depicts the conceptual framework developed from the FGD findings on factors influencing physical activity among women based on socio-ecological model.

Figure 8: Conceptual framework on factors influencing physical activity among women based on socio-ecological model (Mc Leroy 1988)



Phase 2: Formative research: Assessment of the prevalence and correlates of physical activity

Cross sectional survey was done in two waves. First wave was done among 1303 women in fourteen residents associations (seven each in the intervention and control arm) to identify sedentary women and understand the correlates and prevalence of physical activity. Second wave of survey was done to identify the additional number of women required for the intervention trial and hence the correlates were not assessed. The study findings on 1303 women are given below. The mean age of the surveyed women was 45 years (SD- 12). Table 4 describes the study sample characteristics.

Table.4: Baseline study sample characteristics (N=1303)

Variables	Number of study subjects	Percentage
Age group (years)		
<35	0327	25.1
35- 54	0649	49.8
55+	0327	25.1
Educational status		
Up to high school	0657	50.4
Higher secondary and above	0646	49.6
Current occupation		
Employed	0277	21.3
Unemployed*	1026	78.7
Marital status		
Married	1155	88.6
Others**	0148	11.4
Perceived body weight		
Underweight	0164	12.7

Normal weight	0816	62.6
Over weight	0179	13.7
Obese	0144	11.0
Self–reported disease condition		
Diabetes	0210	16.1
Hypertension	0232	17.9
Heart disease	0046	03.5
Asthma	0037	02.8
Dyslipidaemia	0057	04.4
Arthritis	0132	10.1

* Housewives, retired, unemployed and students

**Unmarried, separated, divorced and widowed

The mean level of physical activity among women was 1875 MET-min/week. Out of the total 1303 women, 957 (73.4%, 95% CI: 71.1% -75.9%) reported moderate or high level physical activity. Domain specific analysis of physical activity showed that 99 per cent, 31.4 per cent and 87.1 per cent were inactive at leisure, work and transportation respectively. Out of the 277 (21.3 per cent) employed women, only 12 were daily wage workers with some physical activity and all others were either professionals or in clerical jobs generally sedentary in nature. Even among the daily wage workers only 75 per cent (9 out of 12) reported physical activity. Out of 1303 women, 589 (45.2 per cent) did not report presence of any disease condition.

About 40 per cent of the women perceived that they were “very active” when compared to 42.8 per cent who felt they were “moderately active”. Of those who

perceived themselves to be “very active” and “moderately active”, 81.7 per cent and 71.7 per cent were active on physical activity assessment. A majority of the women (78.8 per cent) had no experience in participating in sports. Nearly three fourths of them (72.6 per cent) said it was very important to exercise for better health. Of the 40.5 per cent of the women who said they were aware of how much exercise one needs a day, 21.5 per cent reported that 30 minutes of brisk walking every day was required. Nearly two thirds of them (62 per cent) did not know or were not sure of the recommended levels of physical activity for health benefits.

The role of physical activity in the primary prevention of chronic diseases such as diabetes, stroke, hypertension, coronary heart disease, arthritis, breast cancer and colon cancer were agreed upon by 75.7, 62.8, 57, 47.1, 32.8 and 32 per cents respectively. Similarly 80, 72.4, 60.2, 55.6, 45.2, 32.4 and 31.8 per cents agreed on the role of physical activity in the secondary prevention of diabetes, stroke, hypertension, coronary heart disease, arthritis, breast cancer and colon cancer respectively. More than half (62.7 per cent) reported of having ever been advised by a doctor to do exercise.

Only one fourth (28.3 per cent) reported having no barriers to physical activity. Barriers to being active at a personal level were lack of time (52.8 per cent), lack of interest or enjoyment of activity (18.4 per cent), child care responsibility (16.3 per cent) and lack of knowledge on what to do for exercise (19.0 per cent). At an interpersonal level reported barriers were lack of support from household member and spouse (13.5 per cent) and lack of company for walking (16.4 per cent).

Among the others, the barriers to being active at the community level were presence of stray dogs (73.2 per cent), heavy traffic (44.6 per cent), hilly terrain (5.1 per cent), lack of sidewalks (53.2 per cent), and lack of safe space for walking (21.3 per cent), poor access to facilities for exercise (41.3 per cent) and poor neighborhood safety (49.7 per cent).

Facilitators for being active were support from household members (40 per cent), spouse support (55.6 per cent), having an exercising member in the household (58.8 per cent), support from friends and neighbors (29 per cent), knowledge on the benefits of physical activity (29.2 per cent) and household member having chronic disease (38.7 per cent).

Table 5: Self- reported physical activity and its correlates: Results of bivariate analysis

Variables	**Subcategories**	**Physically active***	**Percentage**	**Odds ratio (95%CI)**	**P value**
Intrapersonal factors					
Age group	<35	226	69.1	Ref	
	35-54	511	78.7	1.7(1.22-2.23)	<0.001
	55+	220	67.3	0.9(0.66-1.27)	0.6
Educational status	Up to high school	494	75.2	Ref	
	Higher secondary and above	463	71.4	1.2(0.93-1.53)	0.1
Occupational status	Unemployed	747	72.8	Ref	
	Employed	210	75.8	1.2	

				(0.86-1.59)	0.3
Marital status	Others	083	56.1	Ref	
	Married	874	75.7	2.4(1.71-3.46)	<0.001
Perceived body weight	Normal	624	76.2	Ref	
	Overweight	126	71.6	0.8(0.54-1.13)	0.1
	Obese	056	38.9	0.2(0.13-0.28)	<0.001
	Underweight	151	92.1	3.6(2.01-6.54)	<0.001
Knowledge on the benefits of physical activity	No	648	70.2	Ref	<0.01
	Yes	309	81.3	1.8(1.37-2.47)	
Advice from the health professional	No	516	68.5	Ref	
	Yes	441	80.2	1.9(1.43-2.41)	0.01
Interpersonal factors					
Support from household members and spouse	No	721	71.8	Ref	
	Yes	236	78.9	1.5(1.07-2.00)	0.01
Support from friends and neighbours	No	646	70.1	Ref	
	Yes	311	81.6	1.9(1.41-2.55)	<0.001
Exercising member in the household	No	317	58.8	Ref	
	Yes	640	83.8	3.5(2.72-4.50)	<0.001
Household member having a chronic disease	No	545	68.8	Ref	
	Yes	412	80.6	1.9(1.44-2.46)	<0.001

Community level factors					
Access to exercise facilities	No	361	67.4	Ref	
	Yes	596	77.7	1.7(1.31-2.16)	<0.001

*Individuals who reported either moderate or vigorous physical activity

Table 6: Self -reported physical activity and its correlates: Results of multivariate analysis

Variables	**Subcategories**	**Adjusted Odds ratio (95% CI)**	**P value**
Age group (years)	<35	Ref	
	35-54	1.9 (1.32-2.63)	<0.01
	55+	1.1 (0.81 -1.75)	0.3
Marital status	Others	Ref	<0.01
	Married	2.1(1.40-3.25)	
Perceived body weight	Normal	Ref	

	Overweight	0.8(0.54-1.24)	0.35
	Obese	0.2(0.10-0.24)	<0.001
	Underweight	3.7(1.97-6.74)	<0.001
Knowledge on the benefits of physical activity	No	Ref	
	Yes	1.6 (1.13-2.25)	<0.001
Support from friends and neighbours	No	Ref	
	Yes	1.4 (1.05 -2.01)	0.04
Exercising member in the household	No	Ref	
	Yes	3.4(2.52-4.66)	<0.001
Access to facilities	No	Ref	
	Yes	2.2(1.63-2.95)	<0.001

Variable not significant in the bivariate analysis such as occupational status, educational status, household member having a chronic disease, support from household members and spouse and advice from a health professional are not considered in the model

4.3. Phase 3: Validation of the self -report physical activity assessment with the accelerometer

Table 7: Baseline characteristics of the study sample

Variables	Subcategories	Total sample N (%) N=47	Valid for analysis N (%) (n=24)
Age group	18-35years	11(23.4)	02 (08.3)
	36-55 years	26(55.3)	15(62.5)
	55 and above	10(21.3)	07(29.1)
Occupational status	Employed	08(17.0)	02(08.3)
	Unemployed	39(83.0)	22(91.6)
Educational status	Up to high school	06(12.8)	03(12.5)
	Higher secondary and above	41(87.2)	21(87.5)
Marital status	Married	47(100)	24(100)

Although accelerometer and self -report data were captured for 47 participants altogether, only 24 women (51.06%) had accelerometer data for four valid days which was the minimum number of days required for validation studies. So for the further analysis of validation, data of 24 women were used.

The mean duration of moderate and vigorous physical activity (MVPA) minutes per week was 116.92(SD 76.41). Only 15 out of 24 women (62.5%) had at least

one bout of moderate and vigorous physical activity. The mean duration of vigorous intensity activity was 0.18 (SD 0.73) minutes per week.

Table 8: Comparison of mean levels of physical activity through self- report and accelerometer

	Self- report PA	**Accelerometer PA**
Mean (95% CI) **(minutes per week)**	137.29(100.66-173.92)	116.93(84.65-149.19)

4.3.1. Level of agreement between the self- report and accelerometer finding

The level of agreement between the self- report and accelerometer finding was good with an intra-class correlation coefficient of 0.79 (95% CI: 0.56-0.90). The mean difference between the self -reported physical activity and the accelerometer estimated physical activity was 21.2 minutes per week.

4.3. Phase 4: Intervention Trial

4.4.1 Identification of the intervention components

Intervention components were identified based on the findings from the first two phases of the study (understanding the perceptions on barriers and facilitators of physical activity; and assessment of the prevalence and correlates of physical

activity) which was conducted as formative research for the intervention trial. The table below describes the findings from the formative research and the theory that lead to the identification of the intervention components.

Table 9: Factors that lead to the identification of the intervention components

Intervention components	What lead to the identification of the components
NCD risk assessment	**Theory based**: Theory of reasoned action and planned behavior, health belief model **FGD finding**: Lack of knowledge on the adequacy of physical activity
Educational workshop with the informational booklet "Being Active"	**Theory based**: Social cognitive theory **FGD finding**: Lack of awareness on the recommended levels of physical activity, misperceptions on the intensity of the activity **Survey finding**: Having knowledge on the benefits of physical activity as a positive correlate of physical activity
Individualized counselling	**Theory based**: Self-efficacy, theory of reasoned action and planned behavior **FGD finding**: Not aware of what activities to do, lack of awareness on the benefits of physical activity
Goal setting and goal review	**Theory based**: Health action process
Peer Support	**Theory based**: Peer support **FGD finding**: Need for company for walking **Survey finding**: Support from friends and neighbors

4.4.2 Results of the intervention trial

The mean age of the study participants in the intervention group was 48 years (SD 0.72) and 46 years (SD 0.86) in the control group.

Table 10: Baseline characteristics of the study population of the intervention trial

Categories	Control group (n=201) N (%)	Intervention group (n=200) N (%)	P value***
Age group (years)			
<35	047(23.4)	025(12.5)	0.001
35- 54	086(42.8)	117(58.5)	
55+	068(33.8)	058(29.0)	
Education status			
Up to high school	100(49.7)	104(52.0)	0.6
Higher secondary and above	101(51.3)	096(48.0)	
Current Occupational status			
Employed	051(25.3)	031(15.5)	0.01
Unemployed*	150(74.6)	169(84.5)	
Marital status			
Married	170(84.5)	179(89.5)	0.2
Others**	031(15.4)	021(10.5)	

* Housewives, retired, unemployed and students, **Unmarried, separated, divorced and widowed, ***Chi square p value comparing the proportion between intervention and control group.

Table 11: Change in the proportion of physical activity over the study period

Time point	Activity levels	Number in the control group	Control group N (%)	Number in the intervention group	Intervention group N (%)	P value*
Baseline	Inactive	201	201 (100)	200	200 (100)	
	Active		000 (000)		000 (000)	
4th month	Inactive	201	180 (90.0)	200	083 (41.5)	<0.001
	Active		021 (10.04)		117 (58.5)	
7th month	Inactive	200	188 (94.0)	200	103 (51.5)	<0.001
	Active		012 (06.0)		097 (48.5)	
13th month	Inactive	197	196 (99.4)	199	140 (70.4)	<0.001
	Active		001 (00.6)		059 (29.6)	

*Chi square p value comparing the proportion between intervention and control group. Women who expend more than or equal to 600MET min/week are termed as “active” and others as “inactive”

Table 12: Change in physical activity over the study period based on the physical activity classification

Time point	Activity levels	Number in the control group	Control group N (%)	Number in the intervention group	Intervention group N (%)	P value*
Baseline	Low	201	201(100)	200	200(100)	
	Moderate		0 (000)		00(0.00)	
	Vigorous		0(000)		00(0.00)	
4th month	Low	201	180 (90.0)	200	083(41.5)	<0.001
	Moderate		21(10.04)		105(52.5)	
	Vigorous		0(0.00)		012(06.0)	
7th month	Low	200	187(93.5)	200	103(51.5)	<0.001
	Moderate		13(06.5)		096(48.0)	
	Vigorous		0(0.00)		001(0.50)	
13th month	Low	197	196(99.4)	199	140(70.3)	<0.001
	Moderate		01 (00.6)		059(29.6)	
	Vigorous		000 (0.0)		000(0.0)	

*Chi square p value comparing the proportion between intervention and control group. Women who expend more than or equal to 600MET min/week are termed as “active” and others as “inactive”.

Table 13: Mean levels of physical activity and anthropometric parameters at baseline, fourth and thirteenth month of the study.

Time point	Parameters	Number of women in the control group	Control group Mean (SD)	Number of women in the intervention group	Intervention group Mean (SD)
Baseline	Body mass index (kg/m^2)	201	26.72 (5.11)	200	26.96 (3.80)
	Waist circumference (cm)	201	87.90 (11.64)	200	89.81 (9.09)
	Physical activity level (MET minutes per week)	201	120.60 (179.99)	200	84.30 (152.51)
4^{th} month	Body mass Index(kg/m^2)	201	26.85 (5.12)	200	26.85 (3.78)
	Waist circumference (cm)	201	88.04 (11.62)	200	89.62 (8.97)
	Physical activity level(MET minutes per week)	201	202.19 (314.0)	200	1159.22 (1065.6)
7^{th} month	Physical activity level(MET minutes per week)	200	168.26 (310.34)	200	707.30 (608.43)
13^{th} month	Body mass Index(kg/m^2)	197	27.09 (5.15)	199	27.79 (4.08)
	Waist circumference(cm)	197	88.09 (11.37)	199	89.22 (11.22)
	Physical activity level(MET minutes per week)	197	95.12 (156.63)	199	525.93 (547.97)

The trend in the intervention arm over time was significant with a p value of 0.002.

Table 14: Multiple comparison of mean physical activity level over the time period

T test was conducted for multiple comparisons of means over the time period using post hoc bonferroni correction

Group	Dependent variable	Time point compared with	Time point	Mean difference	Standard error	P value
Control	PA energy expenditure	Baseline	4	-81.59*	25.03	0.007
		Baseline	7	-47.66	25.03	0.34
		Baseline	13	25.47	25.03	1.000
		4	7	33.93	25.03	1.000
		4	13	107.09	25.03	<0.001
		7	13	73.13*	25.03	0.02
Intervention	PA energy expenditure	Baseline	4	-1074.90*	67.64	<0.001
		Baseline	7	-623.00*	67.64	<0.001
		Baseline	13	-441.62*	67.64	<0.001
		4	7	451.90*	67.64	<0.001
		4	13	633.27*	67.72	<0.001
		7	13	181.37*	67.72	<0.001

*****represents bonferonni corrected p value of significance

In the control group, the mean physical activity was significantly lower at the baseline when compared to the fourth month physical activity level and the mean difference was -81.59 MET min/ week. There was no significant difference in the level of physical activity at seventh and thirteenth month compared to baseline, and from seventh and thirteenth month to the fourth month. However the mean

physical activity level at the seventh month was 73.13 MET min per week higher than the thirteenth month.

In the intervention arm, the mean physical activity level was significantly lower at the baseline when compared to the fourth month (-1074.90 MET minutes/ week), seventh month (-623 MET minutes /week) and thirteenth month (-441.62 MET minutes /week). However at fourth month the mean level of physical activity was significantly higher than the seventh and thirteenth month by 451.90 and 633.27 MET min/week respectively. Similarly at seventh month of intervention, the physical activity level was higher by 181.37 MET minutes per week when compared to the thirteenth months.

Figure 9: Change in the mean levels of physical activity in the intervention arm at three domains such as work,transport and leisure

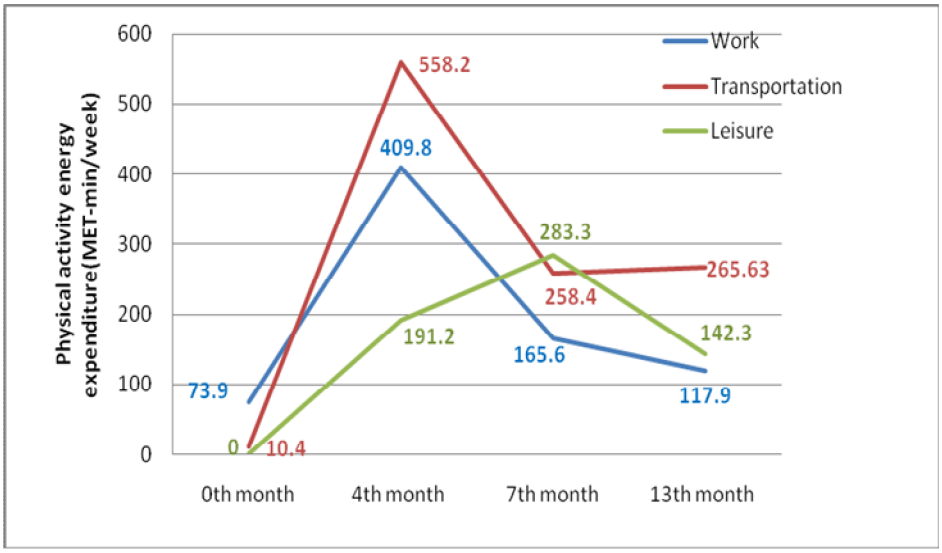


Figure 10: Proportion of women who rated the intervention components as "very important" and "extremely important" in facilitating physical activity behavior at fourth month of intervention

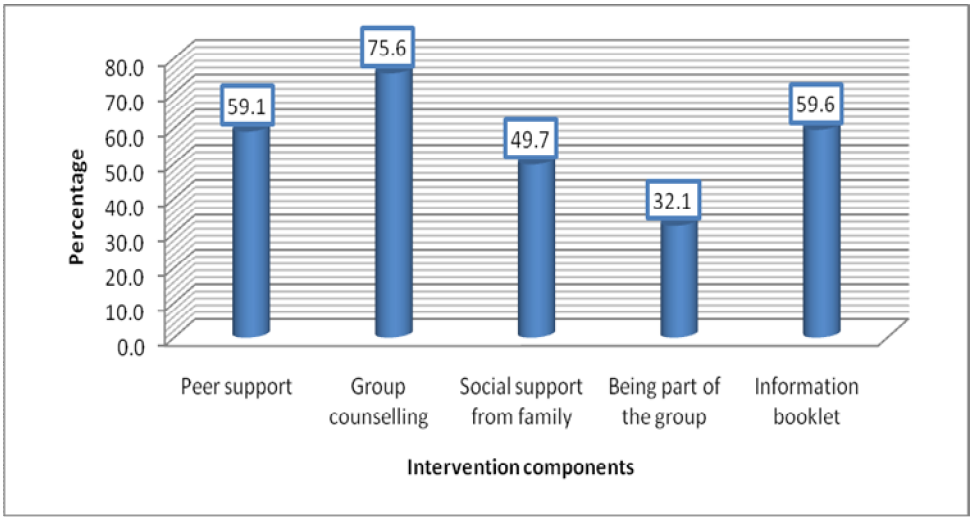


Figure 11: Proportion of women who rated the intervention components as "very important" and "extremely important" in facilitating physical activity behavior at seventh month of intervention

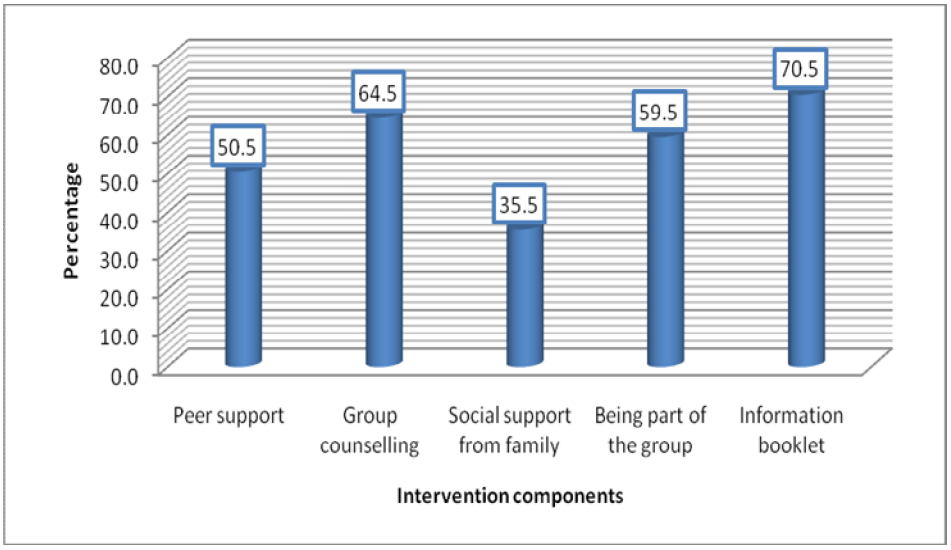
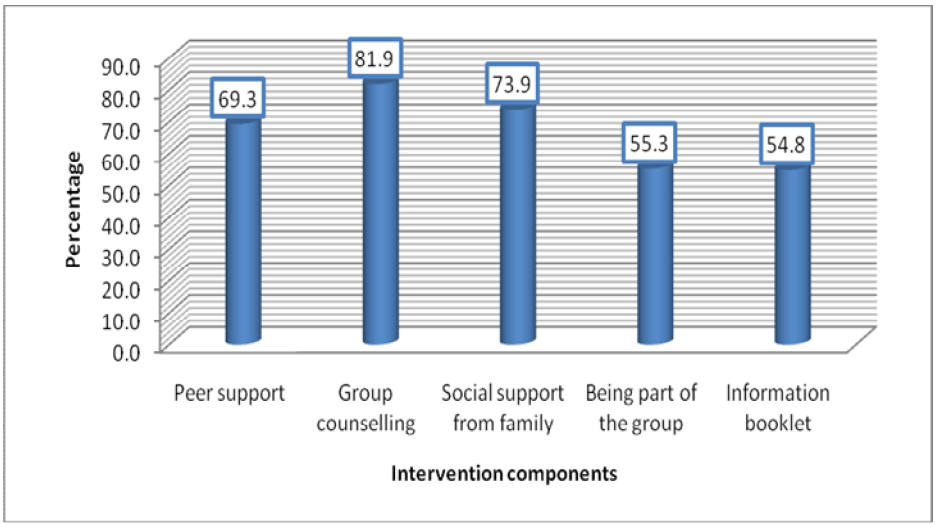


Figure 12: Proportion of women who rated the intervention components as "very important" and "extremely important" in facilitating physical activity behavior at thirteenth month of intervention



4.4.3Multilevel Mixed Modeling

Multilevel linear model was done using STATA to get the modeled estimate of physical activity at four levels namely individual, cluster, group and time point**.** Individual was referred to the study participants. Cluster was referred to the cluster sampling design adopted in the study. There were eight clusters each in the intervention and control arm. Group was referred to the intervention and control arms of the intervention trial. Time point was referred to the multiple time points at which assessments were made namely baseline, fourth, seventh and thirteenth

months. Physical activity was modeled using multi- level linear models at the above mentioned four levels i.e. individual, cluster, group and time.

Table 15: Modeled estimate of physical activity level in the intervention arm at multiple time points

Time point	**Coefficient of change from baseline (MET minutes per week) (95% CI)**	**Mean physical activity * (MET minutes per week) (95%CI)**	**P value****
4th month	1075.02 (952.66-1197.38)	1158.9 (942.96-1375.08)	<0.001
7th month	623 (500.67-745.32)	706.97 (490.92-923.02)	<0.001
13th month	441.02 (318.53-563.51)	524.99 (308.77- 741.21)	<0.001

Variables in the model: Individual, intervention arm, cluster, and time point

* Estimated from the model based on the linear mixed effect model

**P value for the coefficient of change from the baseline

Coefficient of change was the amount of physical activity expended at each time point when compared to the baseline. At the fourth month of intervention, women in the intervention arm expended 1075 MET-min / week more than at baseline. The energy expended was 623 MET-min/ week more in the seventh month of

intervention when compared to the baseline. At the thirteenth month of intervention, the energy expended by the women in the intervention arm was 441 MET-min/ week more when compared to the baseline.

Mean physical activity for the intervention arm participants was estimated from linear mixed effects model after considering the variables in the model at fourth, seventh and thirteenth month.

Table 16: Modeled estimate of physical activity level in the control arm at multiple time points

Time point	**Coefficient of change from baseline (MET minutes per week) (95% CI)**	**Mean physical activity * (MET minutes per week) (95%CI)**	**P value****
4th month	82.96(43.47-122.46)	203.36 (129.2-277.67)	<0.001
7th month	47.68(08.24 - 87.12)	168.08 (93.97-242.19)	0.01
13th month	-25.45 (-64.89-13.98)	094.95 (20.84-169.05)	0.20

Variables considered in the model: Individual, control arm, cluster, time point

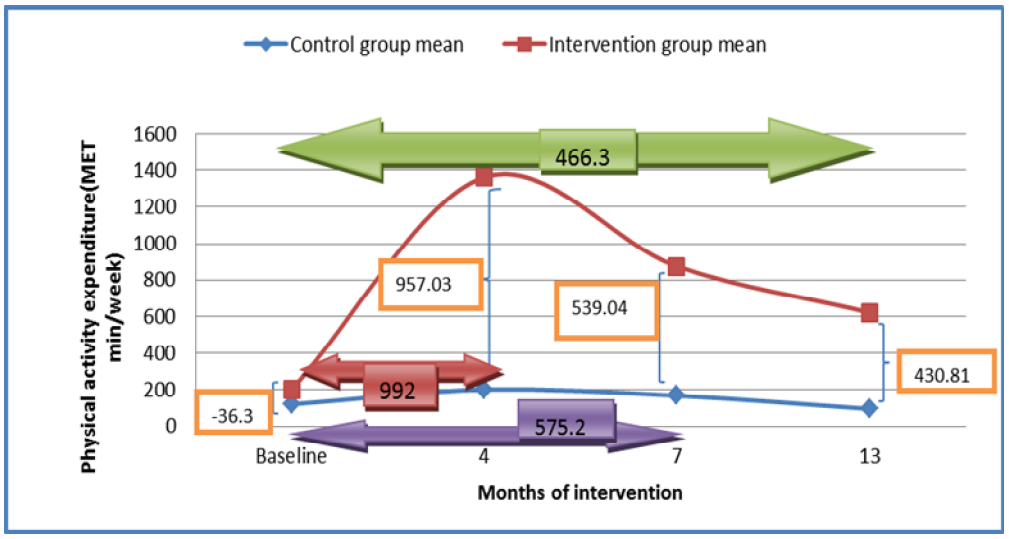
* Estimated from the model based on the linear mixed effect model

**P value for the coefficient of change from the baseline

The control arm participants at the fourth month expended 82.96 MET-min/ week more when compared to the baseline. Similarly an increase of 47.68 MET-min/

week from baseline was found at seventh month. At the thirteenth month the physical activity energy expended was 25.45 MET-min/ week lower than the baseline level.

Figure 13: Modeled estimate of physical activity level in the intervention arm when compared to the control arm at multiple time points



Depicts the difference in the mean level of physical activity between the intervention and control arm at each time point

The improvement from baseline in amount of physical activity expended by the intervention arm when compared to the control arm at each time point

The effect of intervention was analyzed in two levels in the model. Firstly the difference in the mean level of physical activity between the intervention and the control arm at each time point was estimated. This was -36.6 MET min /week, 957.03 MET min /week, 539.0 MET min/ week and 430.81 MET min /week at baseline, fourth, seventh and thirteenth month respectively. This means that at

fourth month the intervention participants expended 957.03 MET min/ week more than the control participants. Similarly at seventh month the intervention participants expended 539 MET min/week more than the control arm participants and at thirteenth month the intervention participants expended 430.81 MET min/week more than the control arm participants.

Second level of analysis estimated the improvement in the physical activity level from baseline due to the effect of the intervention on the intervention arm when compared to the control arm at each time point. Women in the intervention arm expended 992 MET-min /week more than the control arm participants at fourth month when compared to the baseline. Similarly at seventh month of intervention, women in the intervention arm expended 575 MET-min / week more than the control arm participants when compared to the baseline. At thirteenth month, intervention arm participants expended 466 MET-minutes /week more than the control arm participants when compared to the baseline. The study finding showed that intervention was effective with an absolute increase of 29 percent in the intervention arm when compared to the control arm at one year of the intervention.

3.4.4. Adjustment for the effect of confounders

The effect of confounding for age, educational status, occupational status and marital status was eliminated in the analysis by including those variables in the model with the level of significance of 0.1 between the intervention and control

arm. Distribution of age and occupation was significantly different between the intervention and control arms with a “p” value of 0.1 and hence was included in the model. There was no confounding effect of age or occupation on physical activity.

CHAPTER -5

DISCUSSION

Intervention studies on physical activity are very limited in India. Using a quasi-experimental study design with a comparable control group a community based intervention study was conducted among sedentary women in a few expanded part of corporation wards of Thiruvananthapuram city. Intervention was developed through different stages such as focus group discussions and a cross sectional survey to assess correlates of physical activity. Intervention was delivered to the intervention arm at multiple intensities namely three month intense phase, another three months less intense phase and six months of no intervention phase using peer support. Evaluation was made after each phase of the intervention trial. The self-reported physical activity was validated using Actilife accelerometer.

This chapter discusses the major findings of this study under the following headings namely understanding the perceptions on barriers and facilitators of physical activity; assessment of the prevalence and correlates of physical activity; validation of self-report with an accelerometer and intervention trial.

5.1. Phase 1: Understanding the perceptions on barriers and facilitators of physical activity

This study shed light on the perceptions of the importance of physical activity, the barriers and facilitators in engaging in regular physical activity among women in the expanded part of Thiruvananthapuram city, Kerala. Women evinced an understanding of the efficacy of physical activity in controlling chronic diseases. They described some facilitators of physical activity, especially doctors' advice and the company of peers; as well as several barriers, particularly inadequate time, low motivation, and social norms unfavorable to the adoption of regular exercise.

Physical activity was increasingly being acknowledged as a strategy for the management of chronic diseases, particularly diabetes mellitus and cardiovascular diseases. However, awareness of the benefits of physical activity for the prevention of chronic diseases was low. There was generalized lack of awareness on the recommendations for physical activity for adults. Several studies elsewhere have shown that knowledge on the benefits of physical activity is a positive determinant for being active (Clark 1999, Lian et al. 1999). This lacuna points out to an opportunity to inform and advocate in physical activity participation. Mass media could be used to improve awareness at population level on the recommendations, need for addressing myths on physical activity which in turn would assist in overcoming the existing cultural barriers faced by women. Counseling on the benefits of physical activity (Reis et al. 2014), with cues to action, could encourage

the adoption of regular physical activity, and the setting of realistic goals to achieve the recommended levels.

There was a general perception that routine household activities provided sufficient physical activity. Many women cited insufficient time as the principal impediment to engagement in exercise. There were misperceptions on the intensity of activities performed, similar to a report in another study in India (Vaz & Bharathi 2004). When compared to the intensities of activities reported in the Compendium of physical activity (Ainsworth 2000), women in our study perceived “low intensity” activities as “moderate” and “moderate intensity” activities as “vigorous”, which ultimately gave a perception that routine household activities provided sufficient physical activity However, their activities were mostly sedentary or of low intensity, and performed in bouts of less than ten minutes duration, a finding reported in another study among African American and American Indian women (Wilcox et al. 2002). Being occupied, particularly in physical tasks, may give the often inaccurate impression of constituting sufficient, or surplus, physical activity. Efforts to promote physical activity should ideally include information to facilitate a realistic assessment of the amount, particularly intensity of the physical activity that people habitually engage in, so that pragmatic planning for future physical activity regimen may be undertaken.

Walking for exercise emerged as a practice not commonly encountered among urban women in Kerala. Women’s views on the social aspects of walking for exercise was rather complex: Some emphasized that walking for exercise was not

part of their culture. This, in combination with the view that any physical activity beyond household chores was largely unnecessary for those free from chronic diseases, had the effect of providing little or no motivation for most women to exercise. The fact that in the earlier times, most of the activities were labor intensive and majority did not require any additional physical activity was not commonly understood by these women. So it is important to emphasize on the transition of lifestyle in diet and physical activity in the current scenario, and the need to engage more in physical activity at leisure and transportation. However, observing other people walking was cited as motivation for embarking on a regular program of walking. Women in this study did not cite many built environment barriers to walking. This was probably related to the fact that the residential community that they live in, although not possessing footpaths, was not subject to high automobile traffic, and had some green cover, both factors contributing to the acceptability of the outdoor environment for walking. The lanes were described as narrow, although not unsafe. Some women made a mention of stray dogs as a deterrent to walking outdoors. These conditions, along with the increased enthusiasm that exercising together confers, may have contributed to the women articulating a preference for walking in pairs or small groups, rather than alone, or in bigger groups. Encouraging walking individually or in groups, with the engagement of the community, would work towards informing, motivating and empowering women, as well as promoting a pro-physical activity social norm, promising to be an effective step in addressing gender and cultural barriers to walking for exercise, in this community.

The perceptions and knowledge of physical activity among women in South India had similarities and dissimilarities when compared to studies done elsewhere. A few similarities being: lack of time; poor access to recreational facilities; walking as the most important activity; and the need of social support (Wilcox et al. 2002). However some striking dissimilarities were: social and cultural barriers; less awareness of the importance of physical activity and the recommended levels of physical activity. These findings suggest the relatively greater important role of media in India for addressing the knowledge gaps and sensitizing the public on the need for social norming of physical activity behaviors.

Interventions for physical activity promotion in this community would work best by targeting the modifiable determinants of physical activity, such as improving the cognitive skills such as the need for physical activity, levels of activity required for health benefits, facilitating optimal goal-setting, enhancing social support, changing perceived norms, and increasing opportunities for the enjoyment of health behavior through group-based activities. This approach found support in the evidence discussed by other researchers (Clark 1999, Lian et al. 1999). Interventions should ideally be tailored to individual schedules to maximize convenience for women and the probability of adoption and adherence to regular physical activity.

5.2 Phase 2: Cross sectional survey

Mean level of physical activity among women in this study was 1875 MET min/week which was higher than the mean level of 457.8 MET minutes per week

reported in a multi-site ICMR-INDIAB study done in four regions of India namely Tamil Nadu, Maharashtra, Jharkhand and Chandigarh (Anjana et al. 2014). Lower prevalence of inactivity in this study when compared to other studies in India (Kinra et al. 2010; Allender et al. 2010; Anjana et al. 2014) may be due to the differences in the characteristics of the study population and the variability in self-reports. This study was done in an urban area which was the expanded part of the city corporation. Therefore the level of urbanization could be not as high as that of Chennai or any other major cities in India.

Median levels of physical activity (1550 MET min/week) among women in our study was less than that reported among middle and old age urban Chinese women (5802 MET min/wk.) (Jurg et al. 2007). Studies that reported on the physical activity levels among women from India used different measures of assessment and hence the comparison cannot be made (Vaz & Bharathi 2004).

The physical inactivity prevalence of 26.6 per cent among women in our study was similar to the 24.3 per cent inactivity level among women in two work site populations in India (Bauman 2009). It was higher than the inactivity of 8.7 per cent reported in an earlier study among urban woman in the age group of 15-64 years in the Thiruvananthapuram city in the year 2006 (Thankappan et al. 2010). Higher level of physical inactivity in the same population could be due to changing trends in the environment making it not conducive for physical activity due to heavy traffic, poor road safety, increased television and motor vehicle use (GoI, 2011) over a period of six years. Higher level of physical inactivity was also

reported from the neighbouring state of Tamil Nadu corresponding with higher level of urbanization: 75.4 per cent of inactivity in low level urbanization and 92.7 per cent in high level urbanisation (Allender et al. 2010). Inactivity in the present study was lower than the 45 per cent among Indian women in UK (Hayes 2002) and the 36.8 per cent of older US women (Brownson et al. 2000a). Although the level of urbanisation was higher in the UK and the US compared to the cities in Tamil Nadu, the lower prevalence of physical inactivity among Indian women in the UK and the US women may be due to increased opportunities for physical activity through better public transportation and access to facilities or may represent differences in surveys, samples, and perceptions of physical activity. A recent study at four sites in India reported a higher prevalence of inactivity of 54.4 percent (Anjana et al. 2014). The region-wise prevalence of physical inactivity was 66.8 per cent in Chandigarh, 60 per cent in Tamil Nadu, 55.2 per cent in Maharashtra and 34.9 per cent in Jharkhand.

Domain specific analysis showed highest prevalence of inactivity at leisure (99 per cent) followed by transportation (87.1 per cent) and work (31.4 per cent). Such high levels of inactivity at leisure were also reported in another study where 91.9 per cent did not engage in any leisure time activity (Anjana et al. 2014). Lack of leisure time physical activity among women in the study may be due to the perception that their current activity level is adequate and the cultural norms may dissuade in regular leisure time activity.

In our study only 19 per cent of the women perceived themselves to be inactive but on actual physical activity assessment using GPAQ, 26.6 per cent were inactive. Overestimation of different kinds of activities was reported from previous studies in India (Vaz & Bharathi 2004; Patra et al. 2013). In a recent study from New York City (Wyker et al. 2013) there was a 265 per cent over reporting of physical activity in self-report (774 min/ week) compared to the objective measure by accelerometer (292 min/week). Although objective assessment of physical activity using accelerometer is ideal, it is difficult to use in resource poor settings. Moreover self- report using GPAQ (Bull et al. 2009) and IPAQ (Bauman et al. 2009) is an accepted norm in epidemiological studies and for surveillance of physical activity.

The cross sectional survey used self- reported physical activity from GPAQ without concurrent validation by objective measures such as accelerometers. However, GPAQ has been previously validated in India, and similar self-report instruments have been validated in multiple countries (Bull et al. 2009, Craig et al. 2003).

More than half (62 per cent) of women were not aware or did not know of the recommendations for physical activity for health benefits, similar to that of US adults (Bennet et al. 2009). However this was higher than reported among women in England (42 per cent) (Townsend et al. 2012).

Barriers to physical activity reported in our study were similar to that of other studies such as lack of time, lack of interest or enjoyment of activity, child care

responsibility, lack of knowledge on what to do for exercise, lack of support from household members and spouse and lack of company for walking. Barriers to being active at the community level were presence of stray dogs, heavy traffic, hilly terrain, lack of sidewalks, lack of safe space for walking, poor access to facilities for exercise and poor neighborhood safety.

Facilitators for being active were support from household members, spouse support, having an exercising member in the household, support from friends and neighbours, knowledge on the benefits of physical activity and household member having chronic disease.

The positive association of physical activity with middle age in our study was similar to that of urban Chinese women (Jurj et al. 2007) where physical activity increased with age in contrast to US (Brownson et al. 2000a) and Australian women (Booth et al. 2000).In Asian countries especially in India, family is considered to be very important and, cultural and traditional values are centred on the family. Gender and societal norms consider the domestic chores and child care as responsibilities of woman. Middle age is the phase when women enter into a family life and have increased level of child care and household responsibilities. A study from India (Vaz & Bharathi 2004) reported that although women had lower discretionary exercise, they had higher levels of physical activity from household chores than their male counterpart. In our study nearly 74.7 per cent of physical activity among middle age women was attributed to domestic chores when compared to younger (64.8 per cent) and older (68.6 per cent) women. As the

median age of marriage was 18.3 years and median age of first child birth was 22.7 years (Registrar General of India 2001,Census of India 2001), most of the child care and domestic responsibilities decreased by late forties when the children become adults.

Married women reporting more physical activity in our study is in concordance with another study (Sternfeld et al. 1999).This may be because those who were married may have more household responsibilities which were physical activity enablers compared to the single, separated or widowed counterparts.

Women who perceived themselves to be overweight were less likely to be engaged in physical activity similar to a study among US older women (Bauman et al. 2012). Being overweight and obese was reported to be negatively associated with physical activity in another study (Brownson et al. 2000a). It can also be argued that individuals who do not exercise tend to be overweight or obese and thus obesity may also be considered as an “effect” rather than a correlate.

Knowledge on the benefits of physical activity was found to be a strong correlate for physical activity, similar to a study among Singapore older adults (Lian et al.1999). More than half (61.7 per cent) of the women were not aware of the recommendations for physical activity for health benefits. More than half of the women were aware of physical activity’s role in the prevention of diabetes mellitus, hypertension and stroke while its role was least recognised in the prevention of arthritis, colon and breast cancer. Studies elsewhere had shown that participants perceived diet to play a more important role in diabetes prevention

than physical activity and low awareness on the role of physical activity in diabetes prevention (Graco et al. 2009), and breast cancer (Loh et al. 2011). Limited evidence exists on the population awareness level on the role of physical activity in the prevention of chronic non-communicable diseases. However there is ample evidence that knowledge on the role of physical activity in chronic disease prevention influences the individual physical activity level (Patra et al. 2013).

Support from friends and neighbors were a strong correlate for physical activity in this study similar to another study (Booth et al. 2000). Peer support and having friends may enable women to overcome individual level barriers and increase the opportunity for leisure time walking and other activities outside the normal routine. This finding threw light on the importance of group based activities involving peers as an opportunity to promote physical activity among women in South India. Women with an exercising member in the household were more likely to be active similar to another study (Lian et al. 1999). A household member who exercises regularly may be aware of the benefits of physical activity and would help to overcome culture and gender norms that discourage women to undertake walking at leisure or engage in any outdoor activity that promotes physical activity (Sivasankaran & Thankappan 2013). Constant reinforcement and company by a household member may be a facilitator for physical activity.

Access to facilities emerged as a significant correlate for physical activity at community level as reported in another study (Booth et al.2000). It may be because more facilities for exercise influence the activity level positively. Facilities for

physical activity could be in terms of an exercise facility, sports or recreation centres, parks and public spaces and pedestrian walking zones. As mentioned earlier, very few women are in the work force in India (Registrar General of India 2001) and majority of them are financially dependent on the spouse or household members. In order to enhance access to facilities for physical activity, it is important to invest in public goods such as parks, public recreational spaces and safer pedestrian walking zones. There is strong evidence from developed nations as well as developing countries such as Brazil (Hallal et al. 2005) on improving population level physical activity by investing in creating public spaces, transportation policies and land zoning.

5.3. Phase 3: Validation of the self -reported physical activity assessment with the accelerometer

Physical activity assessment was done using the modified GPAQ which is a self -reported physical activity assessment questionnaire and hence the preliminary validation of the tool was done using the accelerometers. The validation of the self-reported physical activity with the accelerometer in this study was done only using data from 24 women. Although accelerometer data was captured from 47 women, only 24 women met the criteria for the data to be valid. Most of the women wore for less than three days even after reminders. A few women were dissuaded from wearing the accelerometer after some local people spread a message that the

accelerometer records other personal data from the wearers without their knowledge. Similar challenges in data collection using accelerometers have been reported in other low and middle income countries (Salvo et al. 2014). The use of accelerometers in field based research was new to this study setting. There were no previous studies reporting the use of accelerometers for validation of self-reported physical activity in South India. Lack of participant trust was commonly encountered and hence it was essential to collaborate with a trust worthy local organization, residents association in this case. Moreover the credibility of the academic institution of the study investigator was necessary to convince women to participate in the study. As there were illiterate women in the sample, self-reported questionnaires had to be administered as an interview schedule and the investigator had to conduct the study in person, similar to the strategies adopted in Brazil, Colombia, and Mexico (Salvo 2014).

Although statistically, the minimum number required for any study to be of large sample is 30, it was difficult to conduct validation with the accelerometers in this study population. However there were validation studies conducted among a sample less than 30 (Bisgaard et al. 1999). The mean duration of moderate and vigorous physical activity (MVPA) minutes per week was very low (116.92) and negligible for vigorous intensity activities (0.18). Other GPAQ validation studies using an accelerometer have also shown that GPAQ may be a more accurate measure to assess vigorous intensity activity over light or moderate activities (Paternoster et al. 1998, Prince et al.2008). Women in our study reported no

physical activity of vigorous intensity and it was mostly of light or moderate intensity.

The over reporting in self-reported physical activity of 21.2 minutes per week when compared to the accelerometer finding was considerably low when compared to other studies (Wyker et al. 2013). A systematic review on studies on validation of self-reported physical activity with accelerometer showed that women generally reported high levels of physical activity through self –reports than men when compared to accelerometers and the mean difference was 138 percent (Prince et al. 2008). Several studies have also pointed out that accelerometers were unable to capture activities of upper body movement or where there was limited movement of center mass such as washing clothes, washing dishes etc. (Paternoster et al. 1998, Prince et al. 2008). Hence there will be mismatch between accelerometer findings and self- report on activities of such nature. One limitation was that the validation of the modified GPAQ was done only among 24 women due to several challenges faced during data collection. However there have been validation studies conducted with similar small samples of less than 30 (Craig et al.2003, Bisgaard et al. 1999).

When evaluating the intervention effectiveness assessed using the modified GPAQ, the 21.2 minutes per week of over reporting which was equivalent to 84.8 MET minutes per week need to be reduced.

5.4 Phase 4: Intervention trial

The intervention to promote physical activity among women using the peer support was found to show positive outcome over the study period. The highest proportion of women who became active during the study period was after the three months of intense phase in the intervention arm when compared to the control arm (58.5 per cent vs 10 per cent). This may be due to the intense nature of the intervention which involved risk factor assessment, educational workshop, group counseling, setting up realistic goals and constant support from peer leader as well as other group members. Educational workshop sensitized women on several dimensions such as recognizing the importance of physical activity, intensities of activity needed for health benefit especially for chronic disease prevention, breaking the misperception of adequacy of physical activity from household work and setting up realistic and feasible goals with the support of group members. Women also underwent aerobic training sessions and it functioned as a group activity in the clusters (six out of eight clusters) along with few walking groups. Group based activities including walking groups were also reported beneficial in other studies where a walking program among the elderly cancer survivors showed that the proportion of walking 150 minutes per week increased from 21 percent at the baseline to 50 per cent over a six month period (Kirsten et al. 2014). Another intervention study among 462 adults with self -reported or physician diagnosed arthritis employed two formats; group and self- directed. At one year of the intervention, 59.6 per cent of the group and 69.3 per cent of the self- directed participants reported continued walking (Kirsten et al. 2014).

The proportion of active women decreased gradually after the “intense” phase, based on the assessment made at the seventh month; however the number of participants who remained to be active in the intervention arm was significantly higher than the control arm (48.5 per cent vs 6 per cent). The decrease in the proportion of active women after the intense phase could be either due to the reduced intensity of the intervention or the “depleting effect” of intervention over time. However, the monthly meetings with the peer leader and peer support from the group based activity would have facilitated in sustaining the activity among active women. The proportion of active women in our study after six months of intervention (48.5 per cent) was lower than another lifestyle intervention study (78 per cent) in the United States which involved group based meetings and goal setting (Dunn et al. 1998). The higher proportion of active individuals in the US could be due to the additional facilitators such as increased access to facilities and lack of cultural norms hindering physical activity as in this study area.

The latter six months of “no intervention” period showed a reduction in the proportion of active women to half (29.6 per cent) of that after the intense phase (58.5 per cent). A physical activity promotion study which targeted both sedentary and physically active participants had shown that participants who were already active were more likely to adhere to the intervention and maintain a healthy life style than the sedentary or inactive ones (Boch 2001). Although the proportion of active women was reduced in the intervention arm with the tapering dose of intervention, the relative proportion of active women was higher in the intervention arm when compared to the control arm (29.6 per cent vs 0.6 per cent). The multiple

strategies of health behavior theory adopted in this study such as improving self-efficacy through goal setting, goal review, self- monitoring and peer support along with support from family and friends would have facilitated the positive behavior change and its maintenance, as reported in other studies as well (De Greef et al. 2011, Allen et al. 2008, King et al. 2006). Apart from increased self –efficacy or confidence through the educational workshop and individualized counseling, social support from peers and family would have played an important role in the sustenance of activity. Other studies have shown that group based intervention delivery was very effective among women and it was more effective than individual or community based interventions (Cleland et al. 2013). The effect of intervention may further decrease over the time period and it is important to devise strategies for "periodic prompts", and integrate with existing community based initiatives.

An increase in the proportion of active women was also seen in the control arm after the intense phase and this may be due to the influence of the educational booklets given to the control participants at the baseline survey addressing blood pressure, diabetes and heart disease which had a mention of physical activity.

A majority of the women who became active at fourth, seventh and thirteenth months of intervention were mostly engaged in moderate intensity activity. Very few women (six per cent) were vigorously active after the intense phase and it became negligible thereafter. Women in the current study generally chose moderate intensity activities and this may be because the study targeted sedentary

women and it may be quite difficult to increase the intensity of the activities chosen. Studies have shown that women preferred to do moderate intensity activity over vigorous ones (Forbes et al. 2014) and walking, the most preferred activity (Belanger et al. 2012; Trinh et al. 2012.

The change in the mean level of physical activity was tested for its significance over the study period in both intervention and control arms. In the intervention arm, the mean physical activity level was found to have significantly increased at fourth, seventh and thirteenth month when compared to the baseline. The highest level of mean physical activity was reported after the intense phase and decreased thereafter. Physical activity level decreased after the less intense phase (seventh month) when compared to intense phase of intervention (fourth month). This decrease could be due to the decreasing intensities of intervention and "depleting effect" of the intervention on behavior change over time.

In the control arm, the mean physical activity level at the fourth month was higher than that of the baseline and this increase may be due to the influence of the informational booklets on chronic diseases where there was a mention of physical activity modification. Similarly physical activity level at seventh month of intervention was 73.13MET min/week higher than the thirteenth month. This was due to the drop in physical activity below the baseline level at thirteenth month which suggests that with no intervention, people tend to be more sedentary over time.

A dose –response relationship between the intervention and physical activity was found in this study, similar to other studies (Tate et al. 2001; Rodondi et al. 2006) and the sustained positive behavior change even after the no intervention phase may be due to the effect of social and peer support. A meta-analysis on physical activity promotion interventions targeting women revealed that the mode of intervention delivery was the key factor that determined the intervention effectiveness. Group based interventions proved more effective in achieving the targets than individually tailored interventions. An additional 70 min per week of physical activity was found among participants in the group based interventions, the effect which was clinically and statistically greater than other modes of intervention delivery (Cleland et al.2013).Another prospective study has reported that the minimum amount of physical activity required to significantly reducing all -cause mortality was 15 minutes per day (Wen et al.2011).

In the intense phase, most changes were made in the transportation domain (558.2 MET min/week) followed by work (409.8) and leisure (191.2). There was as an increase in the moderate intensity activities reported at work such as mopping the floor for 20 minutes on three days a week, doing multiple household activity with vigorous effort and washing the clothes that attributed to the increased physical activity and this could be because majority (84.5 per cent) of them were unemployed and housewives. The increased physical activity level at the transportation domain was because most of them chose to walk for shopping and work. Leisure time activities involved walking individually or in groups and aerobic dancing sessions. Not only leisure time physical activity but physical

activity in domains particularly transport and work were found to have numerous health benefits (Samitz et al. 2011). During the less intense phase, the domestic work related activities reduced substantially but there was sharp increase in the leisure time activities. The increase in leisure time activity may be due to the influence of peer and social support. Although transport related activities reduced during the less intense phase, it was sustained along with leisure activities during the no intervention phase. It could be due to the peer influence and overcoming the cultural barriers following community engagement over time that women chose to increase leisure time activity over a time period.

Women rated group counseling, social support from family and peer support as important facilitators for being active. This points out that "single strategy" does not assist women in making a behavior change and that multiple tailored strategies will have to be employed at multiple time points at multiple levels, i.e. improving personal motivation and self -efficacy at personal level, support from family, spouse and peer support at interpersonal level, and conducive environment for active living at community level. Stating group counseling and information booklet consistently as facilitators stresses the importance of information dissemination and assistance in goal setting for physical activity choices among women. A previous study has pointed out that goal setting and counseling is an important intervention component for behavior change (Reis et al. 2014). Goal setting was found to be effective at helping participants achieve goals and has to be assisted through a goal-setting process, incorporating feedback, assisting in overcoming barriers and developing appropriate skills (Shilts et al. 2004). There was sufficient

evidence on the effectiveness of counseling by doctors or health care providers in improving physical activity (Petrella et al. 2003, Stevens et al.1998). However in countries such as India, with limited health system resources including health care providers such as doctors it is imperative to render the services of a peer leader in the community for activities of health promotion. As behavior change needs constant assistance and support for adoption and maintenance, it is only practical to engage community with effective use of peer support.

Although at fourth and seventh month, the mean level of physical activity was more than the recommended levels (>600 MET min/week), it was reduced to a level below the recommended levels of physical activity at thirteenth month with the tapering dose of intervention.

A decreased trend in physical activity was observed in the control arm with further decline at the thirteenth month, surprisingly lower than the baseline level. This indicated that without any intervention, individuals tend to go back to their initial sedentary state or retrograde further. This clearly calls for the urgent need to initiate physical activity promotion strategies in the community in the wake of rising non communicable diseases and their risk factors.

The effect of intervention was significantly higher in the intervention arm across the study period. Maximum difference of 957.03 MET min /week in physical activity level between the intervention and control arm was found during the intense phase. The difference in physical activity level between the study arms after six months of intervention in our study (539.0 MET min/week) was similar to

a study among rural low income women in North Carolina (151 minutes per week equivalent to 604 MET min/wk.) (Ries et al. 2014). Although the mean physical activity level was just above the recommended levels at seventh month (623 MET min/ week and), it decreased below the recommended levels at the thirteenth month (441.02 MET min/week) in the intervention arm, yet the difference between the intervention and control arm was significant. Even after the period of no intervention, the women in the intervention arm expended 430.81MET min/week higher than the control arm. This shows the extended effect of intervention although decreasing over time. The progress in physical activity level from baseline too was significant at each time point.

After taking into account for the overestimation through self-reports, it was found that the women in the intervention arm expended 872.23 MET minutes per week more than the control arm women at fourth month of intervention. Similarly at seventh and thirteenth month of intervention, women in the intervention arm expended 454.2 MET minutes per week more than the control arm participants. The improvement from baseline was significant at fourth (907.2MET min/week), seventh (490.4 MET min/week) and thirteenth months (381.5 MET min/week) in the intervention arm when compared to the control arm after taking into account for the overestimation through self-reports.

One of the limitations of this study was that it was conducted in the expanded part of Thiruvananthapuram City Corporation and hence the study findings may not be generalizable to the whole district or the State of Kerala. Moreover physical

activity like all other behaviors has a social desirability bias, which is a limitation of the study. Efforts were made to reduce the bias by cross checking with multiple sources such as walking group and aerobics group.

The findings from this study revealed that there was more than 20 per cent absolute increase in the level of physical activity in the intervention arm when compared to the control arm at the end of the intervention, thus suggesting that peer support interventions were effective in improving the physical activity of sedentary women in the study. Further efforts will have to be made to ensure the program sustainability with concerted support from the community and peers.

CHAPTER 6

SUMMARY AND CONCLUSION

This study threw insights on the stages of development of an intervention trial to promote physical activity among sedentary women in Thiruvananthapuram City. This was the first study that was implemented with a primary aim to promote physical activity among women in India. Study findings revealed that it was possible to improve the physical activity level of sedentary women. In order to undertake the interventions, it was necessary to identify feasible strategies for physical activity promotion. Therefore, formative research was done; through focus group discussions to understand the perceptions and barriers to physical activity in the community and; through cross sectional survey to understand the correlates of physical activity.

Focus group discussions, clearly pointed out on the need to alter the misperceptions on the intensity of physical activity and the perceptions on barriers and facilitators of physical activity. Lack of adequate knowledge on the recommended levels of physical activity and its benefits also warranted the need to devise strategies to improve knowledge on physical activity. The lacunae in the cognitive aspect were addressed in the intervention by conducting an educational workshop on the benefits of physical activity and developing a booklet "Being Active". Most of the participants expressed that they were adequately active and engaged only in household activities. The fact that these household activities were mostly of low intensity and of a bout of less than ten minutes clearly showed the lack of knowledge on the adequacy of activity. This was addressed in the intervention by conducting an NCD risk assessment clinic where anthropometric measurements such as height, weight and waist circumference were taken. This enabled participants to introspect on the adequacy of their current physical activity by associating with their current body composition and recommended levels. Need for social norming on the behavior at community level was essential as "no culture of walking" was one amongst the barriers among women. The concept of peer support was introduced in the intervention which improved the self-efficacy to make changes in their lifestyle with the support of their peers, neighbors and community. Furthermore, the peer leader led meetings within their neighborhood assisted women in continuing with the activities.

The cross sectional survey identified the major correlates of physical activity among women. The major positive correlates for physical activity at personal level

were being married, being in the age group of 35-54 years and reported knowledge on the benefits of physical activity. In order to enhance physical activity among women, efforts should be made to encourage men to support physical activity among women. The lower physical activity levels among younger (<35 years) and older (>55 years) women showed that more attention should be given to these age groups when developing an intervention.

At interpersonal level, the factors that positively influenced physical activity were having an exercising member in the household and those who reported support from friends and neighbors. Physical activity promotion among women should be targeted to peer and neighborhood groups with at least one member in the household encouraged being active to initiate activity among women at household level. At community level, those who reported to have access to exercise facilities were physically active than their counterparts which clearly pointed on the need to provide more facilities for physical activity at community level by community organizations, local self- governments, sports councils etc. The findings from the cross sectional survey too supported the identification of the intervention components.

The validation of self- reported physical activity using modified GPAQ with the accelerometer showed that the self -reports were reliable. The modified GPAQ can be used for population studies given the high cost and feasibility issues of using an accelerometer in resource constrained settings. However, the extend of over reporting even in the modified GPAQ has to be taken into account.

The intervention developed for physic.al activity promotion among women was found to be effective in reducing the proportion of sedentary women in the intervention arm when compared to the control arm. The effect of intervention was at peak during the intense phase which involved NCD risk assessment, educational workshop with health information booklet, group counseling and setting on individualized targets, goal review and peer support through group based meetings, and group activities. The findings showed that after the intense phase, more than half of the participants achieved moderate levels of physical activity and another six per cent achieved vigorous levels of physical activity compared to the 21 percent of participants in the control group who achieved moderate levels of physical activity and nobody achieved vigorous activity levels. The mean level of physical activity in the intervention arm was 1159 MET minutes per week when compared to 202 MET min/week in the control arm. Even though only 58.5 per cent were moderately or vigorously active, others would have also increased their physical activity, although not substantial enough to be moderately active.

About 40 percent of women remained sedentary, even after the intense phase of the intervention and the possible reasons could be lack of environmental support in terms of poor urban design and lack of recreational spaces which facilitates physical activity. The interventions that addressed the individual and social aspects of behavior change have got its own limitation in physical activity promotion. This underscores the importance of policy level interventions for enhancing physical activity such as built environment conducive for physical activity and physical activity promotion policies implemented at all public departments namely

education, transport, health and town planning. The increase in the proportion of people who became active (21 per cent) in the control group could be due to the influence of the health informational booklets on blood pressure, obesity and coronary artery disease which had a mention of physical activity.

The intervention effect decreased during the less intense phase which involved continuation of meetings and activities within the groups organized by the peer leaders. During this phase, there was a ten percent decline in the proportion of women either moderately or vigorously active from that of the intense phase. There was only locally led peer group sessions without any external prompts. Even then, nearly half of the participants were moderately active which could be due to the social and peer support which sustained the initial intense intervention. The mean level of physical activity was 707 MET minutes per week in the intervention arm which was above the recommended level when compared to 168 MET min/week in the control arm. This finding showed that peer support from community based or neighborhood groups would be effective in promoting population level physical activity with an initial input from higher levels.

After a period of no intervention it was observed that physical activity level further decreased below the recommended levels. However, the effect of intervention was significantly higher in the intervention arm (29.6 percent active) when compared to the control group (0.6 percent active). The study finding showed that intervention was effective with an absolute increase of 29 percent in the intervention arm when compared to the control arm at one year of the

intervention. It was further observed that the physical activity level in the control arm further reduced below the baseline level suggesting that the population tend to be more sedentary if not intervened appropriate in time. The "depleting effect" of intervention over time needs to be addressed appropriately as behavior change strategies can be sustained either by institutionalizing appropriate strategies for sustenance or by modifying the environment to be more conducive for physical activity. For sustenance, periodic prompts by peer leaders or integration of the program to an existing community program may be required. More attention will have to be focused gradually on addressing the environmental factors of physical activity and policy level interventions.

The overall study clearly evidenced on the feasibility of implementing physical activity promotion among women in Thiruvananthapuram city, Kerala. The alarming increase in the burden of NCDs in the State of Kerala and with physical inactivity having a significant contribution to it, any study that targets physical activity promotion is beneficial. The findings from this physical activity promotion study are crucial to understand the dynamics of physical activity in the community, especially women and to identify the feasible strategies for implementation in the community settings targeting women. The findings of the study could be implemented at different settings in the country with some local adaptation and based on the needs assessment of each community.

When considering physical activity promotion in this country, it is crucial to identify existing gaps that need to be appropriately addressed. Very limited data on

correlates and determinants from India make crafting intervention strategies difficult. Moreover an understanding of environmental correlates of physical activity in India is so limited that it in turn limits the application of correlates to guiding interventions.

Although the perceptions and knowledge of physical activity among women in South India were similar to what has been reported in other settings, there are a few striking differences. The "culture of physical activity and sport" among women in South India differs markedly from that in the countries with most success in physical activity promotion such as Brazil, US, Australia and Europe which invested in social capital and environment for physical activity promotion. Social capital was defined as features of social organization, such as networks, norms, and social trust, which facilitate coordination and cooperation for mutual benefit (Torres 2012). In order to bridge this gap it may require concerted action over a period of time, through government and non-government organizations to raise the social capital for physical activity promotion in order to facilitate transferability and better uptake of the interventions. Furthermore low awareness levels of the benefits of physical activity and specific physical activity recommendations; and the socio-cultural barriers that emerged as a unique feature in this community need to be overcome through information dissemination strategies via media and raising a social capital for physical activity promotion.

The importance of access to exercise facilities as elicited in this study suggests that the Latin American style strategy of utilizing “the public space" might be effective

in India as well. There appears to be a good fit due to the issues of security, limited open space and social capital, but existing cultural norms about physical activity and gender roles in South India may make this a challenging adaptation.

Simultaneous uses of multiple strategies are required to promote physical activity among women. Mass media could be used to provide health promotion messages to address the myths on physical activity and adequate quantity of physical activity. Health personnel's could also be trained in advocating on physical activity on every visit so as to improve the awareness levels in the community on the need for physical activity. High political commitment with mobilization of resources are required for addressing "physical inactivity" described as a "global pandemic" in a lancet series on physical activity. There are no national policies or guidelines set for physical activity promotion in India. Although the National Program for Prevention and Control of Cancer, Diabetes, Cardiovascular Disease and Stroke is implemented in the Thiruvananthapuram City and the State of Kerala the program implementation largely focuses on NCD detection and treatment. It is imperative to bring in health promotion and preventive efforts including physical activity under the national program.

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ANNEXURE

A. List of Publications from the thesis

1. Elezebeth Mathews, J K Lakshmi, TK Sundari Ravindran, Michael Pratt, K R Thankappan.(2015) Perceptions of barriers and facilitators in physical activity participation among women in Thiruvananthapuram city, India. Global Health Promotion. 1757-9759; Vol 0(0): 1–10; 573878

2. Elezebeth Mathews, Michael Pratt, Jissa VT, Thankappan KR.(2015) Self-reported physical activity and its correlates among adult women in the expanded part o Thiruvananthapuram City, India. Indian J Public Health; 59: 136-40

B. Curriculum Vitae

Educational Qualification

- **Master of Public Health |** 2007-2008

Achutha Menon Centre for Health Science Studies, Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum, Kerala, India.

✓ Cumulative grade point average was 4.13 out of 5 (82.6%)

✓ **Dissertation:** Non-communicable disease risk factors among the disabled in South Kerala

- **Bachelor of Science in Nursing |** 1999-2003

Christian Medical College, Vellore, a center of excellence in medicine, nursing and allied health professions, WHO collaborating center for nursing and midwifery.

✓ Four year aggregate marks- 76.5%

Awards and Scholarships

- Recipient of cash award and certificate of merit for the best paper award at the Scientific Meet held on March 15th,2014 at Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum
- Recipient of DAAD funded scholarship at the Department of Epidemiology & International Public Health, University of Bielefeld, Germany from 30th September 2013 to 31st December, 2013.
- Fellowship from Asian Collaboration for Excellence in Non-communicable disease research (ASCEND), a D43 training program by Fogarty International Center, National Institutes of Health, USA from June 2011-December 2012.

- Recipient of the Young Scientist Award for the Best Paper presentation in the 6th Kerala Environment Congress 2010.

- Recipient of mini grant from Global peers for progress foundation for doctoral research.

- Recipient of travel grant from Centre for Disease Control and Prevention, Atlanta, US for paper presentation at the 4th International Conference on Physical activity and Public health Conference "Active Futures – Evidence Informing Change" on "Correlates of physical activity among sedentary women in South India" held from October 31-November 3, 2012 at Sydney, Australia.

Publications

1. Thirunavukkarasu Sathish, Emily D Williams, Naanki Pasricha, Pilvikki Absetz, Paula Lorgelly, Rory Wolfe, **Elezebeth Mathews,** Zahra Aziz, Kavumpurathu Raman Thankappan, Paul Zimmet, Edwin Fisher, Robyn Tapp, Bruce Hollingsworth, Ajay Mahal, Jonathan Shaw, Damien Jolley, Meena Daivadanam , Brian Oldenburg (2013) Cluster randomised controlled trial of a peer-led lifestyle intervention program: study protocol for the Kerala Diabetes Prevention Program. BMC Public Health; 13:1035. doi: 10.1186/1471-2458-13-1035.[Accessed on June 11th 2014]

2. Patra L, Mini GK, **Mathews E**, Thankappan KR (2013) Doctors' self-reported physical activity, their counseling practices and their correlates in urban Trivandrum, South India: should a full-service doctor be a physically active doctor? Br J Sports Med 14 June 2013. doi: 10.1136/bjsports-2012-091995[Accessed on September 6,2013].

3. Daivadanam M, Absetz P, Sathish S, Thankappan KR, Fisher ED, Philip NE, **Mathews E**, Oldenburg B (2013) Lifestyle change in Kerala, India: Needs assessment and planning for a community-based diabetes prevention trial. BMC

Public Health; 13:95.doi: 10.1186/1471-2458-13-95.[Accessed on 14th June 2014]

Conferences attended

- 6th Environmental Congress 2010. Oral presentation on "Health hazards among Solid waste workers of Thiruvananthapuram District, Kerala" and subsequently awarded "Young Scientist award" for the best paper presentation.
- 8th Annual Oxford Health Alliance Summit on 'Chronic epidemic disease: from raising awareness to driving change' in April 2011 held at Keble College, Oxford, UK.
- 5th Annual NIH Conference on the "Science of Dissemination and Implementation: Research at the Crossroads" in March 19-20, 2012 at Maryland, USA.
- Presented at the 4th International Congress on Physical Activity and Public Health Conference "Active Futures – Evidence Informing Change" on "Correlates of physical activity among sedentary women in South India" held from October 31-November 3, 2012 at Sydney, Australia

Invited talks/Conference presentations

1. **Mathews E**, Sajitha B, Zahra A, Sathish T, Pasricha N, Oldenburg B, Thankappan KR and On behalf of the K-DPP research team. Cluster randomized controlled trail of a community-based diabetes prevention program: Kerala Diabetes Prevention Program (K-DPP). Poster presentation at the "7th AMREP World Health Day Forum 2013", Melbourne, Australia | 11 April 2013.

2. **Mathews E,** Pratt M, Thankappan KR. Correlates of physical activity among women in South Kerala, India at the 4th International Congress on Physical Activity and Public Health Conference "Active Futures – Evidence

Informing Change" on "Correlates of physical activity among sedentary women in South India" held from October 31-November 3, 2012 at Sydney, Australia

3. Pratt M, **Mathews E**, Sauzet O. Effect of a six month peer support based physical activity intervention trial among sedentary women in South Kerala presented at the 5th International Congress on physical activity and public health held between April 8-11, 2014 at Rio de Janeiro, Brazil

A. Appendices

Appendix 1: Informed Consent for the Intervention Group

Achutha Menon Centre For Health Science Studies,

Sree Chitra Tirunal Institute for Medical Sciences and Technology,Trivandrum

Greetings to you.

I am Elezebeth Mathews, currently doing my doctoral study at Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum. As a part of my study, I am doing a research project on the "Peer support Interventions to promote physical activity among sedentary women in South Kerala". Please read through the information given below and state your willingness in participating in this study.

PARTICIPANT INFORMATION

1. **Invitation to the study.**

You have been invited to take part in a research study. This form tells you about the study "Peer support interventions to promote physical activity among sedentary women in South Kerala". Please take time to read this information carefully and decide whether or not you wish to participate in this study

2. **What is the purpose of the study?**

Chronic diseases such as diabetes mellitus, hypertension and stroke are on the rise in our population and physical inactivity has been found to be an independent risk factor for the development of these chronic conditions. Nearly 47% of women in Kerala have abdominal obesity, with rising prevalence of diabetes and hypertension. In this context it is important to develop culturally appropriate interventions to promote physical activity among women. This study is to assess the effectiveness of community based peer support physical activity interventions among women in South Kerala.

3. **Do you have to take part?**

Your participation in the study is fully voluntary and have the choice to decide whether or not to

take part in this study. If you decide to participate, you will have to sign the consent form with date and have a copy of that for future reference on the study

details and personal contacts. You are free to withdraw from the study at any point of time if you are uncomfortable and this will not affect your life in any way.

4. What will happen to you if you take part in the study and what do you have to do?

If you take part in the study, you will be asked to answer to questions pertaining to your current physical activity, factors affecting it and regarding your health conditions. Your physical measurements such as height, weight and waist circumference will be measured by trained female volunteers. If you are found to be physically inactive to the level of increased risk to the development of chronic diseases, you will be enrolled to an intervention for a period of one year. The intervention involves counseling in a group on the importance of physical activity, recommended levels of activity and ways to achieve the level of physical activity for health benefits. These group counseling sessions will be organized in a time and place convenient for you. After the group counseling you can decide on a strategy which is acceptable and convenient for you, to achieve the recommended level of physical activity with the support of the investigator. A volunteer will assist you in facilitating the achievement of the goal that is set up by you. Nobody will force you to carry out these activities and it is fully at your will and convenience. You will be invited to attend meetings near to your house, twice a month initially for three months by the volunteer who would help you to identify the barriers/ facilitators in doing those activities and will constantly provide you support along with other group members in achieving your goal. You can either choose to do an activity alone or with your group members or anybody whom you wish to do with. You also have the right to withdraw from the study at any stage. Your physical activity pattern will be assessed at fourth, seventh and thirteenth month of intervention by some other trained volunteer.

5. What are the possible disadvantages and risks?

There is no possible risk or disadvantage for you except spending some time of yours for answering the questions and taking part in the survey and counseling sessions.

6. What are possible benefits of taking part?

As it is a behavioural change intervention to promote physical activity among those of you, who are not currently active to the recommended levels, participation in the intervention will support you in overcoming the barriers and facilitate you in being active according to your choice and convenience. This would help you to prevent getting chronic diseases such as diabetes/hypertension to a greater extend or help you to get it controlled if you already have it.

7. Will your participation in this study be kept confidential?

Yes, all the information collected from you will be kept strictly confidential and stored in a computerized file. It will be used for the research study only after making your details anonymous. Your identity will never be disclosed and results will always be anonymous. The community volunteers who collect the data will be strictly reinforced on the confidentiality of the information.

7. What will happen to the results of the research study?

The results from the trial will be published in medical journal and will be communicated to the local community. Under no circumstances will your personal details be used.

8. **Contact for further information**

Should you have any other question, please do not hesitate to contact the following persons:

1. Ms Elezebeth Mathews, PhD Scholar , Achutha Menon Centre For Health Science Studies,

Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum

Telephone-09495221707, E-mail: elezebethmathews@gmail.com

2. Dr K R Thankappan, Professor and Head, Achutha Menon Centre For Health Science Studies,

Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum.

Email: thank@sctimst.ac.in

3. Dr Anoop Kumar Thekkeveetil, Member Secretary, Institutional Ethics Committee, Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum.

Phone number: 0471- 2520256 (office)

9. Please tick your response

☐ Yes, I am willing to participate in the above mentioned study

☐ No, I am not willing to take part in the above mentioned study

Signature of the participant……..

Date ……

Appendix 2- Informed Consent for the Control Group

Achutha Menon Centre For Health Science Studies,

Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum

Greetings to you.

I am Elezebeth Mathews, currently doing my doctoral study at Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum. As a part of my study, I am doing a research project on the "Peer support Interventions to promote physical activity among sedentary women in South Kerala". Please read through the information given below and state your willingness in participating in this study.

PARTICIPANT INFORMATION

1. Invitation to the study.

You have been invited to take part in a research study. This form tells you about the study "Peer support interventions to promote physical activity among sedentary women in South Kerala". Please take time to read this information carefully and decide whether or not you wish to participate in this study

2. What is the purpose of the study?

Chronic diseases such as diabetes mellitus, hypertension and stroke are on the rise in our population and physical inactivity has been found to be an independent risk factor for the development of these chronic conditions. Nearly 47% of women in Kerala have abdominal obesity, with rising prevalence of diabetes and hypertension. In this context it is important to develop culturally appropriate interventions to promote physical activity among women. This study is to assess the effectiveness of community based peer support physical activity interventions among women in South Kerala.

3. Do you have to take part?

Your participation in the study is fully voluntary and has the choice to decide whether or not to take part in this study. If you decide to participate, you will have to sign the consent form with date and have a copy of that for future reference on

the study details and personal contacts. You are free to withdraw from the study at any point of time if you are uncomfortable and this will not affect your life in any way.

4. What will happen to you if you take part in the study and what do you have to do?

If you take part in the study, you will be asked to answer to questions pertaining to your current physical activity, factors affecting it and regarding your health conditions. Your physical measurements such as height, weight and waist circumference will be measured by trained female volunteers. Your physical activity pattern will be assessed at fourth, seventh and thirteenth month of intervention by some other trained volunteer. You will also be given information booklet on benefits of being active and ways to be active.

5. What are the possible disadvantages and risks?

There is no possible risk or disadvantage for you except spending some time of yours for answering the questions and taking part in the survey.

6. What are possible benefits of taking part?

The information that you get in participating in this study would motivate you increasing your activity which would help you to prevent getting chronic diseases such as Diabetes/hypertension to a greater extend or help you to get it controlled if you already have it.

7. Will your participation in this study be kept confidential?

Yes, all the information collected from you will be kept strictly confidential and stored in a computerized file .It will be used for the research study only after making your details anonymous. Your identity will never be disclosed and results will always be anonymous. The community volunteers who collect the data will be strictly reinforced on the confidentiality of the information.

8. **What will happen to the results of the research study?**

The results from the trial will be published in medical journal and will be communicated to the local community. Under no circumstances will your personal details be used.

9. **Contact for further information**

Should you have any other question, please do not hesitate to contact me or my supervisor:

1. Ms Elezebeth Mathews, PhD Scholar , Achutha Menon Centre For Health Science Studies, Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum,Telephone-09495221707, E-mail: elezebethmathews@gmail.com
2. Dr K R Thankappan, Professor and Head, Achutha Menon Centre for Health Science Studies, Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum. Email: thank@sctimst.ac.in
3. Dr Anoop Kumar Thekkeveetil, Member Secretary, Institutional Ethics Committee, Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum, Phone number: 0471- 2520256 (office).

10. Please tick your response

☐ Yes, I am willing to participate in the above mentioned study

☐ No, I am not willing to take part in the above mentioned study

Signature of the participant……..

Date ……

Appendix 3 – Interview schedule for the cross sectional survey

(Instruction to the interviewer: Please ask the questions carefully and fill up the boxes appropriately)

SECTION 1: DEMOGRAPHIC DETAILS

1.1	Age (in completed years)	
1.2	Sex	Male ☐ Female ☐
1.3	Complete Residential Address	
1.4	Ward Name	
1.5	Contact Phone Number	Mobile : Landline:
1.6	Number of years of schooling	……..
1.7		No formal schooling 1 Less than 7th std 2 7th std completed 3 8th to 10th std completed 4 Plus 2/pre degree completed 5 ☐

		Graduation completed	6
		Post graduation completed	7
		Technical	8
		Professional	9
		Others (specify)	10……

1.8	What is occupat…	Professional/Big business	1
		Clerical/Medium business	2
		Self-employed/Skilled	3
		Coolie/Unskilled	4
		Student	5
		Home maker/House wife	6
		Retired	7
		Unemployed (able to work)	8
		Unemployed (unable to work)	9
		Others (specify)	10……
1.9	What is your marital status?	Married	1
		Unmarried	2
		Separated/Divorced	3
		Widowed	4
		Living together	5

SECTION 2 (FACTORS INFLUENCING PHYSICAL ACTIVITY AT INDIVIDUAL LEVEL)

2.1 How would you describe your weight?

1. Normal weight 2. Overweight

3. Obese 4. Underweight

2.2. How would your assess your present state of health?

1 ☐ Very Poor
2 ☐ Poor
3 ☐ Average
4 ☐ Good
5 ☐ Very Good
6 ☐ Excellent

2.3. How physically active do you consider yourself to be?

1. Very active 2. Moderately active

3. Less active 4. Not active at all

2.4 Do you have any physical disability that restricts you from physical activity?

1. Yes 2. No

2.5 Do you have an experience in participating in sports in the past?

1. Yes 2. No

2.6. Do you think it is important to get exercise apart from your day today activities?

1. Very important 2. Somewhat important

3. Not important 4. Don't know

2.7. Do you know how much exercise one should get every day?

1. Yes 2. No If No, go to 2.9

2.8 If yes, what is the amount of Physical activity required for adults to get health benefits?

1. 10 minutes of walking everyday
2. 15 minutes of walking everyday on at least 3days a week
3. 30 minutes of brisk walking everyday on at least 5days a week
4. Don't know/Not sure

2.9. Do you have any history of the following illness in your family or personally? (You may tick more than one)

Sl no	Diseases	Personal History	Family History
1	Diabetes		
2	High blood pressure		
3	Heart diseases		
4	Asthma		
5	Dyslipidemia		
6	Arthritis		
7	Any other chronic conditions (Please specify)		

2.10. Does any of the disease conditions mentioned above restricts you from being active?

1. Yes 2. No

2.11 Do you think physical activity has a role in preventing the following chronic conditions?

Chronic diseases	Strongly agree	Agree	Disagree	Strongly disagree	Don't know/not sure
1. Diabetes					
2. Hypertension					
3. Stroke					

4. Coronary heart disease					
5. Arthritis					
6. Breast cancer					
7. Colon cancer					

2.12. Do you think physical activity has a role in controlling the disease and preventing progression of the diseases to complications?

Chronic diseases	Strongly agree	Agree	Disagree	Strongly disagree	Don't know/not sure
1. Diabetes					
2. Hypertension					
3. Stroke					
4. Coronary heart disease					
5. Arthritis					

2.13. Have you ever known the benefits of walking or doing exercise?

1. Yes 2. No (If No, go to 2.15)

2.14 What was the source of information on the benefits of physical activity?

1. Health professional 2. Television

3. Newspaper 4. Friends/relatives

5. If others. Please specify…….

2.15. Have you ever been informed on the benefits of physical activity in preventing chronic diseases namely Diabetes, Hypertension, Heart disease by a health professional?

1. Yes 2. No

2.16. Please put a check (√) in one of the boxes to the right of each item that best matches how you feel. How confident are you that you could exercise in each of the following situations…

How confident are you that you could exercise in each of the following situations…	(1) Not at all Confident	(2) Slightly Confident	(3) Moderately Confident	(4) Very Confident	(5) Extremely Confident
1. When I am tired.					
2. When I am in a bad mood.					
3. When I feel I do not have time.					
4. When I am on vacation.					
5. When it is raining.					

2.17 Exercise decisional balance: Please put a check (√) in one of the boxes to the right of each item that best matches your opinion.

Questions	**Strongly disagree**	**Somewhat disagree**	**Neither agree nor disagree**	**Somewhat agree**	**Strongly agree**	**Don't know/ Not sure**
1. I would have more energy for my family and friends if I exercised regularly.						
2. Regular exercise would help me relieve tension.						
3. I think I would be too tired to do my daily work after exercising.						
4. I would feel more						

confident if I exercised regularly.						
5. I would sleep more soundly if I exercised regularly.						
6. I would feel good about myself if I kept my commitment to exercise regularly.						
7. I would find it difficult to find an exercise activity that I enjoy that is not affected by bad weather.						
8. I would like my body better if I exercised regularly.						
9. It would be easier for me to perform routine physical tasks if I exercised regularly.						

10. I would feel less stressed if I exercised regularly.						
11. I feel uncomfortable when I exercise because I get out of breath and my heart beats very fast.						
12. I would feel more comfortable with my body if I exercised regularly.						
13. Regular exercise would take too much of my time.						
14. Regular exercise would help me have a more positive outlook on life.						
15. I would have less time for my family and friends if I exercised regularly.						
16. At the end of the day, I am too exhausted to exercise.						

2.18 Do you consciously make an effort to exercise in addition to your routine household activities?

1. Yes 2. No

2.19 What are the barriers that you face in doing regular physical activity/exercise apart from your work/household chores? Please tick the appropriate box. ☐

Lack of time ☐	People make fun of me ☐
Lack of interest and enjoyment of activity ☐	Child care responsibility ☐
Lack of support from family/spouse ☐	I do not have skills to do exercise ☐
Do not know what to do for exercise ☐	I do not have energy to do any activity ☐
I do not have anybody with me ☐	Any other ☐ Please specify……
Lack of safe place for walking ☐	I do not have any of these barriers ☐

2.20 What are the facilitators for doing exercise or being active?

Support from family/spouse ☐	Exercising member in the family ☐
Support from friends/neighbours ☐	Past participation in the sports ☐
Presence of Diabetes/hypertension ☐	Knowledge on the benefits of physical activity ☐
Advice from health professional ☐	I feel confident to exercise ☐
Family member having any chronic conditions ☐	Any other ☐ Please specify……

SECTION 3: Factors influencing physical activity at Family level and community level

3.1 Does your spouse support you to do exercise in your leisure time?

1. Yes 2. No

3.2 Is your neighborhood safe to walk in terms of traffic interference?

1. Safe 2. Unsafe

3.3 Is your neighborhood safe to walk in terms of crime rates?

1. Yes 2. No

3.4. Is there sidewalks available in your streets for walking?

1. Yes 2. No If yes 3.5, If no, go to 3.6

3.5. Is your sidewalks of good quality?

1. Bad sidewalk 2. Good sidewalk

3.6. Is your neighbourhood aesthetically good for walking?

1. Pleasant 2.Not pleasant

3.7 Do you have any access to health clubs or gyms for leisure time exercise?

1. Yes 2. No

3.8 What are the facilitators at community level to do exercise? Please tick the appropriate box

Code	Facilitators	Yes	No
3.8a	Frequent observation of others exercising		
3.8b	Safe roads		
3.8c	Exercising seen as a positive Behaviour		
3.8d	Social support from neighbours/friends		
3.8e	Access to facilities		
3.8f	Presence of sidewalks		
3.8g	Enjoyable scenery		

3.9 What are the barriers at community level to do exercise?

Code	Barriers	Yes	No
3.9a	Stray dogs		
3.9b	Heavy traffic		
3.9c	Hilly terrain		
3.9d	Poor access to facilities		
3.9e	High crime rates		
3.9f	Lack of Neighborhood safety		
3.9g	Lack of sidewalks		

PHYSICAL ACTIVITY ASSESSMENT

Instruction to the interviewer: Please ask the questions carefully and fill up the boxes appropriately)

I am going to ask you about the time you spend doing different types of physical activity in a typical week. Please answer these questions even if you do not consider yourself to be a physically active person.

At Work

Think first about the time you spend doing work. Think of work as the things that you have to do such as paid or unpaid work, study/training, household chores, harvesting food/crops, fishing or hunting for food, seeking employment. *[Insert other examples if needed].* In answering the following questions 'vigorous-intensity activities' are activities that require hard physical effort and cause large increases in breathing or heart rate, 'moderate-intensity activities' are activities that require moderate physical effort and cause small increases in breathing or heart rate.

Code	Questions	Response	
P1	Does your work involve vigorous-intensity activity that causes large increases in breathing or heart rate like *[carrying or lifting heavy loads, digging or construction work*] for at least 10 minutes continuously?	Yes ☐ No ☐	If Yes Go to P1A Else go to P2

P1A	Please note the number of days a week and time spent each day on the following activities listed below which are considered to be vigorous. Write aside only those activities that is carried out by you in a **typical week**

	Activity	**Number of days a week**	**Time spent in a day**
P1A1	Carrying, loading or stacking wood	└─┴─┘	hrs └─┴─┘: mins └─┴─┘
P1A2	Drawing water from the well and bringing water from other house	└─┴─┘	hrs └─┴─┘: mins └─┴─┘
P1A3	Laying crushed rock	└─┴─┘	hrs └─┴─┘: mins └─┴─┘
P1A4	Ural - Manual grinding	└─┴─┘	hrs └─┴─┘: mins └─┴─┘
P1A5	Pounding grains	└─┴─┘	hrs └─┴─┘: mins └─┴─┘
P1A6	Chopping wood-splitting logs	└─┴─┘	hrs └─┴─┘ :mins └─┴─┘
P1A7	Carrying heavy loads such as bricks	└─┴─┘	hrs └─┴─┘: mins └─┴─┘
P1A8	Any other…….. (Please specify)	└─┴─┘	hrs └─┴─┘: mins └─┴─┘
P1A9	Any other…….. (Please specify)	└─┴─┘	hrs └─┴─┘: mins └─┴─┘
P1A10	Any other…….. (Please specify)	└─┴─┘	hrs └─┴─┘: mins └─┴─┘

Code	Questions	Response	
P2	Does your work involve moderate-intensity activity that causes small increases in breathing or heart rate such as brisk walking *[or carrying light loads*] for at least 10 minutes continuously?	Yes ☐ No ☐	If Yes Go to P2A Else go to P3
P2A	Please note the number of days a week and time spent each day on the following activities listed below which are considered to be moderate. Write aside only those activities that is carried out by you in a **typical week**		

P2A	**Activity**	**Number of days a week**	**Time spent in a day**
P2A1	Washing clothes	⌊_⌋⌊_⌋	hrs ⌊_⌋⌊_⌋ : mins ⌊_⌋⌊_⌋
P2A2	Sweeping floor (inside or outside house)	⌊_⌋⌊_⌋	hrs ⌊_⌋⌊_⌋ : mins ⌊_⌋⌊_⌋
P2A3	Mopping floor(bend on knees and using hand)	⌊_⌋⌊_⌋	hrs ⌊_⌋⌊_⌋ : mins ⌊_⌋⌊_⌋
P2A4	Drawing and bringing water from outside tap	⌊_⌋⌊_⌋	hrs ⌊_⌋⌊_⌋ : mins ⌊_⌋⌊_⌋
P2A5	Animal care: feeding animals, washing animals ,cleaning animal house, etc)	⌊_⌋⌊_⌋	hrs ⌊_⌋⌊_⌋ : mins ⌊_⌋⌊_⌋
P2A6	Walking to bring grass, leaves, etc for feeding animals	⌊_⌋⌊_⌋	hrs ⌊_⌋⌊_⌋ : mins ⌊_⌋⌊_⌋
P2A7	Milking cow	⌊_⌋⌊_⌋	hrs ⌊_⌋⌊_⌋ : mins ⌊_⌋⌊_⌋
P2A8	Gardening: watering plants, pruning, sowing seeds, cleaning, etc	⌊_⌋⌊_⌋	hrs ⌊_⌋⌊_⌋ : mins ⌊_⌋⌊_⌋

P2A9	Patient and elderly care	└─┴─┘	hrs └─┴─┘ : mins └─┴─┘
P2A10	Tailoring	└─┴─┘	hrs └─┴─┘ : mins └─┴─┘
P2A11	Child care-standing, dressing, bathing, grooming, feeding and occasional lifting of the child	└─┴─┘	hrs └─┴─┘ : mins └─┴─┘
P2A12	Multiple household task all at once-vigorous effort	└─┴─┘	hrs └─┴─┘ : mins └─┴─┘
P2A13	Sweeping the garage, sidewalk and outside the house	└─┴─┘	hrs └─┴─┘ : mins └─┴─┘
P2A14	Cooking or food preparation	└─┴─┘	hrs └─┴─┘ : mins └─┴─┘
P2A15	Shopping grocery without a grocery cart and carrying packages	└─┴─┘	hrs └─┴─┘ : mins └─┴─┘
P2A16	Any other……. (Please specify)	└─┴─┘	hrs └─┴─┘ : mins └─┴─┘
P2A17	Any other……. (Please specify)	└─┴─┘	hrs └─┴─┘ : mins └─┴─┘
P2A18	Any other……. (Please specify)	└─┴─┘	hrs └─┴─┘ : mins └─┴─┘

Travel to and from places:

The next questions exclude the physical activities at work that you have already mentioned.

Now I would like to ask you about the usual way you travel to and from places. For example to work, for shopping, to market, to place of worship. [insert other examples if needed]

Code	Questions	Response	
P3	Do you walk or use a bicycle (*pedal cycle*) for at least 10 minutes continuously to get to and from places?	Yes ☐ No ☐	If Yes go to P3A If No, go to P 4

Walking to and from places

P3A	**Activity**	**Number of days a week**	**Time spent in a day**
P3A1	To work	⌊_⌋⌊_⌋	hrs ⌊_⌋⌊_⌋ : mins ⌊_⌋⌊_⌋
P3A2	To market	⌊_⌋⌊_⌋	hrs ⌊_⌋⌊_⌋ : mins ⌊_⌋⌊_⌋
P3A3	To shops	⌊_⌋⌊_⌋	hrs ⌊_⌋⌊_⌋ : mins ⌊_⌋⌊_⌋
P3A4	To bring children from school	⌊_⌋⌊_⌋	hrs ⌊_⌋⌊_⌋ : mins ⌊_⌋⌊_⌋
P3A5	To see friends, relatives or others	⌊_⌋⌊_⌋	hrs ⌊_⌋⌊_⌋ : mins ⌊_⌋⌊_⌋
P3A6	To temple or church	⌊_⌋⌊_⌋	hrs ⌊_⌋⌊_⌋ : mins ⌊_⌋⌊_⌋
P3A7	Any other…… (Please specify)	⌊_⌋⌊_⌋	hrs ⌊_⌋⌊_⌋ : mins ⌊_⌋⌊_⌋
P3B	**Bicycling from and to places**		
P3B1	To work	⌊_⌋⌊_⌋	hrs ⌊_⌋⌊_⌋ : mins ⌊_⌋⌊_⌋
P3B2	To market/shops	⌊_⌋⌊_⌋	hrs ⌊_⌋⌊_⌋ : mins ⌊_⌋⌊_⌋
P3B3	Any other…… (Please specify)	⌊_⌋⌊_⌋	hrs ⌊_⌋⌊_⌋ : mins ⌊_⌋⌊_⌋
P3B4	Any other…… (Please specify)	⌊_⌋⌊_⌋	hrs ⌊_⌋⌊_⌋ : mins ⌊_⌋⌊_⌋

Recreational activities

The next questions exclude the work and transport activities that you have already mentioned.

Now I would like to ask you about sports, fitness and recreational activities (leisure)

P4	Do you do any vigorous-intensity sports, fitness or recreational (*leisure*) activities that cause large increases in breathing or heart rate like [*running or football, badminton,]* for at least 10 minutes continuously?	Yes ☐ No ☐	If Yes go to P5 If No, go to P7
P5	In a typical week, on how many days do you do vigorous-intensity sports, fitness or recreational (*leisure*) activities?	Number of days ⌊__⌋	
P6	How much time do you spend doing vigorous-intensity sports, fitness or recreational activities on a typical day?	Hours : minutes ⌊__⌋⌊__⌋ : ⌊__⌋⌊__⌋ hrs mins	
P7	Do you do any moderate-intensity sports, fitness or recreational (leisure) activities that causes a small increase in breathing or heart rate such as brisk walking, cycling, swimming, volleyball for at least 10 minutes continuously?	Yes ☐ No ☐	If Yes go to P8 If No go to P10
P8	In a typical week, on how many days do you do moderate-intensity sports, fitness or recreational (leisure) activities	Number of days ⌊__⌋	
P9	How much time do you spend doing moderate-intensity sports, fitness or recreational (leisure) activities on a typical day?	Hours : minutes ⌊__⌋⌊__⌋ : ⌊__⌋⌊__⌋ hrs mins	

Sedentary Behaviour: The following question is about sitting or reclining at work, at home, getting to and from places, or with friends including time spent [sitting at a desk, sitting with friends, travelling in car, bus, train, reading, playing cards or watching television], but do not include time spent sleeping.		
P10	How much time do you usually spend sitting or reclining on a typical day?	Hours : minutes ⌊__⌋⌊__⌋ : ⌊__⌋⌊__⌋ hrs mins

P11	How many hours do you sleep on average during night?	Hours : minutes ⌊__⌋⌊__⌋ : ⌊__⌋⌊__⌋ hrs min

Appendix 4- Interview Schedule for intervention assessment at base line, fourth, seventh and thirteenth month of intervention

(Instruction to the interviewer: Please ask the questions carefully based on the stage of the intervention and fill up the boxes appropriately)

SECTION A: BASELINE DATA (BEFORE COMMENCEMENT OF THE INTERVENTION)

A1 Exercise Stages of Change: This is a survey on your attitudes and interest about physical activity. As you read each question, think about the recent past. This is not a test. There are no wrong answers. For these questions, think about how you usually do things.

For each statement, please put a check (√) in one of the boxes to the right that best matches what you have done or think you will do.

QUESTIONS	YES	NO
1. I currently exercise.	☐	☐
2. I intend to exercise in the next 6 months.	☐	☐
3. I currently exercise regularly.	☐	☐
4. I have exercised regularly for the past 6 months.	☐	☐
5. I have exercised regularly in the past for a period of at least 3 months.	☐	☐

A2 ANTHROPOMETRIC ASSESSMENT

Code	Measurements	
A1	Height	___ ___ ___Centimeters
A2	Weight	___ ___ ___Kilograms
A3	Waist circumference	___ ___ ___Centimeters

SECTION B: AT FOURTH MONTH OF THE INTERVENTIONS

B1 STAGES OF CHANGE: This is a survey on your attitudes and interest about physical activity. As you read each question, think about the recent past. This is not a test. There are no wrong answers. For these questions, think about how you usually do things.

For each statement, please put a check (√) in one of the boxes to the right that best matches what you have done or think you will do.

QUESTIONS **YES** **NO**

1. I currently exercise. ☐ ☐

2. I intend to exercise in the next 6 months. ☐ ☐

3. I currently exercise regularly. ☐ ☐

4. I have exercised regularly for the past 6 months. ☐ ☐

5. I have exercised regularly in the past for a period of at least 3 months. ☐ ☐

B2**.** In a usual week, what are the activities that you chose to do in order to get the recommended levels of physical activity. Please tick the appropriate box

Code	Activities	Chose to do(Please tick the option)	Number of weeks :months done	Any gaps in between	Comments
B2a	Brisk Walking (5mph) for a minimum of 15 minutes on 5 days a week	☐			
B2b	Walking with moderate speed(3mph) without carrying anything for 30 minutes on 5 days a week	☐			
B2c	Bicycling at <10 mph for 25 minutes on 5 days a week	☐			
B2d	Stationary bicycling with light effort for 20 minutes on 5 days a week	☐			
B2e	Sweeping the floor for 20 minutes and mopping the floor for 20 minutes on 3 days a week	☐			
B2f	Playing noncompetitive badminton in singles or doubles for one hour on 2days a week	☐			
B2g	Climbing up and down stairs at home for 25 minutes for 5 days a week	☐			
B2h	Aerobic dancing (6-8 inch step) for 20 minutes for 3 days a week	☐			

B2i	I do not do anything	☐			
B2j	Any other. Please specify…… ….	☐			

B3. What were the facilitators for carrying out the specified activity mentioned above?

Support from family/spouse ☐	Exercising member in the family ☐
Support from friends/neighbours ☐	Past participation in the sports ☐
Presence of Diabetes/hypertension ☐	Knowledge on the benefits of physical activity ☐
Advice from health professional ☐	I feel confident to exercise ☐
Family member having any chronic conditions ☐	Any other ☐ Please specify…… …

B4. What were the barriers for carrying out the specified activity mentioned above?

Lack of time ☐	People make fun of me ☐
Lack of interest and enjoyment of activity ☐	Child care responsibility ☐
Lack of support from family/spouse ☐	I do not have skills to do exercise ☐
Do not know what to do for exercise	I do not have energy to do any activity

☐	☐
I do not have anybody with me ☐	I do not have any of these barriers ☐
Lack of safe place for walking ☐	Any other Please specify…… ☐

B5. What aspects in the interventions motivated you the most take up activity?

Interventions	(1) Not at all Important	(2) Slightly Important	(3) Moderately Important	(4) Very Important	(5) Extremely Important
Peer supporters					
Group counseling					
Social support from family					
Social support from neighbours					
Being a part of the group					
Information booklet					

SECTION C: AT SEVENTH MONTH OF THE INTERVENTION

C1. STAGES OF CHANGE: This is a survey on your attitudes and interest about physical activity. As you read each question, think about the recent past. This is not a test. There are no wrong answers. For these questions, think about how you usually do things.

For each statement, please put a check (√) in one of the boxes to the right that best matches what you have done or think you will do.

QUESTIONS **YES** **NO**

1. I currently exercise. ☐ ☐

2. I intend to exercise in the next 6 months. ☐ ☐

3. I currently exercise regularly. ☐ ☐

4. I have exercised regularly for the past 6 months. ☐ ☐

5. I have exercised regularly in the past for a period of at least 3 months. ☐ ☐

C2. In a usual week, what are the activities that you chose to do in order to get the recommended levels of physical activity. Please tick the appropriate box

Code	Activities	Chose to do(Please tick the option)	Number of weeks :months done	Any gaps in between	Comments
C2a	Brisk Walking (5mph) for a minimum of 15 minutes on 5 days a week	☐			
C2b	Walking with moderate speed(3mph) without carrying anything for 30 minutes on 5 days a week	☐			

C2c	Bicycling at <10 mph for 25 minutes on 5 days a week	☐			
C2d	Stationary bicycling with light effort for 20 minutes on 5 days a week	☐			
C2e	Sweeping the floor for 20 minutes and mopping the floor for 20 minutes on 3 days a week	☐			
C2f	Playing noncompetitive badminton in singles or doubles for one hour on 2days a week	☐			
C2g	Climbing up and down stairs at home for 25 minutes for 5 days a week	☐			
C2h	Aerobic dancing (6-8 inch step) for 20 minutes for 3 days a week	☐			
C2i	I do not do anything	☐			
C2j	Any other. Please specify……	☐			

C3. What were the facilitators for carrying out the specified activity mentioned above?

Support from family/spouse ☐	Exercising member in the family ☐
Support from friends/neighbours ☐	Past participation in the sports ☐
Presence of Diabetes/hypertension ☐	Knowledge on the benefits of physical activity ☐

Advice from health professional ☐	I feel confident to exercise ☐
Family member having any chronic conditions ☐	Any other ☐ Please specify……

C4. What were the barriers for carrying out the specified activity mentioned above?

Lack of time ☐	People make fun of me ☐
Lack of interest and enjoyment of activity ☐	Child care responsibility ☐
Lack of support from family/spouse ☐	I do not have skills to do exercise ☐
Do not know what to do for exercise ☐	I do not have energy to do any activity ☐
I do not have anybody with me ☐	I do not have any of these barriers ☐
Lack of safe place for walking ☐	Any other ☐ Please specify……

C5. What aspects in the interventions motivated you the most take up activity?

Interventions	(1) Not at all Important	(2) Slightly Important	(3) Moderately Important	(4) Very Important	(5) Extremely Important
Peer supporters					
Group counseling					
Social support					

from family					
Social support from neighbours					
Information booklet					

SECTION D: POST INTERVENTION: AT THIRTEENTH MONTH

D1. STAGES OF CHANGE: This is a survey on your attitudes and interest about physical activity. As you read each question, think about the recent past. This is not a test. There are no wrong answers. For these questions, think about how you usually do things.

For each statement, please put a check (√) in one of the boxes to the right that best matches what you have done or think you will do.

QUESTIONS **YES** **NO**

1. I currently exercise. ☐ ☐

2. I intend to exercise in the next 6 months. ☐ ☐

3. I currently exercise regularly. ☐ ☐

4. I have exercised regularly for the past 6 months. ☐ ☐

5. I have exercised regularly in the past for a period of at least 3 months. ☐ ☐

D2. In a usual week, what are the activities that you chose to do in order to get the recommended levels of physical activity. Please tick the appropriate box

Code	Activities	Chose to do(Please tick the option)	Number of weeks :months done	Any gaps in between	Comments
D2a	Brisk Walking (5mph) for a minimum of 15 minutes on 5 days a week	☐			
D2b	Walking with moderate speed(3mph) without carrying anything for 30 minutes on 5 days a week	☐			
D2c	Bicycling at <10 mph for 25 minutes on 5 days a week	☐			
D2d	Stationary bicycling with light effort for 20 minutes on 5 days a week	☐			
D2e	Sweeping the floor for 20 minutes and mopping the floor for 20 minutes on 3 days a week	☐			
D2f	Playing noncompetitive badminton in singles or doubles for one hour on 2days a week	☐			
D2g	Climbing up and down stairs at home for 25 minutes for 5 days a week	☐			
D2h	Aerobic dancing (6-8 inch step) for 20 minutes for 3 days a week	☐			

D2i	I do not do anything	☐			
D2j	Any other. Please specify…… ….	☐			

D3. What were the facilitators for carrying out the specified activity mentioned above?

Support from family/spouse ☐	Exercising member in the family ☐
Support from friends/neighbours ☐	Past participation in the sports ☐
Presence of Diabetes/hypertension ☐	Knowledge on the benefits of physical activity ☐
Advice from health professional ☐	I feel confident to exercise ☐
Family member having any chronic conditions ☐	Any other ☐ Please specify…… …

D4. What were the barriers for carrying out the specified activity mentioned above?

Lack of time ☐	People make fun of me ☐
Lack of interest and enjoyment of activity ☐	Child care responsibility ☐
Lack of support from family/spouse ☐	I do not have skills to do exercise ☐
Do not know what to do for exercise	I do not have energy to do any activity

☐	☐
I do not have anybody with me ☐	I do not have any of these barriers ☐
Lack of safe place for walking ☐	Any other Please specify…… ☐

D5 Exercise decisional balance: Please put a check (√) in one of the boxes to the right of each item that best matches your opinion.

Questions	**Strongly disagree**	**Somewhat disagree**	**Neither agree nor disagree**	**Some what agree**	**Strongly agree**	**Don't know/ Not sure**
1. I would have more energy for my family and friends if I exercised regularly.						
2. Regular exercise would help me relieve tension.						
3. I think I would be too tired to do my daily work after exercising.						
4. I would feel more confident if I exercised regularly.						
5. I would sleep more soundly if I exercised regularly.						
6. I would feel good about myself if I kept my commitment to exercise regularly.						
7. I would find it difficult to find an exercise activity that I enjoy that is not affected by bad weather.						
8. I would like my body better if I exercised						

regularly.						
9. It would be easier for me to perform routine physical tasks if I exercised regularly.						

10. I would feel less stressed if I exercised regularly.						
11. I feel uncomfortable when I exercise because I get out of breath and my heart beats very fast.						
12. I would feel more comfortable with my body if I exercised regularly.						
13. Regular exercise would take too much of my time.						
14. Regular exercise would help me have a more positive outlook on life.						
15. I would have less time for my family and friends if I exercised regularly.						
16. At the end of the day, I am too exhausted to exercise.						

Appendix 5:Informed consent for the intervention group (Malayalam)

Consent for the intervention group
സമ്മതപത്രം

അച്യുതമേനോൻ സെൻറർ ഫോർ ഹെൽത്ത് സയൻസ് സ്റ്റഡീസ്

ശ്രീ ചിത്ര തിരുന്നാൾ ഇൻസ്റ്റിറ്റ്യൂട്ട് ഫോർ മെഡിക്കൾ സയൻസസ് ആൻഡ് ടെക്നോളജി, തിരുവനന്തപുരം

നിങ്ങൾക്ക് നമസ്ക്കാരം

ഞാൻ എലിസബത്ത് മാത്യൂസ്, തിരുവനന്തപുരത്തെ ശ്രീ ചിത്തിരതിരുന്നാൾ ഇൻസ്റ്റിറ്റ്യൂട്ട് ഫോർ മെഡിക്കൽ സയൻസസ് ആൻറ് ടെക്നോളജിയിൽ ഇപ്പോൾ ഡോക്ടറേറ്റ് വിദ്യാർത്ഥിനിയാണ്. എന്റെ പഠനത്തിന്റെ ഭാഗമായി "സ്ത്രീകളുടെ ഇടയിൽ വ്യായാമം വർധിപ്പിക്കുന്നതിനുള്ള ആരോഗ്യ ഇടപെടലുകൾ" ഗവേഷണം ചെയ്യുകയാണ്. ദയവായി താഴെ കൊടുത്തിട്ടുള്ള വിവരങ്ങൾ മുഴുവനും വായിക്കുകയും ഈ പഠനത്തിൽ പങ്കെടുക്കുന്നതിനുള്ള താത്പര്യം അറിയിക്കുകയും ചെയ്യുക.

പങ്കെടുക്കുന്നവർ അറിയേണ്ടവ

1. പഠനത്തിലേക്കുള്ള ക്ഷണം

ഒരു ഗവേഷണ പഠനത്തിൽ പങ്കെടുക്കുന്നതിന് നിങ്ങളെ ക്ഷണിക്കുകയാണ്. "സ്ത്രീകളുടെ ഇടയിൽ വ്യായാമം വർധിപ്പിക്കുന്നതിനുള്ള ആരോഗ്യ ഇടപെടലുകൾ" എന്ന പഠനത്തെക്കുറിച്ച് ഈ പത്രിക നിങ്ങളെ അറിയിക്കും. ദയവായി ഈ കുറിപ്പ് ശ്രദ്ധയോടെ കൂടെ സമയമെടുത്ത് വായിച്ച ശേഷം ഈ പഠനത്തിൽ പങ്കെടുക്കാൻ നിങ്ങൾക്ക് ആഗ്രഹമുണ്ടോ ഇല്ലയോ എന്ന് തീരുമാനിക്കുക.

2. ഈ പഠനത്തിന്റെ ഉദ്ദേശ്യം എന്താണ്?

ദീർഘസ്ഥായി രോഗങ്ങളായ പ്രമേഹം, ഉയർന്ന രക്തസമ്മർദ്ദം, പക്ഷാഘാതം എന്നീ രോഗങ്ങൾ സമൂഹത്തിൽ വർദ്ധിച്ചു വരികയാണ്. മേൽപ്പറഞ്ഞ രോഗങ്ങളുടെ മുഖ്യ കാരണം ശാരീരിക വ്യായാമക്കുറവാണ്.

കേരളത്തിലെ ഏതാണ്ട് 47 ശതമാനം സ്ത്രീകളിലും അമിതവണ്ണം ഉണ്ട്. ഈ സന്ദർഭത്തിൽ സ്ത്രീകളിൽ ശാരീരിക വ്യായാമം മെച്ചപ്പെടുത്തുന്നതിന്, നമ്മുടെ സാഹചര്യത്തിനനുകൂലമായ ഉപാധികൾ കണ്ടുപിടിക്കേണ്ടത് അത്യാവശ്യമാണ് .

ക്ഷണിക്കും. നിങ്ങളുടെ ലക്ഷ്യം പ്രാപിക്കുന്നതിനു വേണ്ടി മറ്റു വോളൻറിയർമാരുമായി ചേർന്ന് നിങ്ങൾക്ക് പിന്തുണ നൽകും. നിങ്ങൾക്ക് ഒറ്റയ്ക്കോ, സംഘാംഗങ്ങളുമായി ചേർന്നോ, നിങ്ങൾക്ക് ആഗ്രഹമുള്ള മറ്റൊരാളോടൊപ്പമോ പ്രവർത്തനങ്ങൾ ചെയ്യാം. പഠനത്തിൻെറ ഏതു ഘട്ടത്തിലും പിന്മാറാനുള്ള അവകാശം നിങ്ങൾക്കുണ്ട്. വോളൻറിയർമാർ നാലാമത്തെ, ഏഴാമത്തെ, പതിമൂന്നാമത്തെ മാസങ്ങളിൽ നിങ്ങളുടെ ശാരീരിക വ്യായാമം വിലയിരുത്തും.

5. സംഭവിക്കുന്ന കോട്ടങ്ങളും അപകടങ്ങളും എന്തെല്ലാം?

ചോദ്യങ്ങൾക്ക് ഉത്തരം പറയാനും, സർവ്വേയിലും ആരോഗ്യ ഇടപെടലുകളിൽ പങ്കെടുക്കാനും അൽപം സമയം ചെലവഴിക്കണമെന്നല്ലാതെ ഒരു കോട്ടവും, അപകടവും സംഭവിക്കുകയില്ല.

6. പങ്കെടുക്കുന്നതു കൊണ്ട് സാധ്യമായ നേട്ടങ്ങൾ എന്തെല്ലാം?

നിങ്ങളിൽ ശാരീരിക വ്യായാമം മെച്ചപ്പെടുത്തുന്നതിനുള്ള ഇടപെടലുകൾ ആണ് ലഭിക്കുന്നത്. ഇത് നേടുന്നതിനുള്ള പ്രതിസന്ധികൾ അതിജീവിക്കാനും, നിങ്ങളുടെ തീരുമാനവും സൗകര്യവുമനുസരിച്ച് മാറ്റങ്ങൾ വരുത്തുവാനും ഈ ഇടപെടലുകൾ സഹായിക്കുന്നു. പ്രമേഹം, ഉയർന്ന രക്തസമ്മർദ്ദം എന്നിവയെ വളരെക്കാലം അകറ്റി നിർത്താനും, അസുഖമുണ്ടെങ്കിൽ അതിനെ നിയന്ത്രിക്കാനും ഈ ഇടപെടലുകൾ നിങ്ങളെ സഹായിക്കുന്നു.

7. ഈ പഠനത്തിലെ എൻെറ പങ്കാളിത്തം രഹസ്യമായിരിക്കുമോ?

അതെ, നിങ്ങളിൽ നിന്ന് ശേഖരിക്കുന്ന എല്ലാ വിവരങ്ങളും നിശ്ചയമായും രഹസ്യമായിരിക്കുകയും, കംപ്യൂട്ടറിൽ രേഖയായി സൂക്ഷിക്കുകയും ചെയ്യും. നിങ്ങളുടെ വിവരങ്ങൾ പേര് അറിയാത്ത തരത്തിൽ ആക്കിയ ശേഷം മാത്രമേ ഗവേഷണപഠനത്തിന് ഉപയോഗിക്കുകയുള്ളൂ. നിങ്ങളുടെ വ്യക്തിത്വം ഒരിക്കലും വെളിപ്പെടുത്തുകയില്ല. വിവരങ്ങൾ ശേഖരിക്കുന്ന പ്രാദേശിക വോളൻറിയർമാരെ വിവരങ്ങളുടെ രഹസ്യാത്മകതയെക്കുറിച്ച് കണിശമായി മനസ്സിലാക്കിയിട്ടുണ്ട്.

8. ഗവേഷണ പഠനത്തിൻെറ ഫലങ്ങൾക്ക് എന്ത് സംഭവിക്കും?

ഗവേഷണത്തിൻെറ ഫലം ആരോഗ്യമാസികയിൽ പ്രസിദ്ധീകരിക്കുകയും, പ്രാദേശിക സമൂഹവുമായി വിനിമയം ചെയ്യുകയും ചെയ്യും. നിങ്ങളുടെ വ്യക്തിപരമായ വിശദാംശങ്ങൾ ഒരു സാഹചര്യത്തിലും ഉപയോഗിക്കാതെ വളരെ രഹസ്യാത്മകമായി ഇത് ചെയ്യും.

9. കൂടുതൽ വിവരങ്ങൾക്കായി ബന്ധപ്പെടേണ്ടത്.

നിങ്ങൾക്ക് മറ്റ് ചോദ്യങ്ങൾ ഉണ്ടാകാം. സംശയിക്കാതെ ദയവായി താഴെ കൊടുത്തിരിക്കുന്നവരുമായോ ബന്ധപ്പെടുക.

1. മിസ്. എലിസബത്ത് മാത്യൂസ്, പി.എച്ച്.ഡി. വിദ്യാർത്ഥിനി, അച്യുതമേനോൻ സെൻറർ ഫോർ ഹെൽത്ത് സയൻസ് സ്റ്റഡീസ്, ശ്രീ ചിത്ര തിരുന്നാൾ ഇൻസ്റ്റിറ്റ്യൂട്ട് ഫോർ മെഡിക്കൽ സയൻസസ് ആൻഡ് ടെക്നോളജി, തിരുവനന്തപുരം, ടെലിഫോൺ – 09495221707
   ഇ-മെയിൽ: elezebethmathews@gmail.com
2. ഡോ. കെ. ആർ. തങ്കപ്പൻ, പ്രൊഫസ്സർ & ഹെഡ്, അച്യുതമേനോൻ സെൻറർ ഫോർ ഹെൽത്ത് സയൻസ് സ്റ്റഡീസ്, ശ്രീ ചിത്ര തിരുന്നാൾ ഇൻസ്റ്റിറ്റ്യൂട്ട് ഫോർ മെഡിക്കൽ സയൻസസ് ആൻഡ് ടെക്നോളജി,തിരുവനന്തപുരം
   ഇ-മെയിൽ: thank@sctimst.ac.in
3. ഡോ. അനൂപ് കുമാർ തെക്കേവീട്ടിൽ, മെംബർ സെക്രട്ടറി, ഐ.ഇ.സി, ശ്രീ ചിത്ര തിരുന്നാൾ ഇൻസ്റ്റിറ്റ്യൂട്ട് ഫോർ മെഡിക്കൽ സയൻസസ് ആൻഡ് ടെക്നോളജി,തിരുവനന്തപുരം , ടെലിഫോൺ 0471 2520256

10. നിങ്ങളുടെ പ്രതികരണം അടയാളപ്പെടുത്തുക

☐ അതെ, മുകളിൽ സൂചിപ്പിച്ചിട്ടുള്ള പഠനത്തിൽ പങ്കെടുക്കാൻ എനിക്ക് താത്പര്യമുണ്ട്.
☐ ഇല്ല, മുകളിൽ സൂചിപ്പിച്ചിട്ടുള്ള പഠനത്തിൽ പങ്കെടുക്കാൻ എനിക്ക് താത്പര്യമില്ല

പങ്കെടുക്കുന്നയാളിന്റെ ഒപ്പ്----------

തീയതി----------

Appendix 6: Informed consent for the control group(Malayalam)

Consent for the control group

സമ്മതപത്രം

അച്യുതമേനോൻ സെൻറർ ഫോർ ഹെൽത്ത് സയൻസ് സ്റ്റഡീസ്

ശ്രീ ചിത്ര തിരുന്നാൾ ഇൻസ്റ്റിറ്റ്യൂട്ട് ഫോർ മെഡിക്കൽ സയൻസസ് ആൻഡ് ടെക്നോളജി, തിരുവനന്തപുരം

നിങ്ങൾക്ക് നമസ്ക്കാരം

ഞാൻ എലിസബത്ത് മാത്യൂസ്, തിരുവനന്തപുരത്തെ ശ്രീ ചിത്തിരതിരുന്നാൾ ഇൻസ്റ്റിറ്റ്യൂട്ട് ഫോർ മെഡിക്കൽ സയൻസസ് ആൻറ് ടെക്നോളജിയിൽ ഇപ്പോൾ ഡോക്ടറേറ്റ് വിദ്യാർത്ഥിനിയാണ്. എൻെറ പഠനത്തിൻെറ ഭാഗമായി "തെക്കൻ കേരളത്തിലെ ശാരീരിക വ്യായാമം കുറഞ്ഞ സ്ത്രീകളിൽ വ്യായാമം മെച്ചപ്പെടുത്തുന്നതിനുള്ള ഇടപെടലുകൾ" ഗവേഷണം ചെയ്യുകയാണ്. ദയവായി താഴെ കൊടുത്തിട്ടുള്ള വിവരങ്ങൾ മുഴുവനും വായിക്കുകയും ഈ പഠനത്തിൽ പങ്കെടുക്കുന്നതിനുള്ള താത്പര്യം അറിയിക്കുകയും ചെയ്യുക.

പങ്കെടുക്കുന്നവർ അറിയേണ്ടവ

1. പഠനത്തിലേക്കുള്ള ക്ഷണം

ഒരു ഗവേഷണ പഠനത്തിൽ പങ്കെടുക്കുന്നതിന് നിങ്ങളെ ക്ഷണിക്കുകയാണ്. "തെക്കൻ കേരളത്തിലെ ശാരീരിക വ്യായാമം കുറഞ്ഞ സ്ത്രീകളിൽ വ്യായാമം മെച്ചപ്പെടുത്തുന്നതിനുള്ള ഇടപെടലുകൾ" എന്ന പഠനത്തെക്കുറിച്ച് ഈ പത്രിക നിങ്ങളെ അറിയിക്കും. ദയവായി ഈ കുറിപ്പ് ശ്രദ്ധയോടെ കൂടെ സമയമെടുത്ത് വായിച്ച ശേഷം ഈ പഠനത്തിൽ പങ്കെടുക്കാൻ നിങ്ങൾക്ക് ആഗ്രഹമുണ്ടോ ഇല്ലയോ എന്ന് തീരുമാനിക്കുക.

2. ഈ പഠനത്തിൻെറ ഉദ്ദേശ്യം എന്താണ്?

ദീർഘസ്ഥായി രോഗങ്ങളായ പ്രമേഹം, ഉയർന്ന രക്തസമ്മർദ്ദം, പക്ഷാഘാതം എന്നീ രോഗങ്ങൾ സമൂഹത്തിൽ വർദ്ധിച്ചു വരികയാണ്. മേൽപ്പറഞ്ഞ രോഗങ്ങളുടെ മുഖ്യ കാരണം ശാരീരിക വ്യായാമക്കുറവാണ്.

കേരളത്തിലെ ഏതാണ്ട് 47 ശതമാനം സ്ത്രീകളിലും അമിതവണ്ണം ഉണ്ട്. ഈ സന്ദർഭത്തിൽ സ്ത്രീകളിൽ ശാരീരിക വ്യായാമം മെച്ചപ്പെടുത്തുന്നതിന്, നമ്മുടെ സാഹചര്യത്തിനനുകൂലമായ ഉപാധികൾ കണ്ടുപിടിക്കേണ്ടത് അത്യാവശ്യമാണ് .

തെക്കൻ കേരളത്തിലെ സ്ത്രീകളുടെ ഇടയിൽ നടത്തുന്ന ശാരീരിക വ്യായാമം മെച്ചപ്പെടുത്തുന്നതിനുള്ള ഇടപെടലുകൾ ഗുണകരമായോ എന്ന് വിലയിരുത്താനാണ് ഈ പഠനം.

3. ഞാൻ പങ്കെടുക്കണമോ?

ഈ പഠനത്തിൽ നിങ്ങളുടെ പങ്കാളിത്തം പൂർണമായും സ്വന്തം തീരുമാനപ്രകാരം ആയിരിക്കും. പഠനത്തിൽ പങ്കെടുക്കണമോ വേണ്ടയോ എന്ന് തീരുമാനിക്കാനുള്ള അവകാശം നിങ്ങൾക്കുണ്ട്. പങ്കെടുക്കണം എന്ന് നിങ്ങൾ തീരുമാനിക്കുകയാണെകിൽ, നിങ്ങൾ സമ്മത പത്രത്തിൽ തീയതിയോടൊപ്പം ഒപ്പു വയ്ക്കുകയും, പഠന വിശദാംശങ്ങളുടെ ഭാവിപരിശോധനയ്ക്കും, പരസ്പരം ബന്ധപ്പെടുത്തുന്നതിനും അതിന്റെ ഒരു പകർപ്പ് നിങ്ങൾക്ക് തരുന്നതുമാണ്. നിങ്ങൾക്ക് പഠനത്തിന്റെ ഏതെങ്കിലും അവസരത്തിൽ അസൗകര്യമുള്ളതായി തോന്നിയാൽ പിന്മാറാനുള്ള സ്വാതന്ത്രം ഉണ്ടായിരിക്കും. അത് നിങ്ങളെ ഒരു തരത്തിലും ബാധിക്കുകയില്ല.

4. ഞാൻ ഈ പഠനത്തിൽ പങ്കെടുത്താൽ എനിക്ക് എന്തു സംഭവിക്കും? ഞാൻ എന്താണ് ചെയ്യേണ്ടത്

നിങ്ങൾ ഈ പഠനത്തിൽ പങ്കാളിയായാൽ നിങ്ങളുടെ ആരോഗ്യ അവസ്ഥകളെ ബാധിക്കുന്ന ഘടകങ്ങളായ ഇപ്പോഴത്തെ ശാരീരിക പ്രവർത്തങ്ങളെക്കുറിച്ചുള്ള ചോദ്യങ്ങൾ നിങ്ങളോടു ചോദിക്കുകയും നിങ്ങൾ ഉത്തരം പറയുകയും വേണം. പരിശീലനം ലഭിച്ച വനിത വോളൻറിയർമാർ നിങ്ങളുടെ ഉയരം, ഭാരം, വയറിന്റെ ചുറ്റളവ് മുതലായവയെപ്പോലെയുള്ള അളവുകൾ എടുക്കും. വോളൻറിയർമാർ നാലാമത്തെ, ഏഴാമത്തെ, പതിമൂന്നാമത്തെ മാസത്തിൽ ശാരീരിക വ്യായാമം മെച്ചപ്പെടുത്തുന്നതിനാലുള്ള നേട്ടങ്ങൾ അടങ്ങിയ വിവര സൂചിക നൽകും.

5. സംഭവിക്കുന്ന കോട്ടങ്ങളും അപകടങ്ങളും എന്തെല്ലാം?

ചോദ്യങ്ങൾക്ക് ഉത്തരം പറയാനും, സർവ്വേയിലും ആരോഗ്യ ഇടപെടലുകളിൽ പങ്കെടുക്കാനും അൽപം സമയം ചെലവഴിക്കണമെന്നല്ലാതെ ഒരു കോട്ടവും അപകടവും സംഭവിക്കുകയില്ല.

6. പങ്കെടുക്കുന്നതു കൊണ്ട് സാധ്യമായ നേട്ടങ്ങൾ എന്തെല്ലാം?

നിങ്ങളിൽ ശാരീരിക വ്യായാമം മെച്ചപ്പെടുത്തുന്നതിനുള്ള ഇടപെടലുകൾ ആണ് ലഭിക്കുന്നത്. ഇത് നേടുന്നതിനുള്ള പ്രതിസന്ധികൾ അതിജീവിക്കാനും, നിങ്ങളുടെ തീരുമാനവും സൗകര്യവുമനുസരിച്ച് മാറ്റങ്ങൾ വരുത്തുവാനും, ഈ ഇടപെടലുകൾ

തെക്കൻ കേരളത്തിലെ സ്ത്രീകളുടെ ഇടയിൽ നടത്തുന്ന ശാരീരിക വ്യായാമം മെച്ചപ്പെടുത്തുന്നതിനുള്ള ഇടപെടലുകൾ ഗുണകരമായോ എന്ന് വിലയിരുത്താനാണ് ഈ പഠനം.

3. ഞാൻ പങ്കെടുക്കണമോ?

ഈ പഠനത്തിൽ നിങ്ങളുടെ പങ്കാളിത്തം പൂർണമായും സ്വന്തം തീരുമാനപ്രകാരം ആയിരിക്കും. പഠനത്തിൽ പങ്കെടുക്കണമോ വേണ്ടയോ എന്ന് തീരുമാനിക്കാനുള്ള അവകാശം നിങ്ങൾക്കുണ്ട്. പങ്കെടുക്കണം എന്ന് നിങ്ങൾ തീരുമാനിക്കുകയാണെങ്കിൽ, നിങ്ങൾ സമ്മത പത്രത്തിൽ തീയതിയോടൊപ്പം ഒപ്പു വയ്ക്കുകയും, പഠന വിശദാംശങ്ങളുടെ ഭാവിപരിശോധനയ്ക്കും, പരസ്പരം ബന്ധപ്പെടുത്തുന്നതിനും അതിന്റെ ഒരു പകർപ്പ് നിങ്ങൾക്ക് തരുന്നതുമാണ്. നിങ്ങൾക്ക് പഠനത്തിന്റെ ഏതെങ്കിലും അവസരത്തിൽ അസൗകര്യമുള്ളതായി തോന്നിയാൽ പിന്മാറാനുള്ള സ്വാതന്ത്ര്യം ഉണ്ടായിരിക്കും. അത് നിങ്ങളെ ഒരു തരത്തിലും ബാധിക്കുകയില്ല.

4. ഞാൻ ഈ പഠനത്തിൽ പങ്കെടുത്താൽ എനിക്ക് എന്തു സംഭവിക്കും? ഞാൻ എന്താണ് ചെയ്യേണ്ടത്?

നിങ്ങൾ ഈ പഠനത്തിൽ പങ്കാളിയായാൽ നിങ്ങളുടെ ആരോഗ്യത്തെ ബാധിക്കുന്ന ഘടകങ്ങളായ ഇപ്പോഴത്തെ ശാരീരിക പ്രവർത്തനങ്ങളെക്കുറിച്ചുള്ള ചോദ്യങ്ങൾ നിങ്ങളോടു ചോദിക്കുകയും, നിങ്ങൾ ഉത്തരം പറയുകയും വേണം. പരിശീലനം ലഭിച്ച വനിത വോളൻറിയർമാർ നിങ്ങളുടെ ഉയരം, ഭാരം, വയറിന്റെ ചുറ്റളവ് എന്നീ അളവുകൾ എടുക്കും. നിങ്ങളുടെ ശാരീരിക വ്യായാമം ആവശ്യത്തിൽ കുറവാണെങ്കിൽ, നിങ്ങളെ ഒരു വർഷത്തെ ഇടപെടലുകളിൽ ചേർക്കും. ശാരീരിക വ്യായാമത്തിന്റെ പ്രാധാന്യത്തെക്കുറിച്ചും, വ്യായാമത്തിന്റെ അനുവദനീയമായ അളവുകളെക്കുറിച്ചും, വ്യായാമം ചെയ്യേണ്ട വഴികളെക്കുറിച്ചുള്ള ഉപദേശവും, മാർഗ്ഗ ദർശ്ശനവും ഈ ഇടപെടലുകളിലൂടെ നൽകുന്നതായിരിക്കും. നിങ്ങൾക്ക് സൗകര്യപ്രദമായ സമയത്തും, സ്ഥലത്തുമാണിത് സംഘടിപ്പിക്കുന്നത്. ഈ ഇടപെടലുകൾക്ക് ശേഷം നിങ്ങൾക്ക് സ്വീകാര്യവും, സൗകര്യപ്രദവുമായ രീതിയുടെ അടിസ്ഥാനത്തിൽ സൂക്ഷ്മ പരിശോധകന്റെ പിന്തുണയോടെ ശാരീരിക പ്രവർത്തനത്തിന്റെ അനുവദനീയമായ അളവിൽ എത്താൻ കഴിയുമോ എന്ന് നിങ്ങൾ തീരുമാനിക്കണം. നിങ്ങൾക്കു വേണ്ടി ഒരുക്കിയിട്ടുള്ള ലക്ഷ്യം അനായാസം പ്രാപിക്കുന്നതിന് ഒരു വോളൻറിയർ നിങ്ങളെ സഹായിക്കും. ഈ പ്രവർത്തനങ്ങൾ പാലിക്കാൻ ആരും നിങ്ങളെ പ്രേരിപ്പിക്കുകയില്ല. അത് പൂർണ്ണമായും നിങ്ങളുടെ സൗകര്യത്തിനനുസരിച്ചായിരിക്കും. ആരംഭത്തിലെ മൂന്നു മാസക്കാലം, പ്രതിബന്ധങ്ങൾ കണ്ടെത്താൻ നിങ്ങളെ സഹായിക്കുന്ന വോളൻറിയർമാർ നിങ്ങളുടെ വീടിനു സമീപം, മാസത്തിൽ രണ്ടു പ്രാവശ്യമുള്ള യോഗങ്ങളിൽ പങ്കെടുക്കാൻ നിങ്ങളെ

സഹായിക്കുന്നു. പ്രമേഹം, ഉയർന്ന രക്തസമ്മർദ്ദം എന്നിവയെ വളരെക്കാലം അകറ്റി നിർത്താനും, അസുഖമുണ്ടെങ്കിൽ അതിനെ നിയന്ത്രിക്കാനും ഈ ഇടപെടലുകൾ നിങ്ങളെ സഹായിക്കുന്നു.

7. ഈ പഠനത്തിലെ എന്റെ പങ്കാളിത്തം രഹസ്യമായിരിക്കുമോ?

അതെ, നിങ്ങളിൽ നിന്ന് ശേഖരിക്കുന്ന എല്ലാ വിവരങ്ങളും നിശ്ചയമായും രഹസ്യമായിരിക്കുകയും, കംപ്യൂട്ടറിൽ രേഖയായി സൂക്ഷിക്കുകയും ചെയ്യും. നിങ്ങളുടെ വിവിരങ്ങൾ പേര് അറിയാത്ത തരത്തിൽ ആക്കിയ ശേഷം മാത്രമേ ഗവേഷണപഠനത്തിന് ഉപയോഗിക്കുകയുള്ളു. നിങ്ങളുടെ വ്യക്തിത്വം ഒരിക്കലും വെളിപ്പെടുത്തുകയില്ല. വിവരങ്ങൾ ശേഖരിക്കുന്ന പ്രാദേശിക വോളന്റിയർമാരെ വിവരങ്ങളുടെ രഹസ്യാത്മകതയെക്കുറിച്ച് കണിശമായി മനസ്സിലാക്കിയിട്ടുണ്ട്.

8. ഗവേഷണ പഠനത്തിന്റെ ഫലങ്ങൾക്ക് എന്ത് സംഭവിക്കും?

ഗവേഷണത്തിന്റെ ഫലം ആരോഗ്യമാസികയിൽ പ്രസിദ്ധീകരിക്കുകയും, പ്രാദേശിക സമൂഹവുമായി വിനിമയം ചെയ്യുകയും ചെയ്യും. നിങ്ങളുടെ വ്യക്തിപരമായ വിശദാംശങ്ങൾ ഒരു സാഹചര്യത്തിലും ഉപയോഗിക്കാതെ വളരെ രഹസ്യാത്മകമായി ഇത് ചെയ്യും.

9. കൂടുതൽ വിവരങ്ങൾക്കായി ബന്ധപ്പെടേണ്ടത്

നിങ്ങൾക്ക് മറ്റ് ചോദ്യങ്ങൾ ഉണ്ടാകാം. സംശയിക്കാതെ ദയവായി താഴെ കൊടുത്തിരിക്കുന്നവരുമായോ ബന്ധപ്പെടുക.

1. മിസ്. എലിസബത്ത് മാത്യൂസ്, പി.എച്ച്.ഡി. വിദ്യാർത്ഥിനി, അച്യുതമേനോൻ സെൻറർ ഫോർ ഹെൽത്ത് സയൻസ് സ്റ്റഡീസ്, ശ്രീ ചിത്ര തിരുന്നാൾ ഇൻസ്റ്റിറ്റ്യൂട്ട് ഫോർ മെഡിക്കൽ സയൻസസ് ആൻഡ് ടെക്നോളജി, തിരുവനന്തപുരം, ടെലിഫോൺ - 09495221707
   ഇ-മെയിൽ: elezebethmathews@gmail.com
2. ഡോ. കെ, ആർ. തങ്കപ്പൻ, പ്രൊഫസ്സർ & ഹെഡ്, അച്യുതമേനോൻ സെൻറർ ഫോർ ഹെൽത്ത് സയൻസ് സ്റ്റഡീസ്, ശ്രീ ചിത്ര തിരുന്നാൾ ഇൻസ്റ്റിറ്റ്യൂട്ട് ഫോർ മെഡിക്കൽ സയൻസസ് ആൻഡ് ടെക്നോളജി,തിരുവനന്തപുരം
   ഇ-മെയിൽ: thank@sctimst.ac.in
3. ഡോ. അനൂപ് കുമാർ തെക്കേവീട്ടിൽ, മെംബർ സെക്രട്ടറി, ഐ.ഇ.സി, ശ്രീ ചിത്ര തിരുന്നാൾ ഇൻസ്റ്റിറ്റ്യൂട്ട് ഫോർ മെഡിക്കൽ സയൻസസ് ആൻഡ് ടെക്നോളജി, തിരുവനന്തപുരം , ടെലിഫോൺ=04712520256

10. നിങ്ങളുടെ പ്രതികരണം അടയാളപ്പെടുത്തുക

☐ അതെ, മുകളിൽ സൂചിപ്പിച്ചിട്ടുള്ള പഠനത്തിൽ പങ്കെടുക്കാൻ എനിക്ക് താത്പര്യമുണ്ട്.

☐ ഇല്ല, മുകളിൽ സൂചിപ്പിച്ചിട്ടുള്ള പഠനത്തിൽ പങ്കെടുക്കാൻ എനിക്ക് താത്പര്യമില്ല

പങ്കെടുക്കുന്നയാളിന്റെ ഒപ്പ്----------

തീയതി----------

Appendix 7:Interview schedule for the cross sectional survey(Malayalam)

അച്യുതമേനോൻ സെൻറർ ഫോർ ഹെൽത്ത് സയൻസ് സ്റ്റഡീസ്
ശ്രീ ചിത്തിര തിരുനാൾ ഇൻസ്റ്റിറ്റ്യൂട്ട് ഫോർ മെഡിക്കൽ സയൻസസ്സ് ആൻഡ് ടെക്നോളജി, തിരുവനന്തപുരം–695 001

സ്ത്രീകളുടെ ഇടയിൽ വ്യായാമം വർധിപ്പിക്കുന്നതിനുള്ള ആരോഗ്യ ഇടപെടലുകൾ

വ്യക്തിയുടെ കോഡ് നമ്പർ .....

റസിഡൻറ്സ് അസ്സോസിയേഷൻറെ പേര് .....

വീട്ട് നമ്പർ .....

സർവ്വെ നടത്തുന്ന ആളുടെപേര് .....

(അഭിമുഖം നടത്തുന്നയാൾക്കുള്ള നിർദ്ദേശം: ദയവായി ചോദ്യങ്ങൾ ശ്രദ്ധയോടെ ചോദിക്കുകയും കളങ്ങൾ കൃത്യമായി പൂരിപ്പിക്കുകയും ചെയ്യുക)

വിഭാഗം 1 :വ്യക്തിഗത കുടുംബവിവരങ്ങൾ

1.1	വയസ്സ് (പൂർത്തിയായ വർഷത്തിൽ)	
1.2	ലിംഗം	പുരുഷൻ ☐ സ്ത്രീ ☐
1.3	പൂർണ്ണമായ മേൽ വിലാസം	
1.4	റസിഡൻസ് അസ്സോസിയേഷന്റെ പേര്	
1.5	ബന്ധപ്പെടാനുള്ള ഫോൺ നമ്പർ	മൊബൈൽ : ലാൻഡ് ഫോൺ :
1.6	സ്കൂൾ വിദ്യാഭ്യാസത്തിന്റെ വർഷങ്ങളുടെ എണ്ണം	
1.7	പൂർത്തിയാക്കിയ ഏറ്റവും ഉയർന്ന വിദ്യാഭ്യാസ യോഗ്യത	ഔപചാരിക വിദ്യാഭ്യാസം ഇല്ല 1 7-ാം ക്ലാസ്സിനെക്കാൾ കുറവ് 2 7- ാം ക്ലാസ്സ് പൂർത്തിയാക്കി 3 8-10 ക്ലാസ്സ് പൂർത്തിയാക്കി 4 ☐ പ്ലസ് 2/പ്രീഡിഗ്രി പൂർത്തിയാക്കി 5 ബിരുദം പൂർത്തിയാക്കി 6 ബിരുദാനന്തരബിരുദം പൂർത്തിയാക്കി 7 സാങ്കേതികമായത് 8 തൊഴിലധിഷ്ഠിതമായത് 9 മറ്റുള്ളവ (വിശദമാക്കുക) 10
1.8	തൊഴിൽ നിലവാരം	തൊഴിലധിഷ്ഠിതം/വലിയവിദ്യാഭ്യാസം 1 ☐ ക്ലാർക്ക് ജോലി/ ഇടത്തരം വിദ്യാഭ്യാസം 2 (സ്വയംതൊഴിലുള്ള/ തൊഴിൽ വൈദഗ്ദ്ധ്യം സിദ്ധിച്ചവർ) 3 കൂലിവേല 4

		വിദ്യാർഥി	5
		ഗൃഹപരിപാലനം/വീട്ടമ്മ	6
		വിരമിച്ച	7
		തൊഴിൽരഹിതൻ (ജോലിചെയ്യാൻ സാധിക്കും)	8
		തൊഴിൽരഹിതൻ (ജോലിചെയ്യാൻ സാധിക്കില്ല)	9
		മറ്റുള്ളവ (വിശദമാക്കുക)	10
1.9	നിങ്ങളുടെ വൈവാഹിക നില എന്താണ്?	വിവാഹിത	1
		അവിവാഹിത	2
		(വേർപിരിഞ്ഞ/വിവാഹബന്ധം നിയമപരമായി വേർപ്പെടുത്തിയത്	3 ☐
		വിധവ	4
		വിവാഹം കഴിക്കാതെ ഒരുമിച്ച് താമസിക്കുന്നവർ	5

വിഭാഗം 2 (വ്യക്തിഗത ശാരീരികപ്രവർത്തനത്തെ സ്വാധീനിക്കുന്ന ഘടകങ്ങൾ)

2.1 നിങ്ങളുടെ ശരീരഭാരത്തെ നിങ്ങൾ എങ്ങനെ വിവരിക്കും?

1. സാധാരണഭാരം ☐ 2 ഭാരക്കൂടുതൽ ☐

3. പൊണ്ണത്തടി ☐ 4 ഭാരക്കുറവ് ☐

2.2 നിങ്ങളുടെ ഇപ്പോഴത്തെ ആരോഗ്യ അവസ്ഥയെ നിങ്ങൾ എങ്ങനെ വിലയിരുത്തുന്നു?

1. വളരെ ദയനീയം ☐
2. ദയനീയം ☐
3. ശരാശരി ☐
4. നല്ലത് ☐
5. വളരെ നല്ലത് ☐
6. ഏറ്റവും മെച്ചപ്പെട്ടത് ☐

2.3 നിങ്ങൾക്ക് എത്രത്തോളം ശാരീരികവ്യായാമം ഉണ്ടെന്ന് നിങ്ങൾ കരുതുന്നു?

1. വളരെ കാര്യക്ഷമം ☐ 2. സാമാന്യം കാര്യക്ഷമം ☐
3. കുറവ് കാര്യക്ഷമം ☐ 3. ഒട്ടും കാര്യക്ഷമമില്ല ☐

2.4 ശാരീരിക പ്രവർത്തനത്തിൽനിന്ന് നിങ്ങളെ തടയുന്ന എന്തെങ്കിലും ശാരീരികവൈകല്യം നിങ്ങൾക്കുണ്ടോ?

1. ഉണ്ട് ☐ 2. ഇല്ല ☐

2.5 മുൻ കാലങ്ങളിൽ കളികളിൽ പങ്കെടുത്ത അനുഭവം നിങ്ങൾക്കുണ്ടോ?

1. ഉണ്ട് ☐ 2. ഇല്ല ☐

2.6 നിങ്ങളുടെ ദൈനംദിന പ്രവർത്തനത്തിനുപുറമേ വ്യായാമം ചെയ്യുന്നത് പ്രധാനമാണെന്ന് നിങ്ങൾ കരുതുന്നോ?

1. വളരെ പ്രധാനം ☐ 2. കുറച്ച് പ്രധാനം ☐
3. പ്രാധാന്യമില്ല ☐ 3. അറിയില്ല ☐

2.7 ഒരാൾക്ക് ഒരു ദിവസം എത്ര വ്യായാമം ലഭിച്ചിരിക്കണമെന്ന് നിങ്ങൾക്കറിയാമോ?

1. അതെ 2. ഇല്ല ☐ഇല്ല എങ്കിൽ, 2.9 ലേക്ക് പോവുക

2.8 അതെയെങ്കിൽ ആരോഗ്യവർധന ഉണ്ടാകുന്നതിന് പ്രായപൂർത്തിയായവർക്ക് ആവശ്യമായ ശാരീരിക പ്രവർത്തനത്തിന്റെ അളവെത്ര?

1. ☐ ദിവസവും 10 മിനിറ്റ് നടത്തം.
2. ☐ ദിവസവും 15 മിനിറ്റ് വീതം ആഴ്ച്ചയിൽ 3 ദിവസമെങ്കിലും ഉള്ളനടത്തം.
3. ☐ ദിവസവും 30 മിനിറ്റ് വീതം ആഴച്ചയിൽ 5 ദിവസമെങ്കിലും ഉള്ള വേഗതയേറിയ നടത്തം.
4. ☐ അറിയില്ല/ ഉറപ്പില്ല.

2.9 വ്യക്തിപരമായോ നിങ്ങളുടെ കുടുംബത്തിലോ താഴെ പറയുന്ന രോഗങ്ങൾ ഉണ്ടായിട്ടുണ്ടോ? (നിങ്ങൾക്ക് ഒന്നിൽ കൂടുതൽ അടയാളപ്പെടുത്താം)

ക്രമനമ്പർ	രോഗങ്ങൾ	വ്യക്തിവിവരം	കുടുംബവിവരം
1	ഡയബറ്റെസ്		
2.	അതിരക്തസമ്മർദ്ദം		
3	ഹൃദ്രോഗങ്ങൾ		
4	ആസ്തമ		
5	ഡിസ്ലീപിഡേമിയ		
6	സന്ധിവീക്കം		
7	മറ്റേതെങ്കിലും കടുത്തരോഗം (ദയവായി വിശദമാക്കുക)		

2.10. മുകളിൽ പറഞ്ഞ രോഗങ്ങൾ നിങ്ങളെ ശാരീരികവ്യായാമം ചെയ്യാൻ തടയുന്നുണ്ടോ?

1. ഉണ്ട് 2. ഇല്ല

2.11 താഴെപ്പറയുന്ന ദീർഘസ്ഥായി രോഗങ്ങൾ തടയുന്നതിൽ ശാരീരികവ്യായാമത്തിന് പങ്കുണ്ടെന്ന് നിങ്ങൾ കരുതുന്നോ?

രോഗം	ശക്തമായി യോജിക്കുന്നു	യോജിക്കുന്നു	വിയോജിക്കുന്നു	ശക്തമായി വിയോജിക്കുന്നു	അറിയില്ല/ ഉറപ്പില്ല.
1. പ്രമേഹം					
2. അതിരക്തസമ്മർദ്ദം					
3. പക്ഷാഘാതം					
4. ഹൃദ്രോഗം					
5. സന്ധിവീക്കം					
6. സ്തനാർബുദം					
7. വൻകുടൽ കാൻസർ					

2.12 താഴെപ്പറയുന്ന ദീർഘസ്ഥായി രോഗങ്ങളെ നിയന്ത്രിക്കുന്നതിനും, സങ്കീർണ്ണാവസ്ഥതടയുന്നതിനും ശാരീരിക വ്യായാമത്തിന് പങ്കുണ്ടെന്ന് നിങ്ങൾ കരുതുന്നുണ്ടോ?

രോഗം	ശക്തമായി യോജിക്കുന്നു	യോജിക്കുന്നു	വിയോജിക്കുന്നു	ശക്തമായി വിയോജിക്കുന്നു	അറിയില്ല/ ഉറപ്പില്ല.
1. പ്രമേഹം					
2. അതിരക്തസമ്മർദ്ദം					
3. പക്ഷാഘാതം					
4. ഹൃദ്രോഗം					
5. സന്ധിവീക്കം					
6. സ്തനാർബുദം					
7. വൻകുടൽ കാൻസർ					

2.13 നടക്കാനോ വ്യായാമം ചെയ്യാനോ നിങ്ങളെ ആരെങ്കിലും ഉപദേശിച്ചിട്ടുണ്ടോ?

1. ഉണ്ട് 2. ഇല്ല (ഇല്ല എങ്കിൽ 2.15 ലേക്ക് പോവുക)

2.14 ശാരീരികവ്യായാമത്തിന്റെ നേട്ടങ്ങളെക്കുറിച്ചുള്ള അറിവ് എവിടെനിന്ന് ലഭിച്ചു?

1. ആരോഗ്യപ്രവർത്തകൻ 2. ടെലിവിഷൻ
3. ദിനപ്പത്രം 4. സുഹൃത്തുക്കൾ/ബന്ധുക്കൾ
5. മറ്റുള്ളവ എന്തെങ്കിലും(ദയവായി വിശദമാക്കുക) .....

2.15 ദീർഘസ്ഥായി രോഗങ്ങളായ പ്രമേഹം, അതിരക്തസമ്മർദ്ദം, ഹൃദ്രോഗം മുതലായവയെ ചെറുക്കുന്നതിൽ ശാരീരിക

വ്യായാമത്തിന് പങ്കുണ്ടെന്ന് നിങ്ങളെ ആരോഗ്യപ്രവർത്തകൻ എപ്പോഴെങ്കിലും അറിയിച്ചിട്ടുണ്ടോ?
1. ഉണ്ട് 2. ഇല്ല

2.16 ഒരോവിഭാഗത്തിന്റെയും വലതുഭാഗത്ത് ഉള്ള ഒരോ അഭിപ്രായത്തോട് ഏറ്റവും നന്നായി യോജിക്കുന്നുവെന്ന് നിങ്ങൾക്ക് തോന്നുന്നതിൽ ദയവായി ശരി (✓) അടയാളപ്പെടുത്തുക.

താഴെകൊടുത്തിട്ടുള്ള ഓരോ സാഹചര്യത്തിലും വ്യായാമം ചെയ്യാൻ കഴിയും എന്ന് നിങ്ങൾക്ക് എത്രമാത്രം ആത്മവിശ്വാസമുണ്ട്?	(1) ആത്മ വിശ്വാസമില്ല	(2) നേരിയ ആത്മവിശ്വാസം	(3) സാമാന്യ ആത്മവിശ്വാസം	(4) വളരെ ആത്മവിശ്വാസം	(5) അമിതമായ ആത്മവിശ്വാസം
1. ഞാൻ ക്ഷീണിതനായിരിക്കുമ്പോൾ					
2. ഞാൻ മോശമായ മാനസികാവസ്ഥയിലുള്ളപ്പോൾ					
3. സമയമില്ല എന്ന് എനിക്ക് തോന്നുമ്പോൾ					
4. ഞാൻ അവധിക്കാലത്തായിരിക്കുമ്പോൾ					
5. മഴപെയ്യുമ്പോൾ					

2.17 വ്യായാമതീരുമാനതുല്യത:
ഒരോ വിഭാഗത്തിന്റെയും വലതുവശത്തുള്ള കളങ്ങളിൽ നിങ്ങളുടെ അഭിപ്രായത്തോട് ഏറ്റവും യോജിക്കുന്നതിൽ ശരി (✓) അടയാളമിടുക.

ചോദ്യങ്ങൾ	ശക്തമായി വിയോജിക്കുന്നു	കുറേശ്ശെ വിയോജിക്കുന്നു	യോജിക്കുകയോ വിയോജിക്കുകയോ ചെയ്യുന്നില്ല	കുറേശ്ശെ യോജിക്കുന്നു	ശക്തമായി യോജിക്കുന്നു	അറിയില്ല /ഉറപ്പില്ല
1. ഞാൻ സ്ഥിരമായി വ്യായാമം ചെയ്താൽ എനിക്ക് എന്റെ കുടുബാംഗങ്ങൾക്കുവേണ്ടിയും സുഹൃത്തുക്കൾക്കുവേണ്ടിയും കൂടുതൽ എന്തെങ്കിലും ചെയ്യാൻ കഴിയും.						
2.സ്ഥിരമായി വ്യായാമം ചെയ്യുന്നത് സമ്മർദ്ദം ലഘൂകരിക്കാൻ എന്നെ സഹായിക്കും.						
3.വ്യായാമത്തിനുശേഷം ദൈനംദിനജോലികൾ ചെയ്യുമ്പോൾ കൂടുതൽ ക്ഷീണിക്കുമെന്ന് ഞാൻ കരുതുന്നു						
4. ദിവസവും വ്യായാമം ചെയ്യുകയാണെങ്കിൽ എനിക്ക് കൂടുതൽ						

ആത്മവിശ്വാസം ഉണ്ടാകും.						
5. ദിവസേന വ്യായാമം ചെയ്യുമെങ്കിൽ കൂടുതൽ ഗാഢമായി എനിക്ക് ഉറങ്ങാൻ കഴിയുന്നു.						
6. ദിവസവും വ്യായാമംചെയ്യുന്നതിൽ ഒരു ആത്മാർഥത പുലർത്തുന്നതോടുകൂടെ എനിക്ക് എന്നെക്കുറിച്ച് നല്ലതുതോന്നുന്നു						
7. മോശം കാലാവസ്ഥ ബാധിക്കാത്തതും എനിക്ക് ആസ്വദിക്കാനാവുന്നതുമായ ഒരു ശാരീരികവ്യായാമം കണ്ടെത്തുക പ്രയാസമാണ്.						
8. ഞാൻ ദിവസേന വ്യായാമം ചെയ്യുന്നതിലൂടെ എന്റെ ശരീരം ഉത്തമം ആകുന്നത് ഞാൻ ഇഷ്ടപ്പെടുന്നു						
9. ഞാൻ ദിവസേന വ്യായാമം ചെയ്യുമെങ്കിൽ ദൈനംദിന പ്രവർത്തികൾ എനിക്ക് അനായാസം ചെയ്യാൻ കഴിയും.						
10. ദിവസേന വ്യായാമം ചെയ്യുകയാണെങ്കിൽ സമ്മർദ്ദം കുറയുന്നതായി എനിക്കനുഭവപ്പെടും.						
11. വ്യായാമം ചെയ്യുമ്പോൾ ശ്വാസം ലഭിക്കാതാവുകയും ഹൃദയസ്പന്ദനം വർദ്ധിക്കുകയും ചെയ്യുന്നതിനാൽ ബുദ്ധിമുട്ട് അനുഭവപ്പെടുന്നു.						
12. ദിവസേന ഞാൻ വ്യായാമം ചെയ്യുകയാണെങ്കിൽ എന്റെ ശരീരത്തിൽ കൂടുതൽ സുഖം അനുഭവപ്പെടും.						
13. സ്ഥിരമായ വ്യായാമം എന്റെ വളരെയധികം സമയം അപഹരിക്കുന്നു.						
14. സ്ഥിരമായ വ്യായാമം എന്റെ ജീവിതത്തിൽ പുരോഗമനപരമായ വീക്ഷണത്തിന് എന്നെ സഹായിക്കുന്നു						
15. സ്ഥിരമായി വ്യായാമം ചെയ്യൽ എന്റെ കുടുംബത്തോടും സുഹൃത്തുക്കളോടുമൊപ്പം എനിക്കുള്ള സമയം കുറയുന്നു.						
16. ദിവസാവസാനം എനിക്ക് ക്ഷീണം കൊണ്ട് വ്യായാമം ചെയ്യാൻ കഴിയുന്നില്ല.						

2.18 നിങ്ങളുടെ പതിവായുള്ള കുടുംബ പ്രവർത്തനങ്ങൾക്കു പുറമേ വ്യായാമം ചെയ്യുന്നതിനുള്ള ബോധപൂർവ്വമായ പരിശ്രമം നടത്തുന്നുണ്ടോ?

1. ഉണ്ട് 2. ഇല്ല

2.19 നിങ്ങളുടെ ജോലി/കുടുംബ ഉത്തരവാദിത്തങ്ങൾ കൂടാതെ സ്ഥിരമായ ശാരീരിക വ്യായാമം

ചെയ്യുന്നതിൽ നിങ്ങൾ നേരിടുന്ന തടസ്സങ്ങൾ ഏവ?

സമയക്കുറവ് ☐	എനിക്ക് ഈ ഒരു പ്രതിബന്ധവുമില്ല ..... ☐
പ്രവർത്തനത്തോടുള്ള താൽപര്യവും ആസ്വാദനവുംകുറവ് ☐	ശിശുപരിപാലന ഉത്തരവാദിത്തം ☐
കുടുംബം/പങ്കാളിയിൽനിന്നുള്ള പിന്തുണക്കുറവ് ☐	എനിക്ക് വ്യായാമം ചെയ്യാനുള്ള സാമർഥ്യമില്ല ☐
വ്യായാമത്തിനായി എന്തുചെയ്യണമെന്നറിയില്ല ☐	ഒരു പ്രവർത്തനത്തിനുമുള്ള ഊർജ്ജം എന്നിലില്ല ☐
എന്നോടൊപ്പം ആരുമില്ല ☐	ആളുകൾ എന്നെ പരിഹസിക്കുന്നു. ☐
നടക്കാനുള്ള സുരക്ഷിത സ്ഥലക്കുറവ് ☐	മറ്റുള്ളവ ദയവായി വിശദമാക്കുക..... ☐

2.20 വ്യായാമം ചെയ്യുന്നതും പ്രവർത്തിനിരിതമായിരിക്കുന്നതിനും പ്രോത്സാഹനം നൽകുന്നത് എന്തെല്ലാം?

കുടുംബം/പങ്കാളിയിൽ നിന്നുള്ള പിന്തുണ ☐	കുടുംബത്തിലെ വ്യായാമം ചെയ്യുന്ന അംഗം ☐
സുഹൃത്തുക്കൾ/അയൽക്കാരിൽനിന്നുള്ള പിന്തുണ ☐	കളികളിൽ മുൻപുള്ള പങ്കാളിത്തം ☐
പ്രമേഹം /അതിരക്തസമ്മർദ്ദം ☐	ശാരീരിക വ്യായാമത്തിന്റെ നേട്ടങ്ങളെക്കുറിച്ചുള്ള അറിവ് ☐
ആരോഗ്യപ്രവർത്തകന്റെ ഉപദേശം ☐	വ്യായാമം ചെയ്യാൻ ഉള്ള ആത്മവിശ്വാസം ☐
കുടുംബാംഗങ്ങൾക്ക് എന്തെങ്കിലും കടുത്ത അവസ്ഥയുണ്ടാവുക ☐	മറ്റുള്ളവ എന്തെങ്കിലും..... ☐ ദയവായി വിശദമാക്കുക

വിഭാഗം 3 : കുടുംബത്തിലും സാമൂദായികതലത്തിലും ശാരീരിക വ്യായാമത്തെ സ്വാധീനിക്കുന്ന ഘടകങ്ങൾ

3.1 വിശ്രമവേളകളിൽ വ്യായാമം ചെയ്യാൻ നിങ്ങളുടെ പങ്കാളി പിന്തുണക്കുമോ?
1 ഉണ്ട് 2. ഇല്ല

3.2 നിങ്ങളുടെ സമീപസ്ഥലം ഗതാഗതതടസ്സമുള്ളപ്പോൾ നടക്കുന്നതിന് സുരക്ഷിതമാണോ?
1. സുരക്ഷിതം 2. സുരക്ഷിതമല്ല

3.3 നിങ്ങളുടെ സമീപസ്ഥലം കുറ്റകൃത്യാനുപാതമനുസരിച്ച് നടക്കുന്നതിന് സുരക്ഷിതമാണോ?
1. അതെ 2. അല്ല

3.4 നിങ്ങളുടെ നിരത്തുകളിൽ നടക്കുന്നതിന് വശങ്ങളിലൂടെയുള്ള പാത ഉണ്ടോ?
1. ഉണ്ട് 2. ഇല്ല (ഉണ്ട് എങ്കിൽ 3.5, ഇല്ല എങ്കിൽ 3.6)

3.5 നിങ്ങളുടെ നിരത്തുകളിലെ വശങ്ങളിലെ പാതകൾ നല്ല അവസ്ഥയിലാണോ?
1. മോശമായ വശങ്ങളിലൂടെയുള്ള പാത 2. നല്ല വശങ്ങളിലൂടെയുള്ള പാത

3.6 നിങ്ങളുടെ സമീപസ്ഥലം നടക്കാനുള്ള നല്ല സൗന്ദര്യമുള്ളതാണോ?
1. സന്തോഷകരം 2. സന്തോഷകരമല്ല.

3.7 വിശ്രമ സമയവ്യായാമങ്ങൾക്കായ് ഹെൽത്ത് ക്ലബുകളുടെയോ ജിമ്മുകളുടെയോ സൗകര്യം നിങ്ങൾക്കുണ്ടോ?
1. ഉണ്ട് 2. ഇല്ല

3.8 വ്യായാമം ചെയ്യുന്നതിന് സാമൂഹ്യതലത്തിൽ പ്രോത്സാഹനം നൽകുന്നത് എന്തെല്ലാം? ദയവായി ശരിയായകളത്തിൽ
അടയാളപ്പെടുത്തുക

കോഡ്	പ്രോത്സാഹനം നൽകുന്നത് എന്തെല്ലാം?	അതെ	അല്ല
3.8 a	മറ്റുള്ളവർ വ്യായാമം ചെയ്യുന്നത് കൂടെക്കൂടെ നിരീക്ഷിക്കുക		
3.8 b	സുരക്ഷിതപാതകൾ		
3.8 c	പുരോഗമനപരമായ ശീലമായി വ്യായാമത്തെ കാണണം		
3.8 d	അയൽക്കാർ /സുഹൃത്തുക്കളിൽ നിന്നുള്ള സാമൂഹിക പിന്തുണ		
3.8 e	വ്യായാമം ലഭിക്കുന്ന ഹെൽത്ത് ക്ലബുകളിലും മറ്റും പോകാൻ സൗകര്യമുള്ളത്		
3.8 f	വശങ്ങളിലുള്ള പാതകളുടെ സാന്നിധ്യം		
3.8 g	ആസ്വാദ്യകരമായ പ്രകൃതിദൃശ്യം		

3.9 വ്യായാമം ചെയ്യുന്നതിന് സാമൂഹ്യതലത്തിലെ തടസ്സങ്ങൾ എന്തെല്ലാം? ദയവായി ശരിയായ കളത്തിൽ അടയാളപ്പെടുത്തുക

കോഡ്	തടസ്സങ്ങൾ	അതെ	അല്ല
3.9 a	തെരുവുപട്ടികൾ		
3.9 b	വർദ്ധിച്ച ഗതാഗതക്കുരുക്ക്		
3.9 c	മലമ്പ്രദേശം		
3.9 d	സൗകര്യങ്ങളുടെ ദുർലഭ്യത		
3.9 e	ഉയർന്ന കുറ്റകൃത്യനിരക്ക്		
3.9 f	പരിസരസുരക്ഷിതത്വത്തിന്റെ കുറവ്		
3.9 g	വശങ്ങളിലെ പാതകളുടെ കുറവ്		

ശാരീരിക പ്രവർത്തനമൂല്യനിർണ്ണയം

(അഭിമുഖം നടത്തുന്നയാൾക്കുള്ള നിർദ്ദേശം: ദയവായി ചോദ്യങ്ങൾ ശ്രദ്ധയോടെ ചോദിക്കുകയും കളങ്ങൾ കൃത്യമായി പൂരിപ്പിക്കുകയും ചെയ്യുക)

ഒരു സാധാരണ ആഴ്ച്ചയിൽ വിവിധതരത്തിലുള്ള ശാരീരിക പ്രവർത്തനങ്ങൾക്കായി നിങ്ങൾ ചെലവഴിക്കുന്ന സമയത്തെക്കുറിച്ച് ഞാൻ ചോദിക്കാൻ പോകുകയാണ്. നിങ്ങൾ ശാരീരികമായി കാര്യക്ഷമതയുള്ളയാളാണെന്ന് നിങ്ങൾ അംഗീകരിക്കുന്നെങ്കിൽ പോലും ദയവായി ഈ ചോദ്യങ്ങൾക്ക് ഉത്തരം നൽകുക.

ജോലിയിൽ

നിങ്ങൾ ജോലിചെയ്യാനായി ചെലവഴിക്കുന്ന സമയത്തെക്കുറിച്ച് ആദ്യം ചിന്തിക്കുക. ശമ്പളമുള്ളതോ ഇല്ലാത്തതോ ആയ ജോലി, പഠനം/പരിശീലനം, വീട്ടിലെജോലി, ഭക്ഷണം/വിളകൊയ്യൽ ഭക്ഷണത്തിനായി, തൊഴിലന്വേഷണം മുതലായവയെപ്പോലെയുള്ള നിങ്ങൾ ചെയ്യുന്ന പ്രവർത്തനങ്ങളെക്കുറിച്ച് ചിന്തിക്കുക. താഴെകൊടുത്തിട്ടുള്ള ചോദ്യങ്ങളുടെ ഉത്തരം എഴുതുമ്പോൾ കഠിനമായ കായികപ്രവൃത്തികൾ എന്നാൽ ശാരീരികാദ്ധ്വാനമുള്ള, ശ്വാസോച്ഛ്വാസം വളരെയധികം കൂട്ടുന്നതാണ് , മിതമായ കായികപ്രവൃത്തികൾ എന്നാൽ ശ്വാസോച്ഛ്വാസം നേരിയതോതിൽ കൂട്ടുന്നതാണ്.

കോഡ്	ചോദ്യങ്ങൾ	പ്രതികരണം	
P1	താങ്കളുടെ ജോലി, തുടർച്ചയായി പത്ത് മിനിറ്റെങ്കിലും അടുപ്പിച്ച് കഠിനമായ കായികപ്രവൃത്തികൾ (ശാരീരികാദ്ധ്വാനമുള്ള, ശ്വാസോച്ഛ്വാസം വളരെയധികം കൂട്ടുന്ന) ഉള്ളതാണോ (ഉദാ: വളരെഭാരമുള്ളവ എടുക്കുകയും, ഉയർത്തുകയും ചെയ്യുക, കുഴിക്കുകയോ നിർമ്മാണ പ്രവർത്തനമോ ചെയ്യുക]	അതെ ☐ ഇല്ല ☐	അതെയെങ്കിൽ P1A യിലേക്കും മറിച്ചായാൽ P2 വിലേക്കും പോവുക

P1A	ഒരാഴ്ച്ചയിൽ എത്ര ദിവസവും, ഒരോ ദിവസവും എത്ര സമയവും താഴെപ്പറയുന്ന കഠിനമായ ജോലികളിൽ ചെലവഴിച്ചു എന്നുള്ളത് രേഖപ്പെടുത്തുക. ഒരു സാധാരണ ആഴ്ച്ചയിൽ ചെയ്യുന്ന കഠിനമായ ജോലികൾ മാത്രം രേഖപ്പെടുത്തുക.

കോഡ്	പ്രവർത്തനം	ആഴ്ച്ചയിൽ എത്ര ദിവസം ചെലവഴിച്ചു	ഒരുദിവസം എത്ര സമയം ചെലവാക്കി
P1 A1	ഭാരം എടുക്കൽ, ഭാരംചുമക്കൽ അല്ലെങ്കിൽ തടികൾ കൂട്ടിയിടൽ	_____	മണിക്കൂർ ____ മിനിറ്റ് ____
P1 A2	കിണറിൽനിന്ന് വെള്ളം കോരുകയും മറ്റുവീട്ടിൽനിന്ന് വെള്ളം കോരി കൊണ്ടുവരികയും	_____	മണിക്കൂർ ____ മിനിറ്റ് ____
P1 A3	പൊട്ടിച്ചപാറക്ഷണങ്ങൾ ഇറക്കുക ,	_____	മണിക്കൂർ ____ മിനിറ്റ് ____
P1 A4	അമ്മിക്കല്ലിൽ ആട്ടുക, അരയ്ക്കുക	_____	മണിക്കൂർ ____ മിനിറ്റ് ____
P1 A5	ധാന്യങ്ങൾ ഉരലിൽ പൊടിക്കുക	_____	മണിക്കൂർ ____ മിനിറ്റ് ____
P1 A6	മരം മുറിക്കുക , തടി കഷണങ്ങളാക്കുക	_____	മണിക്കൂർ ____ മിനിറ്റ് ____
P1 A7	ഇഷ്ടികപോലെയുള്ളഭാരമുള്ള വസ്തുക്കൾ എടുക്കുക	_____	മണിക്കൂർ ____ മിനിറ്റ് ____
P1 A8	മറ്റുള്ളവ എന്തെങ്കിലും ..... (ദയവായി വിശദമാക്കുക)	_____	മണിക്കൂർ ____ മിനിറ്റ് ____
	മറ്റുള്ളവ എന്തെങ്കിലും		

P1 A9	(ദയവായി വിശദമാക്കുക)		മണിക്കൂർ —— മിനിറ്റ് ——
P1A10	മറ്റുള്ളവ എന്തെങ്കിലും .....(ദയവായി വിശദമാക്കുക)	————	മണിക്കൂർ —— മിനിറ്റ് ——

കോഡ്	ചോദ്യങ്ങൾ	പ്രതികരണം	
P2	താങ്കളുടെ ജോലി, തുടർച്ചയായി പത്ത് മിനിറ്റെങ്കിലും മിതമായ കായികപ്രവൃത്തികൾ (ശ്വാസോച്ഛ്വാസം നേരിയതോതിൽ കൂട്ടുന്ന) ഉള്ളതാണോ (ഉദാ: വേഗത്തിലുള്ള നടത്തം, ചെറിയ തോതിലുള്ള ഭാരം ഉയർത്തുക, സാവധാനം സൈക്കിൾ ചവിട്ടുക തുടങ്ങിയവ)?	അതെ ☐ ഇല്ല ☐	അതെയെങ്കിൽ P2A യിലേക്കും മറിച്ചായാൽ പി 3യിലേക്കും പോവുക
P2 A	ഒരാഴ്ച്ചയിൽ എത്ര ദിവസവും, ഒരോ ദിവസവും എത്ര സമയവും താഴെപ്പറയുന്ന മിതമായ ജോലികളിൽ ചെലവഴിച്ചു എന്നുള്ളത് രേഖപ്പെടുത്തുക. ഒരു സാധാരണ ആഴ്ച്ചയിൽ ചെയ്യുന്ന മിതമായ ജോലികൾ മാത്രം രേഖപ്പെടുത്തുക.		

കോഡ്	പ്രവർത്തനം	ആഴ്ച്ചയിൽ എത്ര ദിവസം ചെലവഴിച്ചു	ഒരുദിവസം എത്ര സമയം ചെലവാക്കി
P2 A1	തുണികഴുകൽ	————	മണിക്കൂർ —— മിനിറ്റ് ——
P2 A2	തറ തൂക്കുക (വീട്ടിനകത്തോ പുറത്തോ)	————	മണിക്കൂർ —— മിനിറ്റ് ——
P2 A3	തറ വൃത്തിയാക്കൽ (കാൽമുട്ടിൽ കുനിഞ്ഞുനിന്ന് കൈഉപയോഗിച്ച്)	————	മണിക്കൂർ —— മിനിറ്റ് ——

P2 A4	പുറത്തെ ടാപ്പിൽനിന്ന് വെള്ളം കോരി കൊണ്ടുവരുക	_____	മണിക്കൂർ _____ മിനിറ്റ് _____
P2 A5	മൃഗപരിപാലനം: മൃഗങ്ങൾക്ക് ഭക്ഷണം ഭക്ഷണം കൊടുക്കുക, മൃഗങ്ങളെ കുളിപ്പിക്കൽ, മൃഗക്കൂട് വൃത്തിയാക്കൽ മുതലാവയ	_____	മണിക്കൂർ _____ മിനിറ്റ് _____
P2A6	വളർത്തു മൃഗങ്ങൾക്ക് തീറ്റ കൊണ്ടുവരിക (പുല്ല്, വയ്ക്കോൽ തുടങ്ങിയവ)	_____	മണിക്കൂർ _____ മിനിറ്റ് _____
P2 A7	പശുവിൻെറ പാൽകറക്കുക	_____	മണിക്കൂർ _____ മിനിറ്റ് _____
P2 A8	തോട്ടപ്പണി: ചെടി നനയ്ക്കുക, വിത്ത്നടുക, വൃത്തിയാക്കുക മുതലായവ	_____	മണിക്കൂർ _____ മിനിറ്റ് _____
P2 A9	രോഗിയെയോ മുതിർന്നവരെയോ ശുശ്രൂഷിക്കുക	_____	മണിക്കൂർ _____ മിനിറ്റ് _____
P2 A10	തയ്യൽ	_____	മണിക്കൂർ _____ മിനിറ്റ് _____
P2 A11	ശിശുപരിപാലനം –കുഞ്ഞിനെ ശുശ്രൂഷിക്കുക, വസ്ത്രംധരിപ്പിക്കുക, കുളിപ്പിക്കുക, ഭക്ഷണംനൽകുക, വല്ലപ്പോഴും എടുക്കുക.	_____	മണിക്കൂർ _____ മിനിറ്റ് _____
P2 A12	പല വീട്ടുജോലികളിൽ ഒരുമിച്ച് ഏർപ്പെടുക കഠിനമായ പരിശ്രമത്തിൽ	_____	മണിക്കൂർ _____ മിനിറ്റ് _____
P2 A13	ഗാരേജും വീടിനുവെളിയിലുള്ള ഭാഗങ്ങളും പാതകളും വൃത്തിയാക്കുക,	_____	മണിക്കൂർ _____ മിനിറ്റ് _____

P2 A14	പാചകം അല്ലെങ്കിൽ ഭക്ഷണം തയ്യാറാക്കൽ	_____	മണിക്കൂർ _____ മിനിറ്റ് _____
P2 A15	കടയിൽനിന്ന് സാധനങ്ങൾ വാങ്ങിച്ച് ചുമന്നുകൊണ്ടുവരിക	_____	മണിക്കൂർ _____ മിനിറ്റ് _____
P2 A16	മറ്റുള്ളവ എന്തെങ്കിലും. ..... (ദയവായി വിശദമാക്കുക)	_____	മണിക്കൂർ _____ മിനിറ്റ് _____
P2 A17	മറ്റുള്ളവ എന്തെങ്കിലും. ..... (ദയവായി വിശദമാക്കുക)	_____	മണിക്കൂർ _____ മിനിറ്റ് _____
P2 A18	മറ്റുള്ളവ എന്തെങ്കിലും. ..... (ദയവായി വിശദമാക്കുക)	_____	മണിക്കൂർ _____ മിനിറ്റ് _____
P2 A19	മറ്റുള്ളവ എന്തെങ്കിലും. ..... (ദയവായി വിശദമാക്കുക)	_____	മണിക്കൂർ _____ മിനിറ്റ് _____

ഒരിടത്തുനിന്നും മറ്റൊരിടത്തേക്ക് യാത്ര			
താഴെകൊടുത്തിരിക്കുന്ന ചോദ്യങ്ങളിൽ ജോലിസംബന്ധമായ ശാരീരിക പ്രവർത്തനങ്ങൾ ഉൾപ്പെടുന്നില്ല ഞാൻ ഇനി ചോദിക്കുവാൻ പോകുന്നത് ഒരു സാധാരണ ആഴ്ച്ചയിൽ ഒരിടത്തുനിന്നും മറ്റൊരിടത്തേക്കുള്ള യാത്രയെകുറിച്ചാണ് (ഉദാ: ജോലിസ്ഥലം, മാർക്കറ്റ്, അമ്പലം അഥവ പള്ളിയിൽ പോകുന്നത്)			
കോഡ്	ചോദ്യങ്ങൾ	പ്രതികരണം	
P3	നിങ്ങൾ ഒരിടത്തുനിന്ന് മറ്റൊരിടത്തെത്താൻ തുടർച്ചയായി പത്ത് മിനിറ്റെങ്കിലും നടക്കുകയോ, സൈക്കിൾ ചവിട്ടുകയോ ചെയ്യുന്നുണ്ടോ?	ഉണ്ട് ☐ ഇല്ല ☐	P3 a യിലേക്ക് പോവുക ഇല്ലെങ്കിൽ P4 ലേക്ക് പോവുക
ഒരിടത്തുനിന്നും മറ്റൊരു സ്ഥലത്തേക്ക് നടന്നത്			
		ആഴ്ച്ചയിൽ എത്ര	ഒരുദിവസം എത്ര

P3 A	പ്രവർത്തനം	ദിവസം ചെലവഴിച്ചു	സമയം ചെലവാക്കി
P3 A1	ജോലിക്ക്	_____	മണിക്കൂർ _____ മിനിറ്റ് _____
P3 A2	ചന്തയിലേക്ക്	_____	മണിക്കൂർ _____ മിനിറ്റ് _____
P3 A3	കടകളിലേക്ക്	_____	മണിക്കൂർ _____ മിനിറ്റ് _____
P3 A4	കുട്ടികളെ കൂട്ടികൊണ്ടുവരാൻ സ്കൂളിലേക്ക്	_____	മണിക്കൂർ _____ മിനിറ്റ് _____
P3 A5	സുഹൃത്തുക്കളെ, ബന്ധുക്കളെ അല്ലെങ്കിൽ മറ്റുള്ളവരെ കാണാൻ	_____	മണിക്കൂർ _____ മിനിറ്റ് _____
P3 A6	ക്ഷേത്രത്തിലേക്കോ, പള്ളിയിലേയ്ക്കോ	_____	മണിക്കൂർ _____ മിനിറ്റ് _____
P3 A7	മറ്റുള്ളവ എന്തെങ്കിലും ..... (ദയവായി വിശദമാക്കുക)	_____	മണിക്കൂർ _____ മിനിറ്റ് _____
P3 B	ഒരിടത്തുനിന്നും മറ്റൊരിടത്തേക്ക് സൈക്കിളിൽ പോയത്		
P3 B1	ജോലിക്ക്	_____	മണിക്കൂർ _____ മിനിറ്റ് _____
P3 B2	ചന്തയിലേക്ക്/കടകളിലേക്ക്	_____	മണിക്കൂർ _____ മിനിറ്റ് _____
P3 B3	മറ്റുള്ളവ എന്തെങ്കിലും ..... (ദയവായി വിശദമാക്കുക)	_____	മണിക്കൂർ _____ മിനിറ്റ് _____
P3 B4	മറ്റുള്ളവ എന്തെങ്കിലും ..... (ദയവായി വിശദമാക്കുക)	_____	മണിക്കൂർ _____ മിനിറ്റ് _____

വിനോദ പ്രവർത്തനങ്ങൾ

നിങ്ങൾ നേരത്തേസൂചിപ്പിച്ച തൊഴിൽ, സഞ്ചാര പ്രവർത്തനങ്ങളെ അടുത്ത ചോദ്യങ്ങളിൽ ഉൾപ്പെടുത്തരുത്. കളി, വിനോദ/വിശ്രമ വേളയിലുള്ള പ്രവർത്തനങ്ങളെക്കുറിച്ചാണ് ഞാനിപ്പോൾ നിങ്ങളോട് ചോദിക്കാൻ പോകുന്നത്.

P4	തുടർച്ചയായി പത്ത് മിനിറ്റെങ്കിലും ശ്വാസഗതിയുടെയോ, ഹൃദയമിടിപ്പിന്റെയോ വലിയവർധനയ്ക്കു കാരണമാകുന്ന കഠിനമായ കളികൾ (ഓട്ടം, ഫുട്ബോൾ, ബാഡ്മിൻറൺ എന്നിവയെപ്പോലെ) വിനോദം/ വിശ്രമ വേളകളിൽ നിങ്ങൾ ചെയ്യാറുണ്ടോ?	ഉണ്ട് ☐ ഇല്ല ☐	ഉണ്ടെങ്കിൽ P5ലേക്ക് പോവുക ഇല്ലെങ്കിൽ P7ലേക്ക് പോവുക
P5	ഒരു സാധാരണ ആഴ്ച്ചയിൽ എത്രദിവസം നിങ്ങൾ കഠിനമായ കളികൾ ചെയ്യാറുണ്ട്?	ദിവസങ്ങളുടെ എണ്ണം _____	
P6	ഒരു സാധാരണ ദിവസത്തിൽ എത്രസമയം നിങ്ങൾ കഠിനമായ കളികൾ ചെയ്യാൻ വിനിയോഗിക്കുന്നുണ്ട്?	മണിക്കൂർ _____ മിനിറ്റ് _____	
P7	തുടർച്ചയായി പത്ത് മിനിറ്റെങ്കിലും ശ്വാസഗതിയുടെയോ, ഹൃദയമിടിപ്പിന്റെയോ നേരിയവർധനയ്ക്കുകാരണമാവുന്ന വേഗത്തിലുള്ള നടത്തം, സൈക്കിൾ ചവിട്ടൽ, നീന്തൽ, വോളിബോൾ എന്നിവയെപ്പോലുള്ള മിതമായ കളികൾ, വിനോദം/ വിശ്രമ വേളകളിൽ നിങ്ങൾ ചെയ്യുന്നുണ്ടോ?	ഉണ്ട് ☐ ഇല്ല ☐	ഉണ്ടെങ്കിൽ P8ലേക്ക് പോവുക ഇല്ലെങ്കിൽ P10ലേക്ക് പോവുക
P8	ഒരു സാധാരണ ആഴ്ച്ചയിൽ എത്രദിവസം നിങ്ങൾ മിതമായ കളികൾ ചെയ്യും?	ദിവസങ്ങളുടെ എണ്ണം _____	
P9	ഒരു സാധാരണ ദിവസം എത്രസമയം നിങ്ങൾ മിതമായ കളികൾ ചെയ്യും?	മണിക്കൂർ _____ മിനിറ്റ് _____	

ഇരിക്കുന്ന സമയം:

ജോലിയിൽ, വീട്ടിൽ, ഒരിടത്തുനിന്ന് മറ്റൊരിടത്തേക്കുപോവുക അല്ലെങ്കിൽ സുഹൃത്തുക്കളോടൊപ്പമിരിക്കുക [ഇരുന്നുള്ള ഓഫീസ് ജോലി, സുഹൃത്തുക്കളോടൊപ്പമിരിക്കുക, കാർ, ബസ്, തീവണ്ടി മുതലായവയിൽ സഞ്ചരിക്കുക, വായിക്കുക, ചീട്ടുകളിക്കുക അല്ലെങ്കിൽ ടെലിവിഷൻ കാണുക] എന്നിവയ്ക്കായി ചെലവാക്കുന്ന സമയത്തെക്കുറിച്ചുള്ളതാണ് താഴെകൊടുത്തിരിക്കുന്ന ചോദ്യം. പക്ഷേ, ഉറങ്ങാൻ വിനിയോഗിക്കുന്ന സമയത്തെ ഉൾപ്പെടുത്തിയിട്ടില്ല.

P10	ഒരു സാധാരണ ദിവസത്തിൽ നിങ്ങൾ ഇരിക്കുന്നതിനോ കിടക്കുന്നതിനോ എത്രസമയം വിനിയോഗിക്കുന്നു?	മണിക്കൂർ —— മിനിറ്റ് ——
P11	ദിവസവും രാത്രിയിൽ ശരാശരി എത്ര മണിക്കൂർ ഉറങ്ങുന്നു?	മണിക്കൂർ —— മിനിറ്റ്

Appendix 8: Interview Schedule for intervention assessment at base line, fourth, seventh and thirteenth month of intervention (Malayalam)

അച്യുതമേനോൻ സെൻറർ ഫോർ ഹെൽത്ത് സയൻസ് സ്റ്റഡീസ്
ശ്രീ ചിത്തിര തിരുനാൾ ഇൻസ്റ്റിറ്റ്യൂട്ട് ഫോർ മെഡിക്കൽ സയൻസസ്സ് ആൻഡ് ടെക്നോളജി, തിരുവനന്തപുരം-695 001

സ്ത്രീകളുടെ ഇടയിൽ വ്യായാമം വർധിപ്പിക്കുന്നതിനുള്ള ആരോഗ്യ ഇടപെടലുകൾ

ഇടക്കാല മൂല്യനിർണ്ണയ ചോദ്യാവലി

വ്യക്തിയുടെ കോഡ് നമ്പർ .....

റസിഡൻറ്സ് അസ്സോസിയേഷന്റെ പേര് .....

വീട്ട് നമ്പർ .....

സർവ്വെ നടത്തുന്ന ആളുടെപേര് .....

(അഭിമുഖം നടത്തുന്നയാൾക്കുള്ള നിർദ്ദേശം: ദയവായി ചോദ്യങ്ങൾ ശ്രദ്ധയോടെ ചോദിക്കുകയും കളങ്ങൾ കൃത്യമായി പൂരിപ്പിക്കുകയും ചെയ്യുക.)

<u>വിഭാഗം എ: അടിസ്ഥാന വിവരപ്പട്ടിക (ആരോഗ്യ ഇടപ്പെടലുകൾ തുടങ്ങുന്നതിനു മുൻപ് എടുക്കേണ്ട സർവ്വെ)</u>

A1. ശാരീരിക വ്യായാമത്തെക്കുറിച്ചുള്ള നിങ്ങളുടെ മനോഭാവത്തെയും താൽപര്യത്തെയും കുറിച്ചാണ് ഈ സർവേ. ഓരോ ചോദ്യവും നിങ്ങൾ വായിച്ചിട്ട് കഴിഞ്ഞകാല സമീപസംഭവങ്ങളെക്കുറിച്ച് ചിന്തിക്കുക. ഇതൊരുപരീക്ഷയല്ല. തെറ്റുത്തരങ്ങളില്ല. ഈ ചോദ്യങ്ങൾക്ക് നിങ്ങൾക്ക് പതിവായി നിങ്ങൾ കാര്യങ്ങൾ ചെയ്യുന്നതെങ്ങനെയെന്ന് ചിന്തിക്കുക.

ഒരോപ്രസ്താവനയിലും നിങ്ങൾ ചെയ്യുന്നതോ ചെയ്യാൻ ആഗ്രഹിക്കുകയോ ചെയ്യുന്നവയുടെ വലതുഭാഗത്തുള്ള കളങ്ങളിൽ ദയവായി ശരി (✓) അടയാളമിടുക.

ചോദ്യങ്ങൾ	അതെ	അല്ല
1. ഞാൻ വ്യായാമം ചെയ്യുകൊണ്ടിരിക്കുന്നു.		
2. ഞാൻ അടുത്ത 6 മാസം വ്യായാമം ചെയ്യാൻ ഉദ്ദേശിക്കുന്നു.		
3. ഞാൻ പതിവായി വ്യായാമം ചെയ്യുകൊണ്ടിരിക്കുന്നു.		
4. ഞാൻ കഴിഞ്ഞ 6 മാസമായി വ്യായാമം ചെയ്യുകൊണ്ടിരിക്കുന്നു		
5. മുൻപ് ഏതാണ്ട് 3 മാസത്തോളം ഞാൻ പതിവായി വ്യായാമം ചെയ്തിരുന്നു.		

A2: <u>ശരീരത്തിന്റെ വിവിധ അളവുകൾ</u>

കോഡ്	അളവുകൾ	
B1	ഉയരം	☐☐☐ സെന്റിമീറ്റർ
B2	ഭാരം	☐☐☐ കിലോഗ്രാം
B3	അരക്കെട്ട് ചുറ്റളവ്	☐☐☐ സെന്റിമീറ്റർ

<u>വിഭാഗം ബി: (ആരോഗ്യ ഇടപ്പെടലുകളുടെ നാലാം മാസം എടുക്കേണ്ട സർവ്വെ)</u>

B1. ശാരീരിക വ്യായാമത്തെക്കുറിച്ചുള്ള നിങ്ങളുടെ മനോഭാവത്തെയും താൽപര്യത്തെയും കുറിച്ചാണ് ഈ സർവേ. ഓരോ ചോദ്യവും നിങ്ങൾ വായിച്ചിട്ട് കഴിഞ്ഞകാല സമീപസംഭവങ്ങളെക്കുറിച്ച് ചിന്തിക്കുക. ഇതൊരുപരീക്ഷയല്ല. തെറ്റുത്തരങ്ങളില്ല. ഈ ചോദ്യങ്ങൾക്ക് നിങ്ങൾക്ക് പതിവായി നിങ്ങൾ കാര്യങ്ങൾ ചെയ്യുന്നതെങ്ങനെയെന്ന് ചിന്തിക്കുക.

ഒരോപ്രസ്താവനയിലും നിങ്ങൾ ചെയ്യുന്നതോ ചെയ്യാൻ ആഗ്രഹിക്കുകയോ ചെയ്യുന്നവയുടെ വലതുഭാഗത്തുള്ള കളങ്ങളിൽ ദയവായി ശരി (✓) അടയാളമിടുക.

ചോദ്യങ്ങൾ	അതെ	അല്ല
1. ഞാൻ വ്യായാമം ചെയ്യുകൊണ്ടിരിക്കുന്നു.		
2. ഞാൻ അടുത്ത 6 മാസം വ്യായാമം ചെയ്യാൻ ഉദ്ദേശിക്കുന്നു.		
3. ഞാൻ പതിവായി വ്യായാമം ചെയ്യുകൊണ്ടിരിക്കുന്നു.		
4. ഞാൻ കഴിഞ്ഞ 6 മാസമായി വ്യായാമം ചെയ്യുകൊണ്ടിരിക്കുന്നു		
5. മുൻപ് ഏതാണ്ട് 3 മാസത്തോളം ഞാൻ പതിവായി വ്യായാമം ചെയ്തിരുന്നു.		

B2. ശാരീരിക പ്രവർത്തനത്തിൻെറ അനുവദനീയമായ അളവുകൾ എത്താൻ ഒരു സാധാരണ ആഴ്ചയിൽ എന്തൊക്കെ പ്രവർത്തനങ്ങളാണ് നിങ്ങൾ തെരഞ്ഞെടുക്കുന്നത്. യോജിച്ച കോളത്തിൽ ദയവായി ശരി (✓) അടയാളമിടുക.

കോഡ്	പ്രവർത്തികൾ	ചെയ്യുവാൻ തീരുമാനിച്ചത്	ആഴ്ച്ചയിൽ: മാസത്തിൽ എത്ര തവണ	ഇടയ്ക്ക് ചെയ്യാൻ പറ്റാതിരിന്നിട്ടുണ്ടോ?	അഭിപ്രായം
B2a	1. വേഗതയിലുള്ള നടത്തം (5mph) 15 മിനിറ്റ് എങ്കിലുംവീതം ആഴ്ച്ചയിൽ 5 ദിവസം.				
B2b	2. മിതമായ വേഗതയിലുള്ള നടത്തം (3mph) ഒന്നു എടുക്കാതെ 30 മിനിറ്റ് എങ്കിലും വീതം ആഴ്ച്ചയിൽ 5 ദിവസം				
B2c	3. സൈക്കിൾ ചവിട്ടൽ <10mph 20 മിനിറ്റ് വീതം ആഴ്ച്ചയിൽ 5 ദിവസം				
B2d	4. ലഘുഭാര സൈക്കിൾ ചവിട്ടൽ 20 മിനിറ്റ് വീതം ആഴ്ച്ചയിൽ 5 ദിവസം.				
B2e	5. തറതുക്കുകയും വ്യത്തിയാക്കുകയും 20 മിനിറ്റ് വീതം ആഴ്ച്ചയിൽ 3 ദിവസം				
B2f	6. ബാഡ്മിൻറൺ കളി ഒരുമണിക്കൂർവീതം ആഴ്ച്ചയിൽ 2				

	ദിവസം.				
B2g	7. വീട്ടിലെ പടികയറുകയും ഇറങ്ങുകയും ചെയ്യുക 20 മിനിറ്റ് വീതം ആഴ്ച്ചയിൽ 5 ദിവസം.				
B2h	8. ഞാൻ ഒന്നും ചെയ്യുന്നില്ല				
B2i	9. മറ്റുള്ളവ എന്തെങ്കിലും ദയവായി വിശദമാക്കുക.				

B3 . വ്യായാമം ചെയ്യുന്നതും പ്രവർത്തിനിരിതമായിരിക്കുന്നതിനും പ്രോത്സാഹനം നൽകുന്നത് എന്തെല്ലാം ഘടകങ്ങളാണ്?

കുടുംബം/പങ്കാളിയിൽ നിന്നുള്ള പിന്തുണ	☐	കുടുംബത്തിലെ വ്യായാമം ചെയ്യുന്ന അംഗം	☐
സുഹൃത്തുക്കൾ/അയൽക്കാരിൽനിന്നുള്ള പിന്തുണ	☐	കളികളിൽ മുൻപുള്ള പങ്കാളിത്തം	☐
പ്രമേഹം /അതിരക്തസമ്മർദ്ദ	☐	ശാരീരിക വ്യായാമത്തിന്റെ നേട്ടങ്ങളെക്കുറിച്ചുള്ള അറിവ്	☐
ആരോഗ്യപ്രവർത്തകന്റെ ഉപദേശം	☐	വ്യായാമം ചെയ്യാൻ ഉള്ള ആത്മവിശ്വാസം	☐
കുടുംബാംഗങ്ങൾക്ക് എന്തെങ്കിലും കടുത്ത അവസ്ഥയുണ്ടാവുക	☐	മറ്റുള്ളവ എന്തെങ്കിലും..... ദയവായി വിശദമാക്കുക	☐

B4 നിങ്ങളുടെ ജോലി/കുടുംബ ഉത്തരവാദിത്തങ്ങൾ കൂടാതെ സ്ഥിരമായ ശാരീരിക വ്യായാമം ചെയ്യുന്നതിൽ നിങ്ങൾ നേരിടുന്ന തടസ്സങ്ങൾ ഏവ?

സമയക്കുറവ്	☐	എനിക്ക് ഈ ഒരു പ്രതിബന്ധവുമില്ല	☐
പ്രവർത്തനത്തോടുള്ള താൽപര്യവും ആസ്വാദനവുംകുറവ്	☐	ശിശുപരിപാലന ഉത്തരവാദിത്തം	☐
കുടുംബം/പങ്കാളിയിൽനിന്നുള്ള പിന്തുണക്കുറവ്	☐	എനിക്ക് വ്യായാമം ചെയ്യാനുള്ള സാമർഥ്യമില്ല	☐

വ്യായാമത്തിനായി എന്തുചെയ്യണമെന്നറിയില്ല	☐	ഒരു പ്രവർത്തനത്തിനുമുള്ള ഊർജ്ജം എന്നിലില്ല	☐
എന്നോടൊപ്പം ആരുമില്ല	☐	ആളുകൾ എന്നെ പരിഹസിക്കുന്നു.	☐
നടക്കാനുള്ള സുരക്ഷിത സ്ഥലക്കുറവ്	☐	മറ്റുള്ളവ ദയവായി വിശദമാക്കുക.....	☐

B5. ഈ ആരോഗ്യ ഇടപെടലുകളിൽ ഏതൊക്കെ ഘടകങ്ങളാണ് നിങ്ങളെ വ്യായാമത്തിനു പ്രോത്സാഹിപ്പിക്കുന്നത്

ആരോഗ്യ ഇടപെടലുകൾ	(1) അത്രത്തോളം പ്രാധാന്യമില്ല	(2) നേരിയ പ്രാധാന്യം	(3) മിതമായ പ്രധാന്യം	(4) വളരെ പ്രാധാന്യം	(5) അങ്ങേയറ്റം പ്രാധാന്യം
സമപ്രായക്കാരുമായുള്ള ഇടപെടൽ					
കൂട്ടമായ കൗൺസിലിങ്ങ്					
കുടുംബത്തിൽനിന്നുള്ള പിന്തുണ					
അയൽക്കാരിൽനിന്നുള്ള പിന്തുണ					
വിവരസൂചിക					

<u>വിഭാഗം സി: ആരോഗ്യ ഇടപ്പെടലുകളുടെ എഴാം മാസം എടുക്കേണ്ട സർവെ</u>

C1. ശാരീരിക വ്യായാമത്തെക്കുറിച്ചുള്ള നിങ്ങളുടെ മനോഭാവത്തെയും താൽപര്യത്തെയും കുറിച്ചാണ് ഈ സർവേ. ഓരോ ചോദ്യവും നിങ്ങൾ വായിച്ചിട്ട് കഴിഞ്ഞകാല സമീപസംഭവങ്ങളെക്കുറിച്ച് ചിന്തിക്കുക. ഇതൊരുപരീക്ഷയല്ല. തെറ്റുത്തരങ്ങളില്ല. ഈ ചോദ്യങ്ങൾക്ക് നിങ്ങൾക്ക് പതിവായി നിങ്ങൾ കാര്യങ്ങൾ ചെയ്യുന്നതെങ്ങനെയെന്ന് ചിന്തിക്കുക.

ഒരോപ്രസ്താവനയിലും നിങ്ങൾ ചെയ്യുന്നതോ ചെയ്യാൻ ആഗ്രഹിക്കുകയോ ചെയ്യുന്നവയുടെ വലതുഭാഗത്തുള്ള കളങ്ങളിൽ ദയവായി ശരി (✓) അടയാളമിടുക.

ചോദ്യങ്ങൾ	അതെ	അല്ല
1. ഞാൻ വ്യായാമം ചെയ്യുകൊണ്ടിരിക്കുന്നു.		

2. ഞാൻ അടുത്ത 6 മാസം വ്യായാമം ചെയ്യാൻ ഉദ്ദേശിക്കുന്നു.		
3. ഞാൻ പതിവായി വ്യായാമം ചെയ്യുകൊണ്ടിരിക്കുന്നു.		
4. ഞാൻ കഴിഞ്ഞ 6 മാസമായി വ്യായാമം ചെയ്യുകൊണ്ടിരിക്കുന്നു		
5. മുൻപ് ഏതാണ്ട് 3 മാസത്തോളം ഞാൻ പതിവായി വ്യായാമം ചെയ്ത്തിരുന്നു.		

C2. ശാരീരിക പ്രവർത്തനത്തിന്റെ അനുവദനീയമായ അളവുകൾ എത്താൻ ഒരു സാധാരണ ആഴ്ചയിൽ എന്തൊക്കെ പ്രവർത്തനങ്ങളാണ് നിങ്ങൾ തെരഞ്ഞെടുക്കുന്നത്. യോജിച്ച കോളത്തിൽ ദയവായി ശരി (✓) അടയാളമിടുക.

കോഡ്	പ്രവർത്തികൾ	ചെയ്യുവാൻ തീരുമാനിച്ചത്	ആഴ്ച്ചയിൽ: മാസത്തിൽ എത്ര തവണ	ഇടയ്ക്ക് ചെയ്യാൻ പറ്റാതിരിന്നിട്ടുണ്ടോ?	അഭിപ്രായം
C2a	1. വേഗതയിലുള്ള നടത്തം (5mph) 15 മിനിറ്റ് എങ്കിലും വീതം ആഴ്ച്ചയിൽ 5 ദിവസം				
C2b	2. മിതമായ വേഗതയിലുള്ള നടത്തം (3mph) ഒന്നു എടുക്കാതെ 30 മിനിറ്റ് എങ്കിലും വീതം ആഴ്ച്ചയിൽ 5 ദിവസം				
C2c	3. സൈക്കിൾ ചവിട്ടൽ <10mph 20 മിനിറ്റ് വീതം ആഴ്ച്ചയിൽ 5 ദിവസം.				
C2d	4. ലഘുദൂര സൈക്കിൾ ചവിട്ടൽ 20 മിനിറ്റ് വീതം ആഴ്ച്ചയിൽ 5 ദിവസം.				
C2e	5. തറതൂക്കുകയും വ്യത്തിയാക്കുകയും 20 മിനിറ്റ് വീതം ആഴ്ച്ചയിൽ 3 ദിവസം				
C2f	6. ബാഡ്മിൻറൺ കളി ഒരുമണിക്കൂർവീതം ആഴ്ച്ചയിൽ 2 ദിവസം.				
C2g	7. വീട്ടിലെ പടികയറുകയും ഇറങ്ങുകയും ചെയ്യുക 20 മിനിറ്റ് വീതം ആഴ്ച്ചയിൽ 5 ദിവസം.				
C2h	8. ഞാൻ ഒന്നും ചെയ്യുന്നില്ല				

C2i	9. മറ്റുള്ളവ എന്തെങ്കിലും ദയവായി വിശദമാക്കുക.				

C3 . വ്യായാമം ചെയ്യുന്നതും പ്രവർത്തിനിരിതമായിരിക്കുന്നതിനും പ്രോത്സാഹനം നൽകുന്നത് എന്തെല്ലാം ഘടകങ്ങളാണ്?

കുടുംബം/പങ്കാളിയിൽ നിന്നുള്ള പിന്തുണ	☐	കുടുംബത്തിലെ വ്യായാമം ചെയ്യുന്ന അംഗം	☐
സുഹൃത്തുക്കൾ/അയൽക്കാരിൽനിന്നുള്ള പിന്തുണ	☐	കളികളിൽ മുൻപുള്ള പങ്കാളിത്തം	☐
പ്രമേഹം /അതിരക്തസമ്മർദ്ദ	☐	ശാരീരിക വ്യായാമത്തിന്റെ നേട്ടങ്ങളെക്കുറിച്ചുള്ള അറിവ്	☐
ആരോഗ്യപ്രവർത്തകന്റെ ഉപദേശം	☐	വ്യായാമം ചെയ്യാൻ ഉള്ള ആത്മവിശ്വാസം	☐
കുടുംബാംഗങ്ങൾക്ക് എന്തെങ്കിലും കടുത്ത അവസ്ഥയുണ്ടാവുക	☐	മറ്റുള്ളവ എന്തെങ്കിലും..... ദയവായി വിശദമാക്കുക	☐

C4 നിങ്ങളുടെ ജോലി/കുടുംബ ഉത്തരവാദിത്തങ്ങൾ കൂടാതെ സ്ഥിരമായ ശാരീരിക വ്യായാമം ചെയ്യുന്നതിൽ നിങ്ങൾ നേരിടുന്ന തടസ്സങ്ങൾ ഏവ?

സമയക്കുറവ്	☐	എനിക്ക് ഈ ഒരു പ്രതിബന്ധവുമില്ല	☐
പ്രവർത്തനത്തോടുള്ള താൽപര്യവും ആസ്വാദനവുംകുറവ്	☐	ശിശുപരിപാലന ഉത്തരവാദിത്തം	☐
കുടുംബം/പങ്കാളിയിൽനിന്നുള്ള പിന്തുണക്കുറവ്	☐	എനിക്ക് വ്യായാമം ചെയ്യാനുള്ള സാമർഥ്യമില്ല	☐
വ്യായാമത്തിനായി എന്തുചെയ്യണമെന്നറിയില്ല	☐	ഒരു പ്രവർത്തനത്തിനുമുള്ള ഊർജ്ജം എന്നിലില്ല	☐
എന്നോടൊപ്പം ആരുമില്ല	☐	ആളുകൾ എന്നെ പരിഹസിക്കുന്നു.	☐
നടക്കാനുള്ള സുരക്ഷിത സ്ഥലക്കുറവ്	☐	മറ്റുള്ളവ ദയവായി വിശദമാക്കുക.....	☐

C5. ഈ ആരോഗ്യ ഇടപെടലുകളിൽ ഏതൊക്കെ ഘടകങ്ങളാണ് നിങ്ങളെ വ്യായാമത്തിനു പ്രോത്സാഹിപ്പിക്കുന്നത്

ആരോഗ്യ ഇടപെടലുകൾ	(1) അത്രത്തോളം പ്രാധാന്യമില്ല	(2) നേരിയ പ്രാധാന്യം	(3) മിതമായ പ്രധാന്യം	(4) വളരെ പ്രാധാന്യം	(5) അങ്ങേയറ്റം പ്രാധാന്യം
സമപ്രായക്കാരുമായുള്ള ഇടപെടൽ					
കൂട്ടമായ കൗൺസിലിങ്ങ്					
കുടുംബത്തിൽനിന്നുള്ള പിന്തുണ					
അയൽക്കാരിൽനിന്നുള്ള പിന്തുണ					
വിവരസൂചിക					

<u>വിഭാഗം ഡി: ആരോഗ്യ ഇടപ്പെടലുകളുടെ പതിമൂന്നാം മാസം എടുക്കേണ്ട സർവ്വെ</u>

D1. ശാരീരിക വ്യായാമത്തെക്കുറിച്ചുള്ള നിങ്ങളുടെ മനോഭാവത്തെയും താൽപര്യത്തെയും കുറിച്ചാണ് ഈ സർവേ. ഓരോ ചോദ്യവും നിങ്ങൾ വായിച്ചിട്ട് കഴിഞ്ഞകാല സമീപസംഭവങ്ങളെക്കുറിച്ച് ചിന്തിക്കുക. ഇതൊരുപരീക്ഷയല്ല. തെറ്റുത്തരങ്ങളില്ല. ഈ ചോദ്യങ്ങൾക്ക് നിങ്ങൾക്ക് പതിവായി നിങ്ങൾ കാര്യങ്ങൾ ചെയ്യുന്നതെങ്ങനെയെന്ന് ചിന്തിക്കുക.

ഒരോപ്രസ്താവനയിലും നിങ്ങൾ ചെയ്യുന്നതോ ചെയ്യാൻ ആഗ്രഹിക്കുകയോ ചെയ്യുന്നവയുടെ വലതുഭാഗത്തുള്ള കളങ്ങളിൽ ദയവായി ശരി (✓) അടയാളമിടുക.

ചോദ്യങ്ങൾ	അതെ	അല്ല
1. ഞാൻ വ്യായാമം ചെയ്യുകൊണ്ടിരിക്കുന്നു.		
2. ഞാൻ അടുത്ത 6 മാസം വ്യായാമം ചെയ്യാൻ ഉദ്ദേശിക്കുന്നു.		
3. ഞാൻ പതിവായി വ്യായാമം ചെയ്യുകൊണ്ടിരിക്കുന്നു.		
4. ഞാൻ കഴിഞ്ഞ 6 മാസമായി വ്യായാമം ചെയ്യുകൊണ്ടിരിക്കുന്നു		
5. മുൻപ് ഏതാണ്ട് 3 മാസത്തോളം ഞാൻ പതിവായി വ്യായാമം ചെയ്തിരുന്നു.		

D2. ശാരീരിക പ്രവർത്തനത്തിന്റെ അനുവദനീയമായ അളവുകൾ എത്താൻ ഒരു സാധാരണ ആഴ്ചയിൽ എന്തൊക്കെ പ്രവർത്തനങ്ങളാണ് നിങ്ങൾ തെരഞ്ഞെടുക്കുന്നത്. യോജിച്ച കോളത്തിൽ ദയവായി ശരി (✓) അടയാളമിടുക.

കോഡ്	പ്രവർത്തികൾ	ചെയ്യുവാൻ തീരുമാനിച്ചത്	ആഴ്ച്ചയിൽ: മാസത്തിൽ എത്ര തവണ	ഇടയ്ക്ക് ചെയ്യാൻ പറ്റാതിരിന്നിട്ടുണ്ടോ?	അഭിപ്രായം
D2a	1. വേഗതയിലുള്ള നടത്തം (5mph) 15 മിനിറ്റ് എങ്കിലുംവീതം ആഴ്ച്ചയിൽ 5 ദിവസം				
D2b	2. മിതമായ വേഗതയിലുള്ള നടത്തം (3mph) ഒന്നു എടുക്കാതെ 30 മിനിറ്റ് എങ്കിലും വീതം ആഴ്ച്ചയിൽ 5 ദിവസം				
D2c	3. സൈക്കിൾ ചവിട്ടൽ <10mph 20 മിനിറ്റ് വീതം ആഴ്ച്ചയിൽ 5 ദിവസം				
D2d	4. ലഘുദൂര സൈക്കിൾ ചവിട്ടൽ 20 മിനിറ്റ് വീതം ആഴ്ച്ചയിൽ 5 ദിവസം.				
D2e	5. തറതൂക്കുകയും വ്യത്തിയാക്കുകയും 20 മിനിറ്റ് വീതം ആഴ്ച്ചയിൽ 3 ദിവസം				
D2f	6. ബാഡ്മിൻറൺ കളി ഒരുമണിക്കൂർവീതം ആഴ്ച്ചയിൽ 2 ദിവസം.				
D2g	7. വീട്ടിലെ പടികയറുകയും ഇറങ്ങുകയും ചെയ്യുക 20 മിനിറ്റ് വീതം ആഴ്ച്ചയിൽ 5 ദിവസം.				
D2h	8. ഞാൻ ഒന്നും ചെയ്യുന്നില്ല				
D2i	9. മറ്റുള്ളവ എന്തെങ്കിലും ദയവായി വിശദമാക്കുക.				

D3. വ്യായാമം ചെയ്യുന്നതും പ്രവർത്തിനിരിതമായിരിക്കുന്നതിനും പ്രോത്സാഹനം നൽകുന്നത് എന്തെല്ലാം ഘടകങ്ങളാണ്?

കുടുംബം/പങ്കാളിയിൽ നിന്നുള്ള പിന്തുണ	☐	കുടുംബത്തിലെ വ്യായാമം ചെയ്യുന്ന അംഗം	☐
സുഹൃത്തുക്കൾ/അയൽക്കാരിൽനിന്നുള്ള പിന്തുണ	☐	കളികളിൽ മുൻപുള്ള പങ്കാളിത്തം	☐
പ്രമേഹം /അതിരക്തസമ്മർദ്ദ	☐	ശാരീരിക വ്യായാമത്തിന്റെ നേട്ടങ്ങളെക്കുറിച്ചുള്ള അറിവ്	☐
ആരോഗ്യപ്രവർത്തകന്റെ ഉപദേശം	☐	വ്യായാമം ചെയ്യാൻ ഉള്ള ആത്മവിശ്വാസം	☐
കുടുംബാംഗങ്ങൾക്ക് എന്തെങ്കിലും കടുത്ത അവസ്ഥയുണ്ടാവുക	☐	മറ്റുള്ളവ എന്തെങ്കിലും..... ദയവായി വിശദമാക്കുക	☐

D4 നിങ്ങളുടെ ജോലി/കുടുംബ ഉത്തരവാദിത്തങ്ങൾ കൂടാതെ സ്ഥിരമായ ശാരീരിക വ്യായാമം ചെയ്യുന്നതിൽ നിങ്ങൾ നേരിടുന്ന തടസ്സങ്ങൾ ഏവ?

സമയക്കുറവ്	☐	എനിക്ക് ഈ ഒരു പ്രതിബന്ധവുമില്ല	☐
പ്രവർത്തനത്തോടുള്ള താൽപര്യവും ആസ്വാദനവുംകുറവ്	☐	ശിശുപരിപാലന ഉത്തരവാദിത്തം	☐
കുടുംബം/പങ്കാളിയിൽനിന്നുള്ള പിന്തുണക്കുറവ്	☐	എനിക്ക് വ്യായാമം ചെയ്യാനുള്ള സാമർഥ്യമില്ല	☐
വ്യായാമത്തിനായി എന്തുചെയ്യണമെന്നറിയില്ല	☐	ഒരു പ്രവർത്തനത്തിനുമുള്ള ഊർജ്ജം എന്നിലില്ല	☐
എന്നോടൊപ്പം ആരുമില്ല	☐	ആളുകൾ എന്നെ പരിഹസിക്കുന്നു.	☐
നടക്കാനുള്ള സുരക്ഷിത സ്ഥലക്കുറവ്	☐	മറ്റുള്ളവ ദയവായി വിശദമാക്കുക.....	☐

D5. ഈ ആരോഗ്യ ഇടപെടലുകളിൽ ഏതൊക്കെ ഘടകങ്ങളാണ് നിങ്ങളെ വ്യായാമത്തിനു പ്രോത്സാഹിപ്പിക്കുന്നത്

ആരോഗ്യ ഇടപെടലുകൾ	(1) അത്രത്തോളം പ്രാധാന്യമില്ല	(2) നേരിയ പ്രാധാന്യം	(3) മിതമായ പ്രധാന്യം	(4) വളരെ പ്രാധാന്യം	(5) അങ്ങേയറ്റം പ്രാധാന്യം
സമപ്രായക്കാരുമായുള്ള ഇടപെടൽ					
കൂട്ടമായ കൗൺസിലിങ്ങ്					
കുടുംബത്തിൽനിന്നുള്ള പിന്തുണ					
അയൽക്കാരിൽനിന്നുള്ള പിന്തുണ					
വിവരസൂചിക					

D6: വ്യായാമതീരുമാനതുല്യത:

ഒരോ വിഭാഗത്തിന്റെയും വലതുവശത്തുള്ള കളങ്ങളിൽ നിങ്ങളുടെ അഭിപ്രായത്തോട് ഏറ്റവും യോജിക്കുന്നതിൽ ശരി (✓) അടയാളമിടുക.

ചോദ്യങ്ങൾ	ശക്തമായി വിയോജിക്കുന്നു	കുറെശ്ശെ വിയോജിക്കുന്നു	യോജിക്കുകയോ വിയോജിക്കുകയോ ചെയ്യുന്നില്ല	കുറെശ്ശെ യോജിക്കുന്നു	ശക്തമായി യോജിക്കുന്നു	അറിയില്ല /ഉറപ്പില്ല
1. ഞാൻ സ്ഥിരമായി വ്യായാമം ചെയ്യാൽ എനിക്ക് എന്റെ കുടുബാംഗങ്ങൾക്കുവേണ്ടിയും സുഹൃത്തുക്കൾക്കുവേണ്ടിയും കൂടുതൽ എന്തെങ്കിലും ചെയ്യാൻ കഴിയും.						
2.സ്ഥിരമായി വ്യായാമം ചെയ്യുന്നത് സമ്മർദ്ദം ലഘൂകരിക്കാൻ എന്നെ സഹായിക്കും.						
3.വ്യായാമത്തിനുശേഷം ദൈനംദിനജോലികൾ ചെയ്യുമ്പോൾ കൂടുതൽ ക്ഷീണിക്കുമെന്ന് ഞാൻ കരുതുന്നു						
4. ദിവസവും വ്യായാമം ചെയ്യുകയാണെങ്കിൽ എനിക്ക് കൂടുതൽ ആത്മവിശ്വാസം ഉണ്ടാകും.						

5. ദിവസേന വ്യായാമം ചെയ്യുമെങ്കിൽ കൂടുതൽ ഗാഢമായി എനിക്ക് ഉറങ്ങാൻ കഴിയുന്നു.						
6. ദിവസവും വ്യായാമംചെയ്യുന്നതിൽ ഒരു ആത്മാർഥത പുലർത്തുന്നതോടുകൂടെ എനിക്ക് എന്നെക്കുറിച്ച് നല്ലതുതോന്നുന്നു						
7. മോശം കാലാവസ്ഥ ബാധിക്കാത്തതും എനിക്ക് ആസ്വദിക്കാനാവുന്നതുമായ ഒരു ശാരീരികവ്യായാമം കണ്ടെത്തുക പ്രയാസമാണ്.						
8. ഞാൻ ദിവസേന വ്യായാമം ചെയ്യുന്നതിലൂടെ എന്റെ ശരീരം ഉത്തമം ആകുന്നത് ഞാൻ ഇഷ്ടപ്പെടുന്നു						
9. ഞാൻ ദിവസേന വ്യായാമം ചെയ്യുമെങ്കിൽ ദൈനംദിന പ്രവർത്തികൾ എനിക്ക് അനായാസം ചെയ്യാൻ കഴിയും.						
10. ദിവസേന വ്യായാമ ചെയ്യുകയാണെങ്കിൽ സമ്മർദ്ദം കുറയുന്നതായി എനിക്കനുഭവപ്പെടും.						
11. വ്യായാമം ചെയ്യുമ്പോൾ ശ്വാസം ലഭിക്കാതാവുകയും ഹൃദയസ്പന്ദനം വർദ്ധിക്കുകയും ചെയ്യുന്നതിനാൽ ബുദ്ധിമുട്ട് അനുഭവപ്പെടുന്നു.						
12. ദിവസേന ഞാൻ വ്യായാമം ചെയ്യുകയാണെങ്കിൽ എന്റെ ശരീരത്തിൽ കൂടുതൽ സുഖം അനുഭവപ്പെടും.						
13. സ്ഥിരമായ വ്യായാമം എന്റെ വളരെയധികം സമയം അപഹരിക്കുന്നു.						
14. സ്ഥിരമായ വ്യായാമം എന്റെ ജീവിതത്തിൽ പുരോഗമനപരമായ വീക്ഷണത്തിന് എന്നെ സഹായിക്കുന്നു						
15. സ്ഥിരമായി വ്യായാമം ചെയ്യൽ എന്റെ കുടുംബത്തോടും സുഹൃത്തുക്കളോടുമൊപ്പം എനിക്കുള്ള സമയം കുറയുന്നു.						
16. ദിവസാവസാനം എനിക്ക് ക്ഷീണംകൊണ്ട് വ്യായാമം ചെയ്യാൻ കഴിയുന്നില്ല.						