

**UNDERSTANDING THE BEHAVIOURAL PATTERN OF SELF-MANAGEMENT
OF METS AMONG THE URBAN SLUM POPULATION OF DELHI THROUGH
THE HEALTH BELIEF MODEL**

Dissertation Submitted to



The IIHMR University, Jaipur

for the partial fulfilment for the award of the degree of

Master of Business Administration (MBA)

in

Hospital and Health Management

By

Chandan Kumar

Under the Supervision and Guidance of

Dr Goutam Sadhu

2024



Date: 05. July.2024

Certificate of Internship

This is to certify that Mr. Chandan Kumar has completed his internship with FHTS from April 05, 2024 till July 05, 2024.

He participated in a community initiative to address SDG3 (Good Health and Well-Being), conducted in-depth interviews for an ICMR study on metabolic syndrome, and prepared videos for self-measurement of blood pressure and blood sugar. He also assisted in preparing academic modules, participated in evaluating the impact of digital health interventions, and curated IEC material for the ICMR study.

Chandan's performance was good and he was able to accomplish the assigned tasks timely and successfully. He worked diligently during this period and displayed positive attitude and effective interpersonal, communication and professional skills.

Thank you.
Yours sincerely,
for and on behalf of FHTS

A handwritten signature in red ink, which appears to read 'Sanjay Sharma', is written over a rectangular stamp area.

President
Foundation of Healthcare Technologies Society

Appendix D: Declaration by Student

DECLARATION BY STUDENT

I hereby declare that this dissertation titled *Understanding the Behavioural Pattern on Self-management of MetS among the urban slum population of Delhi through the Health Belief Model* is the bona-fide record of my original research work. I declare that it has not been submitted to any other university or institution for the award of any degree or diploma. Information derived from the published or unpublished work of others has been duly acknowledged in the text.

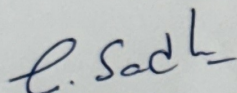
(Signature) 

Name of the student: Chandan Kumar

Date: - 05-07-2024

Appendix F: Certificate from Faculty Guide and School Dean**CERTIFICATE**

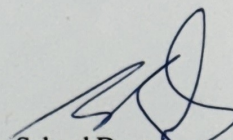
This is to certify that the dissertation titled *Understanding the Behavioural Pattern on Self-management of MetS among the urban slum population of Delhi through the Health Belief Model* is a record of the research work undertaken by Chandan Kumar in partial fulfilment of the requirements for the award of the degree of MBA (Hospital and Health Management from the IIHMR University, Jaipur under my guidance and supervision, and his approach to the research study has been sincere, scientific, and analytical.



Faculty Guide

IIHMR University, Jaipur

Date



School Dean

IIHMR University, Jaipur

Date

05/07/2024.

ABSTRACT

The metabolic syndrome (MetS) represents a group of risk factors that predispose individuals to cardiovascular diseases, type 2 diabetes, and several types of malignancies. The purpose of this research was to identify sociocultural and behavioural factors of non-communicable chronic diseases' self-management among the MetS population of the studied urban slums in Delhi, India. The hybrid design of the study engaged 120 adults with MetS as participants. The type of data used included sociodemographic characteristics, health and clinical records, which were used with qualitative data from the interviews based on the Health Belief Model. Evaluation of the outcomes showed the participants' unawareness of MetS, behavioural regulation through diet and physical activity, stress impact on self-management, and the capacity of mobile technology in health literacy and promotion. I, therefore, suggest targeted interventions at identifying and addressing these needs for the population in question with an emphasis on culturally competent treatments and quality healthcare.

ABBREVIATIONS

A
ANM: Auxiliary Nurse Midwife
ATP III: Adult Treatment Panel III
B
BP: Blood Pressure
BMC: British Medical Council
C
CHO: Community Health Officer
CSR: Corporate Social Responsibility
CURES: Chennai Urban Rural Epidemiology Study
D
DM: Diabetes Mellitus
DQ: Dietary Quality
F
FGD: Focus Group Discussion
G
GPAQ: Global Physical Activity Questionnaire
H
HDL: High-density Lipoprotein
HBM: Health Belief Model
I
IDDS: Individual Dietary Diversity Score
IDF: International Diabetes Federation
J
JIS: Joint Interim Statement

M
MBA: Master of Business Administration
MetS: Metabolic Syndrome
MEDFICTS: Meat, Eggs, Dairy, Fried foods, In baked goods, Convenience foods, Table fats, Snacks
N
NCEP: National Cholesterol Education Program
NCD: No Communicable Disease
P
PSS: Perceived Stress Scale
PSQI: Pittsburgh Sleep Quality Index
PSBI: Possible Serious Bacterial Infection
R
RCT: Randomized Controlled Trial
S
SAMNCEP: South Asian Modified NCEP
T2DM: Type 2 Diabetes Mellitus
W
WHO: World Health Organization

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Chapter 1: Introduction

1.1 Background

Metabolic Syndrome (MetS) has been identified as a cluster of risk factors, including obesity, elevated blood pressure, and distorted lipid and glucose metabolism (Alberti 1998). The pathogenesis of MetS is still under debate, but a study has suggested chronic inflammation as one of the underlying mechanisms for its development (Esposito K., 2004). A strong association of MetS has been demonstrated with the risk of coronary heart disease, stroke, nonalcoholic fatty liver disease, diabetes mellitus type 2 (T2DM), and other forms of cardiovascular diseases (Galassi et al. 2006; Lonardo et al. 2015; Li et al., 2008; Mottillo et al., 2010; Giampaolli et al 2009; Vishram et al 2014). The susceptibility to MetS can also be attributed to factors such as environmental chemical exposure (Christensen 2019, Shim 2019), increased sedentary lifestyle (Oliveira 2016), and unhealthy diet (Giugliano 2006). In a recent study (SotosPrieto 2021), the Mediterranean lifestyle was found to be associated with a lower frequency of MetS and reduced allcause mortality in Spain, indicating the need for lifestyle modifications for preventive measures. A recent study framed in relation to Japanese employees proved that MetS was related to incidents of severe cancer events, particularly those associated with malignancies elicited by obesity; also, based on research, odds of severe cancer situations may rise with the growth in the number of MetS features (Hoang et al., 2023).

1.2 MetS Prevalence: Global Scenario

The prevalence of MetS may vary according to the definition, however among adults it has been estimated to be 20% in Asia (Ranasinghe et al 2017), 24.3% in Europe (Engine et al 2017), and 37% in the U.S (Hirode et al. 2020). In low to medium income countries, a prevalence of 4.2%–15.4% was found among studies that used the NCEPATP III criteria, and 4.5%–38.7% in studies where the WHO criteria were used (Moraes et al., 2009)

Although the risk of MetS has been observed to be higher at an older age (Scruti et al 2015, Hildrum et al 2007; Guallar et al 2014); however, few studies have identified the younger population to be at risk (Vanlanckar et al 2017, Nolan et al., 2017; Gutierrez et al 2018; Alzabbi

et al 2019; Shehri et al 2022). Furthermore, the development of MetS has been shown to have some gender differences according to age; men having a higher prevalence at younger ages compared to women which has reversed among older age groups (Pucci et al., 2017).

1.3 MetS Prevalence: Indian Scenario

The prevalence of MetS among urban Asian Indians is nearly 25% with a distribution of 18% prevalence in men and 31% prevalence in men using NCEP criteria (Gupta et al., 2004).

Studies have shown that In India, the prevalence of MetS is higher in urban areas, compared with rural areas, and rises further with higher socioeconomic status (Mohan 2005, Ramachandran 1998, Mohan et al., 2001). A study reported that the prevalence of MetS in northern India is more than 40%, and the prevalence was significantly higher in females. The study also indicated that while the majority of MetS cases (80%) were found in individuals over 40 years old, there is a notable and rapid increase in prevalence among those under 40 years old (Khan et al., 2018).

The Chennai Urban Rural Epidemiology Study (CURES) reported MetS prevalence rates of 26%, 18%, and 23% according to the IDF, NCEP, and WHO criteria, respectively. However, the concordance among these criteria was low, with only 30% of the Indian population being consistently identified as having MetS by all three criteria, in contrast to over 93% of the US population (Deepa et al., 2007).

A Scoping review study has demonstrated that almost one in three adults in India suffer from MetS; and females, people living in urban areas and in the northeast region had higher prevalence. This study also suggested that Development and implementation of policies and protocols for the screening of MetS would enable us in early diagnosis and treatment with a special focus on the vulnerable and high-risk groups (Krishnamoorthy et al., 2020).

Another study from rural Andhra Pradesh, India, including 4,535 persons aged 30 and above, found that the prevalence of MetS was 27% in males and 18% in women. When SAMNCEP criteria were applied, however, the prevalence jumped to 33% and 24%, respectively (Chow 2007). In a recent, extensive, multicenter study conducted in India with 19,973 participants, the

prevalence of MetS was shown to be 27% when using NCEP criteria, but rose to 35% when using SAMNCEP criteria. (Reddy et al 2006). Approximately 3050% of urban South Asians have MetS. (Gupta et 2004; Enas et al., 2007) The prevalence increases to >73% in people with diabetes with women having even higher prevalence (83%) compared to men (65%) (Raman et al 2010)

The prevalence of MetS was 41% (men 36% and women 47%) in urban Chennai using waist circumference >90cm in men and >85cm in women as criteria for abdominal obesity (Ramachandran et al., 2003). Another study showed that there is an alarming rise in the prevalence of MetS in rural areas that will eventually be reflected in increasing morbidity and mortality from heart disease (Krupp et al., 2020).

1.4 Health Belief Model

It has been proven that public fitness and health promotion involvements that are based on behavioural and social science theories are more operative than those deficient a theoretical base (Glanz and Bishop, 2012). Among the most frequently used theoretical frameworks, one can identify Health Belief Model – it is one of the few models that consist of constructs that would help comprehend the relationship of the behavioural and environmental aspects and decision-making concerning the management of the disease. The six constructs risk susceptibility, risk severity, action benefits, barriers to action, self-efficacy, and cues to action investigate the issues that cannot be explained effectively by quantitative analysis. Although this model was originally formulated for preventive health behaviours in the United States, it fits the diverse cultural and topical contexts (Griffin, 2012; Scarinci et al., 2012). A scoping review study has identified that the Health Belief Model has a good predictive ability of COVID19 related behavior (Zewdie et al., 2022). The usage of this model to express the risky behaviours that are related to chronic diseases as mentioned in Coleman, M. T. ; Pasternak, et al. 2012 has been useful in explaining findings of cross-sectional studies of MetS, as noted by Chen et al 2019; Lo et al 2015. Moreover, it has been clearly shown that this model can be used to analyse the antecedent that leads to disregard of certain health advice (Hirakawa et al. 2019) and further it is also observed that there are positive aspects of this model which can be utilised for programme development (Marks 2008, Coleman and Pasternak 2012, Bully et al., 2015).

In view of the above, the present study has used the Health Belief Model to understand the behavioural factors that affect the self-management practice of individuals having MetS. Understanding the factors would help develop better intervention plans that are individual specific and tailored to cater to the specific needs. Since the behavioural pattern is deeply influenced by the sociocultural settings of the individual, this study also attempts to understand the behavioural pattern in the sociocultural context. Therefore, the objective of this paper is to explore the role of social cultural and behavioural determinants of health in managing the disease conditions associated with MetS among the individuals living in the urban slums of Delhi.

Review of Literature

MetS is reported to affect a third of the population in the world; albeit with intercontinental differences whereby their frequency is 20% in Asia (Ranasinghe et al. , 2017) while in the US, it is 37% (Hirode et al. , 2020); such variations being most prevalent among the urban and affluent. Based on data from the Indian population, MetS incidence is estimated at 30 % in adult Indian population (Krishnamoorthy et al. , 2020); it is more common in urbanized population and in the people with higher levels of income (Mohan et al. , 2001; Mohan, 2005; Ramachandran, 1998).

Though the prevalence of MetS is significantly associated with age because of the aging population (Hildrum et al. , 2007; Guallar et al. , 2014; Scrutin et al. , 2015), research also proposed young generations at risk (Alzabbi et al. , 2019; Gutierrez et al. , 2018; Nolan et al. , 2017; Sheh There are disparities in the development of MetS regarding the gender, for example, men have a higher MetS prevalence in early ages and women in later ages (Pucci et al. , 2017).

The HBM is a well-developed theoretical model that focuses on explaining the health behaviors and the psychological and environmental factors that influence them (Janz & Becker, 1984; Rosenstock, 2005). The key insight has previously been used to rationalize the outcomes of cross-sectional research investigating MetS (Chen and colleagues, 2019; Lo and associates, 2015) and to appraise factors causing non-compliance to healthy tips (Hirakawa and peers, 2019).

Certain aspects of sociocultural factors with regard to the diet, physical activity, and stress play a key role in MetS self-management (Mahadzir et al., 2022). Several behavioral factors play a very

influential role in the onset and development of MetS and some of them are unhealthy diet, lack of physical activity, and stress (Giugliano et al., 2006; Oliveira et al. , 2016). Finally, A healthy diet and an active lifestyle, have been advocacy in management of MetS; (Sotos-Prieto et al., 2021). Mobile communication especially the Short Message Service (SMS) and video messages also have the potential of enhancing medication compliance and exercising in MetS subjects (Pandey et al., 2017).

Research

Gap

Address sociocultural factors: This should be culturally adaptable and should include the influence a patient receives from his or her family and friends from outside. Perhaps, it would be useful to engage the families and the community members in the health promotion.

Improve access to healthcare services: Therefore, the effort should be put in to enhance the access of sufficient and quality health care services in the urban slum segment. Hence, it involves annual health care check-ups, MetS examination, essential preventive and subsequent medical intervention and follow-up.

Nonetheless, if the articulated recommendations will be effectively implemented, it will be possible to achieve improved self-management regarding MetS and, as a consequence, a reduced burden of this chronic state in the studied population

Chapter 2: Methodology

2.1 Research Aim

Understanding the Behavioural Pattern on Self-management of MetS among the urban slum population of Delhi through the Health Belief Model.

2.2 Research Question

How do the Health Belief Model constructs influence self-management behaviours among adults with Metabolic Syndrome in the urban slums of Delhi, and what are the key environmental and lifestyle factors that interact with these behaviours?

2.3 Objectives

- To identify an interaction between behavioural determinants such as unhealthy diet, physical activity, stress and sleep levels, and environmental factors.
- To understand how these factors influence the self-management practices among the individuals having MetS.

2.4 Materials and Methods

2.4.1 Study Design

It was a cross-sectional study conducted on 120 adults identified as having MetS. A mixed method (quantitative and qualitative) approach was employed to identify an interaction between behavioural determinants such as unhealthy diet, physical activity, stress and sleep levels, and environmental factors and how this influences the self-management practices among the individuals having MetS.

2.4.2 Study Area:

Individuals living in urban slum settings representing different locations such as North, South, East, and West, of New Delhi were enrolled in the study. The individuals were selected based on the inclusion and exclusion criteria mentioned below.

Inclusion criteria: Participants were included if they were adults aged 18 years and older, provided informed consent, were available for follow-up interviews, and had metabolic syndrome (MetS) according to the JIS criteria 2009. MetS diagnosis requires the presence of any three of the following five risk factors: increased waist circumference (≥ 90 cm for men and ≥ 80 cm for women in Asian populations), elevated triglycerides (≥ 150 mg/dL or 1.7 mmol/L) or undergoing treatment for elevated triglycerides, decreased HDL cholesterol (< 40 mg/dL for men and < 50 mg/dL for women) or undergoing treatment for reduced HDL cholesterol, elevated fasting glucose (≥ 100 mg/dL or 5.6 mmol/L) or undergoing treatment for elevated glucose, and elevated blood pressure ($\geq 130/85$ mm Hg) or using antihypertensive drugs with a history of hypertension. Additionally, participants needed to have an Android phone and be willing to use technology.

2.4.3 Exclusion criteria:

They will be excluded if they are less than 18 years of age, they have a terminal illness, they have impaired cognition, Coexisting illness documented in the medical record (type 1 diabetes) or self-reported associated with systemic inflammation (e.g. rheumatoid arthritis, acute systemic infection), pregnant or lactating women, Involvement in other clinical trials or protocols related to MetS, Other limitations judged to interfere with study participation or the ability to follow study procedures (e.g., scheduled surgery, travel plans or scheduling difficulties that do not permit full participation).

2.4.4 Study tools

Study has been conducted interviews using semi structured interview guidelines based on the HBM model to understand existing MetS related self-management knowledge, attitude, and practices. A series of semi structured questions gathered information related to the factors that would motivate patients living with MetS to adopt self-management practices. These questions relate to monitoring of blood sugar levels, adherence to medications, any lifestyle intervention including diet and physical activity. Exploratory questions were also asked to obtain information on their experience and feelings regarding self-management of their disease condition.

2.4.5 Data collection

The individuals were screened for the MetS condition using the JIS, 2009 diagnostic criteria, and were enrolled if they were diagnosed having MetS and met the conditions for inclusion and exclusion criteria. In-depth interviews will be among a sample population of 120 participants enrolled across urban slum settings across four zones of New Delhi (North, South, East, and West).

Zones	No. of Urban Slum Dwelling for the study	No. of Focus Group Discussions (FGD) per zone	No. of Individuals in each FGD	Total Sample
North	2		15	30
South	2		15	30
West	2		15+	30
East	2		15	30
Total	8			120

2.5 Study enrolment and Data Collection Procedure

2.5.1 Informed Consent

Written informed consent to participate in the study was obtained from each of the selected participants. Audio recording of consent was done for uneducated individuals. Complete data confidentiality and anonymity of study participants was ensured. Study consent was available in English and Hindi.

2.5.2 Quantitative

Sociodemographic profile, existing knowledge on internet usage, medical history of the participant was taken using series of questionnaire. Laboratory assessment of blood sugar, and blood pressure levels assessed. Anthropometric measurement like height, weight, and waist circumference were collected using standard techniques.

Dietary pattern was assessed using 24hour dietary recall, which is a standard questionnaire to assess the dietary intake of the previous 24 hours. The protocol included visual aids (photographs of servings) to assist them in accurate reporting of food intake. Individual dietary diversity Score (IDDS) tool was used to assess diversity in the diets of the individual participants. This tool covers 16 food groups, of which nine were analysed. Diets consisting of foods from ≤ 3 groups I want you to act like a communication manager in a NGO, which is working for the maternal and child health field from last 20+ years in Uttar Pradesh, India and organization name is Community Empowerment Lab (CEL), currently its working in 4 different regions in Uttar Pradesh which is Lucknow, Kanpur, Ghaziabad and Varanasi. Organization is also working in some regions of Himachal Pradesh in the field of mother and new born health. A program named as "Sakshmaa" in which CEL working on the empowering mothers to protect their new born baby from the Possible Serious Bacterial Infection, the study, BMC Public Health, examined the incidence of PSBI in 20 rural primary health centres around Nagpur, India. Of 37,379 live singleton births, 2,123 met the criteria for PSBI, and 493 of those babies died. In the "Sakshmaa" initiative CEL trains the ground staff like CHO, ANM And ASHA how they can identify the symptoms of PSBI, in the training they got to know about all 7 symptoms of Possible serious bacterial infection like

fever, cold fever(hypothermia), Poor feeding, Respiratory rate more than 60 per minute, convulsion (seizures or fits), laziness, Episodes of stopped breathing. After the train of ground medical staff, they have instructed to convey these to the mother. CEL also runs many programs related to the mother and new-born. So, want to you make a 34-min video script for seeking CSR fund to strengthen these areas. Were categorized as low IDDS, diets meeting 45 food groups were of moderate diversity and those >6 groups were of diets of high diversity. MEDFICTS Dietary Assessment Questionnaire: was also used, which is an efficient tool to quickly assess the adherence of participants to fat components of a diet and identify those consuming a diet higher in total fat, saturated fat, and cholesterol.

Perceived stress scale (PSS), which is a most widely used psychological instrument was used to assess perception of stress. It is a measure of the degree to which situations are appraised as stressful.

Physical activity assessment was carried out using the Global Physical Activity Questionnaire (GPAQ). The questionnaire calculates the total time spent in lifestyle physical activity for leisure, entertainment, house hold chores and business in the last one week.

Pittsburgh Sleep Quality Index (PSQI) is a self-rated questionnaire that will be used to assess disturbances and sleep quality over a 1month time interval. Nineteen individual items generate seven "component" scores: daytime dysfunction, use of sleeping medication, sleep duration, habitual sleep efficiency, sleep latency, sleep disturbances, and subjective sleep quality. The sum of scores for these seven components yields one global score

2.5.3 Qualitative Data

Semi structured interviews were conducted using an interview guide based on the Health Belief Model (HBM) to understand participants' existing knowledge, attitudes, and practices related to self-management of metabolic syndrome (MetS). The interview guide consisted of a series of semi structured questions designed to gain perspective on the factors that would enable individuals living with MetS to adopt self-management practices and improve their health outcomes.

The questions were focused on exploring participants' perspectives and behaviours related to Monitoring of blood sugar levels, Adherence to prescribed medications, Lifestyle interventions, including dietary modifications and physical activity. In addition, exploratory questions were posed to obtain in-depth data on participants lived experiences, feelings, and perceptions regarding self-management of their MetS condition.

The interview guide was developed based on the six key constructs of the HBM: The six P's are therefore, perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to act, and self-efficacy. Consequently, the questions and probes that were used were in a way that would capture the participant's perception of each of these constructs to MetS self-management. The interviews were conducted in English and Hindi by trained qualitative researchers. All interviews were audio recorded with participants' consent for subsequent verbatim transcription and analysis.

2.5.4 Data Analysis

Content analysis: A procedure for organizing unprocessed material into groups or themes on the basis of reliable deduction and interpretation is known as qualitative content analysis. This procedure makes use of inductive reasoning, in which the researcher carefully examines and continuously compares the data to extract themes and categories. We will rewrite coding guidelines, code example material, and verify consistency of coding. It is an iterative process that would go on until there is adequate consistency in the code.

The descriptive analysis was done followed by computing means with SD's for the continuous variables while percentages were computed for the categorical variables. Association between the continuous independent and dependent variables was conducted using the correlation analysis while association between the continuous dependent variables and categorical independent variables was conducted using either the statistics or analysis of variance. Association between categorical variables can be performed using Chi-square statistics. Adjusted analysis will be performed after taking into consideration potential confounders. We performed multivariate regression and logistics regression analysis for continuous and categorical dependent variables as appropriate. All statistical analysis was performed using SAS v9.3 and results will be reported as

95% CI and values. The qualitative content analysis was conducted which is mainly inductive, grounding the examination of topics and themes, as well as the inferences drawn from them, in the data.

Chapter 3: Results

3.1 Quantitative

3.1.1 Sociodemographic Profile

Present study involved 120 individuals from different walks of life, with ages ranging from 20 to 79 years, and an average age of 51 years (Table 1). Many participants were women (70%), and a significant number (64%) had not received any formal education, while 17% had completed primary schooling. Most participants were married, with 85% of women and 94% of men being wedded.

The participants were equally represented from the North, South, East, and West regions of the study area, ensuring a diverse geographical spread. Among the male participants, the most common occupations were skilled workers, shopkeepers, and salesmen (38%), while a substantial proportion (35%) were unemployed. For the women, a majority (52%) identified themselves as homemakers. In terms of family income, a significant portion (43%) of the participants belonged to households with a monthly income ranging from Rs. 11,708 to Rs. 19,515.

Table 1: Sociodemographic of the respondents

Sociodemographic variables	Attributes	Total, n (%)	Male, n (%)	Female, n (%)
Gender, N=120		120 (100)	36 (30)	84 (70)
Geographical Region, N=120	North	30 (25)	13 (36)	17 (20)
	South	30 (25)	7 (19)	23 (27)
	East	30 (25)	1 (3)	29 (35)
	West	30 (25)	15 (42)	15 (18)
Age(in Years) , N=120	20-29	4 (3)	0 (0)	4 (5)

	30-39	9 (8)	3 (8)	6 (7)
	40-49	35 (29)	11 (31)	24 (29)
	50-59	46 (38)	13 (36)	33 (39)
	60-69	24 (20)	8 (22)	16 (19)
	70-79	2 (2)	1 (3)	1 (1)
Religion, N=120	Christian	1 (1)	0 (0)	1 (1)
	Hindu	88 (73)	26 (72)	62 (74)
	Muslim	31 (26)	10 (28)	21 (25)
Marital status, N=120	Divorced	1 (1)	0 (0)	1 (1)
	Married	105 (88)	34 (94)	71 (85)
	Widow	13 (11)	2 (6)	11 (13)
	Unmarried	1 (1)	0 (0)	1 (1)
Educational level (Participant), N=120	Uneducated	62 (52)	8 (22)	54 (64)
	Primary school (IV standard)	23 (19)	9 (25)	14 (17)
	Middle school (VIX standard)	31 (26)	18 (50)	13 (15)
	High school (XIXII standard)	3 (3)	0 (0)	3 (4)
	Graduate	1 (1)	1 (3)	0 (0)
Educational level(Head of the family), N=111	Uneducated	29 (26)	9 (26)	20 (26)
	Primary school (IV standard)	21 (19)	7 (21)	14 (18)
	Middle school (VIX standard)	46 (41)	17 (50)	29 (38)

	High school (XIXII standard)	8 (7)	0 (0)	8 (10)
	Intermediate or diploma	2 (2)	0 (0)	2 (3)
	Graduate	5 (5)	1 (3)	4 (5)
	Profession or Honours	0 (0)	0 (0)	0 (0)
Family income, N=119	< 3,907	6 (5)	0 (0)	6 (7)
	11,70819,515	51 (43)	16 (46)	35 (42)
	19,51629,199	11 (9)	5 (14)	6 (7)
	29,20039,032	2 (2)	1 (3)	1 (1)
	3,90811,707	47 (40)	13 (37)	34 (40)
	39,03378,062	2 (2)	0 (0)	2 (2)
	>78,063	0 (0)	0 (0)	0 (0)
Employment status(Participant), N=118	Clerks	1 (1)	1 (3)	0 (0)
	Craft and related trade workers	2 (2)	1 (3)	1 (1)
	Elementary occupation	11 (9)	4 (12)	7 (8)
	Homemaker	44 (37)	0 (0)	44 (52)
	Plant and machine operators and assemblers	1 (1)	0 (0)	1 (1)
	Professionals	1 (1)	1 (3)	0 (0)
	Skilled workers and shops and market sales workers	16 (14)	13 (38)	3 (4)
	Technicians and associated professionals	2 (2)	2 (6)	0 (0)

	Unemployed	40 (34)	12 (35)	28 (33)
	Legislators, senior officials and managers	0 (0)	0 (0)	0 (0)
Employment status(Head of the family),N=110	Clerks	1 (1)	1 (3)	0 (0)
	Craft and related trade workers	4 (4)	1 (3)	3 (4)
	Elementary occupation	33 (30)	6 (18)	27 (35)
	Legislators, senior officials and managers	1 (1)	0 (0)	1 (1)
	Plant and machine operators and assemblers	1 (1)	0 (0)	1 (1)
	Professionals	1 (1)	1 (3)	0 (0)
	Skilled workers and shops and market sales workers	42 (38)	13 (39)	29 (38)
	Technicians and associated professionals	2 (2)	1 (3)	1 (1)
	Unemployed	25 (23)	10 (30)	15 (19)
	Legislators, senior officials and managers	0 (0)	0 (0)	0 (0)

3.1.2 Health status

Anthropometric measurements

Thirty-nine percent of the participants(n=46) possess a weight between 60-69kg; females (n=35, 39%). Slightly more than half of the male respondents (n=18, 51%) have categorized under 70-79kg. When it came to waist circumference, a significant portion of our participants, 44% (n=51), had measurements ranging from 100 to 110 cm. Interestingly, this trend was observed

across both genders, with 39% (n=14) of males and 43% (n=37) of females falling within this range. Among the female participants, however, only a small fraction, 1% (n=1), had a waist circumference between 70 and 80 cm, while none of them fell into the 80 to 90 cm category. When we looked at the weight distribution among our participants, we found that none of them fell into the underweight category. However, a small proportion, 5% (n=6), had a normal weight range. Notably, overweight and obesity were prevalent in our study sample. More than half, 54% (n=64), were overweight, while a substantial number, 28% (n=34), fell into the obesity grade I category, and 9% (n=10) were classified as obesity grade II. Interestingly, these weight issues were more pronounced among female participants. The prevalence of overweight was 51% (n=42) among women, compared to 63% (n=22) among men. Similarly, obesity grade I was more common in women, with 31% (n=27) falling into this category, as opposed to 20% (n=7) of men. The disparity was even more significant for obesity grade II, where 11% (n=9) of women were affected, while only 3% (n=1) of men fell into this category. Table 2 presents a comprehensive overview of the anthropometric measurements, providing a detailed breakdown of the weight and body composition characteristics of our study sample.

Table 2: Anthropometric measurements

Anthropometric measurement	Attributes	Total, n (%)	Male, n (%)	Female, n (%)
Weight(kg), N=120	4049	2 (2)	0 (0)	2 (2)
	5059	14 (12)	0 (0)	14 (12)
	6069	46 (39)	11 (31)	35 (39)
	7079	34 (29)	18 (51)	16 (29)
	8089	15 (13)	3 (9)	12 (13)
	9099	7 (6)	2 (6)	5 (6)
	120129	1(1)	1(3)	0(0)
Height (in cm),N=119	100109	1 (1)	1 (3)	0 (0)
	120130	1 (1)	1 (3)	0 (0)
	130139	1 (1)	0 (0)	1 (1)

	140149	37 (31)	0 (0)	37 (31)
	150159	48 (40)	11 (31)	37 (45)
	160169	30 (25)	22 (61)	8 (10)
	170179	1 (1)	1 (3)	0 (0)
	180190	1 (1)	1 (3)	0 (0)
Waist circumference (in cm), N=120	7080	1 (1)	0 (0)	1 (1)
	8090	4 (5)	0 (0)	4 (3)
	90100	27 (23)	8 (22)	19 (23)
	100110	51 (44)	14 (39)	37 (43)
	110120	31 (21)	13 (36)	18 (26)
	120130	4 (5)	0 (0)	4 (3)
	130140	1 (1)	0 (0)	1 (1)
	140150	1 (1)	1 (3)	0 (0)
BMI(kg/m2), N=120	Underweight (<18)	0 (0)	0 (0)	0 (0)
	Normal weight (1824.9)	6 (5)	3 (3)	3 (3)
	Overweight (2529.9)	64 (54)	22 (63)	42 (51)
	Obesity Class I (3034.9)	34 (28)	7 (20)	27 (31)
	Obesity Class II (3539.9)	10 (9)	1 (3)	9 (11)
	Obesity Class III(>40)	3 (3)	1 (3)	2 (3)

3.1.3 Clinical Assessment

The clinical assessment is tabulated in Table 3. The average blood pressure of the sample population is 148/74mm of Hg (N=119), fasting/random blood sugar is 236 mg/dl(N=119) by

using the testing type of random /fasting sugar (n=43, 39). Fifty eight percent participants(n=69) was marked above 200 mg/dl their blood sugar; male (n=42, 63%); females (n=27, 56%).Sixty-seven percent (n=80) were diagnosed with blood sugar early. Fifty five percent(n=65) was by blood pressure early; male (n=14, 39%); females (n=51, 61%). Blood sugar, blood pressure, blood cholesterol, and weight were tested frequently monthly (n=45, 39%), (n=39, 34%), (n=1, 1%), (n=21, 18%), and never (n=20, 17%), (n=16, 14%), (n=93, 83%), (n=48, 81%) respectively. Medicine is the most preferred medication for blood sugar (n=68, 87%). More than one third (n=42, 35%) participants were screened for Mets; males (n=15, 42%), females (n=27, 32%).Seventy percent of them(n=35) were diagnosed with Mets; males (n=12, 67%), females (n=23, 28%).

Table 3: Clinical assessment of the participants

Clinical Assessment	Attributes	Total, n (%)	Male, n (%)	Female, n (%)
Blood Pressure (mm of Hg), N=119	Average	148/74	147/74(n=35)	146/76(n=84)
Blood sugar(mg/dl), N=119	Average	236	241(n=35)	234(n=84)
Blood sugar N=116	Weekly	7(6)	4(11)	3(4)
	Twice a year	1(1)	1(3)	0(0)
	Twice a week	6(5)	1(3)	5(6)
	Once in a year	13(11)	2(6)	11(14)
	Never	20(17)	8(22)	12(15)
	Monthly	45(39)	13(36)	32(40)

	36 months	24(21)	7(19)	17(21)
Type of testing for blood sugar, N=110	Fasting blood sugar	26(24)	4(12)	22(29)
	HbA1C	1(1)	1(3)	0(0)
	Never	19(17)	7(21)	12(16)
	Random blood sugar	17(15)	5(15)	12(16)
	Random blood sugar, Fasting blood sugar	43(39)	17(50)	26(34)
	Random blood sugar, Fasting blood sugar, HbA1C	4(4)	0(0)	4(5)
B. Pressure, N=115	Weekly	16(14)	5(14)	11(14)
	Twice a year	3(3)	2(3)	1(3)
	Twice a week	10(9)	2(6)	8(10)
	Once in a year	10(9)	1(3)	9(11)
	Never	16(14)	10(29)	6(8)
	Monthly	39(34)	11(31)	28(35)
	Daily	1(1)	0(0)	1(1)
	36 months	20(17)	5(14)	15(19)
B. cholesterol, N=112	Never	93(83)	30(86)	63(82)
	Monthly	1(1)	1(3)	0(0)
	Every twice a year	1(1)	1(3)	0(0)
	Every once in a year	12(11)	1(3)	11(14)
	3 – 6 Months	5(4)	2(6)	3(4)
Weight, N=116	Weekly	5(4)	4(11)	1(1)

	Twice a year	3(3)	2(6)	1(1)
	Twice a week	3(3)	1(3)	2(3)
	Once in a year	12(10)	4(11)	8(10)
	Never	48(41)	12(33)	36(45)
	Monthly,3 – 6 Months	1(1)	1(3)	0(0)
	Monthly	21(18)	6(17)	15(19)
	3 – 6 Months	23(20)	6(17)	17(21)
Earlier Diagnosed with diabetes, N=120	Yes	80(67)	25(69)	55(66)
	No	39(33)	11(31)	28(33)
Fasting/Random Blood sugar(mg/dl), N=119	80100	2(2)	0(0)	2(2)
	101125	4(3)	2(6)	2(2)
	126200	44(37)	11(31)	33(40)
	>200	69(58)	42(63)	27(56)
Type of medication for Blood sugar, N=78	Insulin	3(4)	0(0)	3(6)
	Medicine	68(87)	24(92)	44(85)
	Medicine, Insulin	3(4)	0(0)	3(6)
	Any other	4(5)	2(8)	2(4)
Earlier Diagnosed with Blood pressure, N=119	Yes	65(55)	14(39)	51(61)
	No	52(44)	21(58)	31(37)
	Don't know	2(2)	1(3)	1(1)

Earlier Diagnosed with NCD, N=118	Yes	81(69)	22(63)	59(71)
	No	4(3)	1(3)	3(4)
	Don't know	57(46)	18(47)	39(45)
Usage of any type of drugs, N=120	Yes		2(6)	1(1)
	No	112(95)	34(94)	78(95)
	Sometimes	1(1)	0(0)	1(1)
Frequency of screening of Mets, N=120	Yes	42(35)	15(42)	27(32)
	No	78(65)	21(58)	57(68)
Frequency of diagnosis of Mets, N=50	Yes	35(70)	12(67)	23(28)
	No	15(30)	6(33)	9(28)
Duration of diagnosis (In Years) , N=120		16(43)	7(50)	9(39)
		17(46)	6(43)	11(48)
		3(8)	0(0)	3(13)
	e	1(3)	1(7)	0(0)
Frequency of regular medical check-up, N=119	Yes	67(78)	26(72)	67(81)
	No	16(22)	10(28)	16(19)
	No	16(22)	10(28)	16(19)

3.1.4 Knowledge, Attitude, Practice (KAP)

Knowledge, Attitude, Practice on Metabolic Syndrome

Data in Table 3 shows the Knowledge, Attitude, and Practice of the respondents. The majority of the participants (n=117, 98%) are not familiar with the term Metabolic Syndrome (MetS) and have zero percent knowledge about it. However, the majority of them (n=106, 89%) perceive metabolic syndrome as a risk to health; males (n=33, 92%), and females (73, 88%). Cause of metabolic syndrome, is perceived as stress (n=46,38%), unhealthy diet (n=22, 18%), decreased physical activity (n=7, 6%); females perceive stress (n=36, 43%) as the cause of metabolic syndrome. Nearly a quarter percent(n=28) was not sure. Sixty-nine percent(n=69) receive health education/awareness; males (n=22, 61%), females (n=47, 56%).Seventy-five percent (n=51) receive dietary modification type of education and zero knowledge on weight reduction. More than 90% of those (n=63) were conducted by a doctor ,14 % of males(n=3) receive the same from friends and family along with it, zero percent women attend medical camps, and 56% (n=39) adhere to the suggestion.

Self-management at home was practiced by 57%(n=68) participants; Health eating(n=18, 26),walking(n=13, 19%),Ayurveda treatment(n=10, 14%).There was no difficulty faced doing self-management (n=78, 72%).Female participants face more difficulties(n=26, 35%) than male(n=5, 15%).The participants perceive changes in physical activity(n=33, 29%),dietary changes(n=29, 25%),stress reduction(n=23, 20%) would be having more influence on Mets. More males (n=22, 28%) perceive dietary changes make more influence on Mets than males (n=7, 19%).

Table 4: Knowledge, Attitude, Practice on Metabolic Syndrome

Knowledge regarding Mets	Attributes	Total, n (%)	Male, n (%)	Female, n (%)
Familiarity with the term “Metabolic Syndromes (MetS)”, N=120	Yes	3 (3)	1 (3)	2 (2)
	No	117 (98)	35 (97)	82 (98)
Knowledge about MetS, N=12	Yes	0 (0)	0 (0)	0 (0)
	No	12 (100)	3 (100)	9 (100)
	Yes	106 (89)	33 (92)	73 (88)

Perception of Mets as risk for the health, N=119	No	8 (7)	0 (0)	8 (10)
	I don't know	5 (4)	3 (8)	2 (2)
6. According to you, how did you acquire MetS? (Prompts: genetic predisposition [family history] decreased physical activity, unhealthy diet, stress,), N=120	Genetic predisposition	13 (11)	3 (8)	10 (12)
	Decreased Physical Activity	7 (6)	4 (11)	3 (4)
	Stress	46 (38)	9 (25)	36 (43)
	Unhealthy diet	22 (18)	7 (19)	14 (17)
	Not sure	28 (23)	12 (33)	16 (19)
Receipt of Health education/awareness, N=120	Yes	69 (58)	22 (61)	47 (56)
	No	51 (43)	14 (39)	37 (44)
Type of educator, N=69	Doctor	63 (91)	17 (81)	46 (96)
	Friends or family	5 (4)	3 (14)	2 (7)
	Medical camp	1 (0)	1 (1)	0 (0)
Adherence to the suggestions by the educator, N=69	Yes	39 (56)	13 (62)	26 (54)
	No	30 (43)	8 (38)	22 (46)
Type of Education, N=68	Dietary modification	51 (75)	15 (75)	36 (75)
	Weight management/reduction	0 (0)	0 (0)	0 (0)
	Physical activity	11 (9)	2 (15)	9 (6)
	Others	6 (16)	3 (10)	3 (19)
Frequency of receipt of treatment, N=120	Yes	60 (73)	28 (78)	60 (71)
	No	24 (27)	8 (22)	24 (29)
7e.If no, what are the challenges that you faced for follow up of the suggestions given?, N=28	Inability to do physical activity	7 (25)	2 (29)	5 (24)
	Inadequate time & money	5 (18)	1 (14)	4 (19)

	Tiredness	1 (4)	1 (14)	0 (0)
	Feeling bored with food	1 (4)	0 (0)	1 (5)
	Craving	2 (7)	0 (0)	2 (10)
	Not habituated	1 (4)	0 (0)	1 (5)
	Cannot avoid staple food	2 (9)	0 (0)	1 (5)
	Cannot cook separately, no accompany	3 (11)	0 (0)	3 (14)
	Forgetfulness	1 (4)	1 (14)	0 (0)
Change of treatment over a period of time, N=116	Yes	44 (38)	18 (51)	26 (32)
	No	69 (59)	16 (46)	53 (65)
	Not sure	3 (3)	1 (3)	2 (2)
Frequency of facing side effects on any of the treatment, N=116	Yes	13 (11)	2 (6)	11 (14)
	No	97 (84)	34 (94)	63 (79)
	Not sure	6 (5)	0 (0)	6 (8)
9a. If yes, what are the side affects you faced during and after treatment please specify, N=13	Headache	3 (23)	0 (0)	3 (27)
	Swelling of arms	1 (8)	0 (0)	1 (9)
	Gas Problem	1 (8)	0 (0)	1 (9)
	Palpitation and Irritation	1 (8)	0 (0)	1 (9)
	Heaviness	2 (15)	0 (0)	1 (9)
	Sleeping problem	1 (8)	0 (0)	1 (9)
	Fever	1 (8)	0 (0)	1 (9)
	Sexual Weakness	1 (8)	1 (50)	0 (0)
	Feeling dizziness	1 (8)	0 (0)	1 (9)
	Gastric/acidity	1 (8)	0 (0)	1 (9)

	Stomach pain	1 (8)	1 (50)	0 (0)
	Heaviness	2 (15)	0 (0)	1 (9)
Has the treatment changed over a period of time? N=116	Yes	44 (38)	18 (51)	26 (32)
	No	69 (59)	16 (46)	53 (65)
	Not Sure	3 (3)	1 (3)	2 (2)
Frequency of self-management of MetS at home along with treatment, N=120	Yes	68 (57)	21 (58)	47 (56)
	No	52 (43)	15 (42)	37 (44)
11a. If so, please describe the type of self-management you have modified for the Mets at home. , N=70	Ayurvedic treatment	10 (14)	2 (9)	8 (17)
	Healthy eating	18 (26)	8 (36)	10 (21)
	Physical exercise	1 (1)	0 (0)	1 (2)
	Yoga	5 (7)	1 (5)	4 (8)
	Walking	13 (19)	4 (18)	7 (15)
	Walking and Physical exercise	1 (1)	0 (0)	0 (0)
	Home Remedy and Healthy eating	1 (1)	0 (0)	1 (2)
	Home remedies	7 (10)	0 (0)	7 (15)
Freq. of people faced difficulties in doing self-management, N=109	Yes	31 (28)	5 (15)	26 (35)
	No	78 (72)	29 (85)	49 (65)
The perception by the people on the factor which has more influence, N=115	Dietary changes	29 (25)	7 (19)	22 (28)
	Medication	20 (17)	8 (22)	12 (15)
	Physical changes	33 (29)	9 (25)	24 (30)
	Reduced stress	23 (20)	10 (28)	13 (16)

	Sleep	10 (9)	2 (6)	8 (10)
13. How do you maintain your dietary habits in day to day life?	Flexible meal timing	40 (34)	12 (33)	28 (35)
	Fixed meal timing	32 (28)	12 (33)	20 (25)
	Flexible dietary habits	23 (19)	5 (14)	18 (21)
	Fixed dietary habits	16 (14)	5 (17)	10 (13)

3.1.5 Knowledge, Attitude, Practice on Technology

Data on KAP on technology was gathered in Table 3. Eighty one percent of the sample population used mobile phones (n=81, 97%); male (n=33, 92%); female (n=64, 76%). Access to internet is 60%(n=.72); males (n=21, 58%); females (n=51, 61%). However, 85%(n=101); of males (n=31, 86%); females (n=70, 84%) of are not able to send messages,62%(n=74); males (n=16, 44%); females (n=58, 70%) are not able to read text messages. Ninety two percent (n=110); males (n=32, 89%; females (n=78, 93%) of the respondents do not use any mobile application for managing the Mets conditions and 98%(n=118) prefer to get more information on Mets. Twenty eight percent of the population(n=34) prefer to get information on diet and 21%(n=25) on stress management. Males prefer those on sleep (n=8, 26%) than females (n=4, 9%). The females prefer those of weight management (n=9, 21%) and physical activity (n=12, 22%) than males (n=5, 17%), (n=4, 10%) respectively.

Percentages of preferred methods of receipt of information included video messages (n= 42, 35%), SMS (n=27, 23%), phone calls (41, 26%), and WhatsApp messages (n=12, 10%) respectively weekly (n=77, 65%). The most preferred media source to get information is TV (n=16, 68%). Sixty three percent of the people can follow the advice(n=27). Males (n=7, 77.78%)are more able to follow than females(n=10, 56%).

Table 5: Knowledge, Attitude, Practice on Technology

Familiarity with technology	Attributes	Total, n (%)	Male, n (%)	Female, n (%)
	Yes	97 (81)	33 (92)	64 (76)

Frequency of usage of mobile phone, N=120	No	23 (19)	3 (8)	20 (24)
Availability of Internet access, N=120	Yes	72 (60)	21 (58)	51 (61)
	No	48 (40)	15 (42)	33 (39)
Knowledge how to send a text message, N=119	Yes	18 (15)	5 (14)	13 (16)
	No	101 (85)	31 (86)	70 (84)
Knowledge how to read a text message, N=119	Yes	45 (38)	20 (56)	25 (30)
	No	74 (62)	16 (44)	58 (70)
Frequency of usage of mob app to manage your condition, N=120	Yes	10 (8)	4 (11)	6 (7)
	No	110 (92)	32 (89)	78 (93)
Perception to get more information on self-management , N=120	Yes	118 (98)	35 (97)	83 (99)
	No	2 (2)	1 (3)	1 (1)
Preferred topic to obtain information, N=101	Diet	34(28)	10(27)	24 (28)
	Weight management	14(12)	5(17)	9(21)
	Sleep	12(10)	8(26)	4 (9)
	Physical activity	16(13)	4 (10)	12 (22)
	Stress reduction	25(21)	7(20)	18 (21)
Preferred method of receipt of information about managing Mets, N=119	Phone Call	31 (26)	14 (40)	17 (20)
	Phone Call, Video message	2 (2)	1 (3)	1 (1)
	SMS	27 (23)	7 (20)	20 (24)
	SMS, Phone Call	2 (2)	1 (3)	1 (1)
	SMS, Video message	3 (3)	0(0)	3 (4)

	Video message	42 (35)	8 (23)	34 (40)
	WhatsApp message	12 (10)	4 (11)	8 (10)
Preferred Frequency to receive of advice from any Media source, N=120	Biweekly	4 (3)	1 (3)	3 (4)
	Daily	23 (19)	6 (17)	17 (20)
	Twice a week	15 (13)	6 (17)	9 (11)
	Weekly	77 (65)	22 (63)	55 (65)
Freq. of receipt of advice from any Media source, N=120	Yes	23(19)	7(19)	16(19)
	No	97(81)	29(81)	68(81)
Media source people get advice, N=25	Health channels	1 (4)	0 (0)	1 (6)
	TV	17 (68)	6 (86)	11 (61)
	You tube	7 (28)	1 (14)	6 (33)
Topic of advice receiving, N=25	Diet	17 (10)	7 (11)	10 (10)
	Others	2 (3)	0 (3)	2 (4)
	Physical activity	5 (19)	0 (17)	5 (20)
	Weight management	1 (13)	0 (17)	1 (11)
Ability to implement the advice sought, N=27	Yes	17 (63)	7 (78)	10 (56)
	No	10 (37)	2 (22)	8 (44)

3.1.6 Knowledge, Attitude, Practice on Diet & Physical Activity

Table 4 contains the data of KAP on diet and physical activity. Milk is the most consumed dairy product (n=75, 82%), curd (n=42, 46%), Paneer (n=39, 42%) and the most preferred frequency to consume dairy products is once/day (n=42, 35%), weekly (n=30, 25%). Ninety percent(n=108) of participants prefer to add additional sweets to beverages due to taste preference (n=11, 91). However, most of them do not prefer to end their meals with sweets (n=89, 74%). Additional salt

is not preferred by the respondents (n=94, 78%). Sixty three percent (n=75) sample population consume food from outside in a frequency of monthly (n=19, 25%), twice a month (n= 22, 29%), once a week (n=18, 24%). The participants have the perception change in dietary choices is capable of making changes in MetS Condition (n=86, 72%).

Fifty two percent of participants (n=62) are engaged in physical activity in a frequency of every day (n=52, 85%). However, 99% (n=119) did not use any mobile application for calculating steps. Doing aerobic exercise after the diagnosis was unlikely (n=74, 62%).

Table 5: Knowledge, Attitude, Practice on Diet & physical activity

Diet & Physical activity	Attributes	Total, n (%)	Male, n (%)	Female, n (%)
Frequency of consumption of dairy products, N=120	>once a day	10 (8)	4 (11)	6 (7)
	Never	3 (3)	1 (3)	2 (2)
	once/day	42 (35)	13 (36)	29 (35)
	Rarely	19 (16)	4 (11)	15 (18)
	Twice a week	16 (13)	7 (19)	9 (11)
	Weekly	30 (25)	7 (19)	23 (27)
16a. If yes, what dairy products do you consume	Milk	75 (82)	23 (85)	52 (80)
	Curd	42 (46)	17 (63)	25 (38)
	Butter/Ghee	17 (18)	5 (19)	12 (18)
	Paneer	39 (42)	11 (41)	28 (43)
	Buttermilk	17 (18)	8 (30)	9 (14)
Freq. of people whether they use additional sugar in beverage, N=119	Yes	11 (9)	4 (11)	7 (8)
	No	108 (91)	31 (89)	77 (92)
16c.State the reason you add additional sugar, N=11	Taste	10 (91)	3 (100)	7 (88)
	Habit	0 (0)	0 (0)	0 (0)
	Choice	0 (0)	0 (0)	0 (0)

	No reason	1 (9)	0 (0)	1 (13)
Freq. of people whether they use using additional salt, N=120	Yes	26 (22)	5 (14)	21 (25)
	No	94 (78)	31 (86)	63 (75)
17a. State the reason you add additional salt, N=26	Taste	24 (92)	3 (60)	19 (90)
	Habit	2 (8)	2 (40)	2 (10)
	Choice	0 (0)	0 (0)	0 (0)
	No reason	0 (0)	0 (0)	0 (0)
Frequency of people want to end meals with sweet, N=120	Always	4 (3)	2 (6)	2 (2)
	Never	89 (74)	23 (64)	66 (79)
	Rarely	4 (3)	0 (0)	4 (5)
	Sometimes	21 (18)	10 (28)	11 (13)
	Very often	2 (2)	1 (3)	1 (1)
Freq. of the people who consume outside food, N=120	Yes	75 (63)	21 (58)	54 (64)
	No	45 (38)	15 (42)	30 (36)
Frequency of taking food outside, N=76	Daily	3 (4)	2 (10)	1 (2)
	Monthly	19 (25)	3 (14)	16 (29)
	More than 3 times a week	1 (1)	1 (5)	0 (0)
	Occasionally (once in 3 months)	7 (9)	0 (0)	7 (13)
	Once a week	18 (24)	5 (24)	13 (24)
	Thrice a week	2 (3)	2 (10)	0 (0)
	Twice a month	22 (29)	6 (29)	16 (29)
	Twice a week	4 (5)	2 (10)	2 (4)
	Yes	86 (72)	26 (72)	60 (71)
	No	12 (10)	4 (11)	8 (10)

Attitude towards capability of dietary choices to make changes in MetS Condition, N=120	Not Sure	15 (13)	6 (17)	9 (11)
	Don't Know	7 (6)	0 (0)	7 (8)
Freq. of people who made changes the shopping style intentionally, N=119	Yes	28 (24)	10 (29)	18 (21)
	No	91 (76)	25 (71)	66 (79)
Freq. of whether the people engaged in physical activity, N=120	Yes	62 (52)	19 (53)	43 (51)
	No	58 (48)	17 (47)	41 (49)
Freq. of the physical activity, N=61	13 times/week	6 (10)	2 (11)	4 (10)
	46 times/week	2 (3)	0 (0)	2 (5)
	Everyday	52 (85)	16 (1)	36 (86)
	Once a month	1 (2)	1 (5)	0 (0)
Freq. of usage of apps to calculate steps per day, N=120	Yes	1 (1)	0 (0)	1 (1)
	No	119 (99)	36 (100)	83 (99)
Freq. of doing aerobic exercise after diagnosis, N=120	Likely	41 (34)	15 (42)	26 (31)
	Very likely	5 (4)	1 (3)	4 (5)
	Unlikely	74 (62)	20 (56)	54 (64)
Do you consume unhealthy food when you are bored stressed or upset? N=120	Yes	9 (8)	4 (11)	5 (6)
	No	103 (86)	73 (83)	30 (87)
	Biweekly	1 (1)	1 (3)	0 (0)
	Bimonthly	1 (1)	0 (0)	1 (1)
	Sometimes	4 (3)	1 (3)	3 (7)
	Rarely	2 (2)	0 (0)	2 (2)
Frequency of doing exercise, N=119	Yes	57 (48)	18 (50)	39 (47)
	No	61 (51)	18 (50)	43 (52)
	Sometimes	1 (1)	0 (0)	1 (1)

Type of work, N=53	Mild	44 (83)	14 (88)	30 (81)
	Moderate	8 (15)	2 (12)	6 (16)
	Strenuous	1 (2)	0 (0)	1 (3)

3.1.7 Knowledge, Attitude, and Practice on Health risk behaviour

Smoking and alcohol are not consumed by the majority of the total population (n=102, 86%), (n=95, 91) respectively. Male respondents consume alcohol (n=16, 44%) monthly (n=6,35%) and smoking n=4, 13) daily (n=12, 86) with an average number of cigarettes/beedi is 4 (SD=4). Seventy five percent females consume smoking(n=6) daily (n=6, 75%). Ninety four percent of the people don't take any type of drugs. Slightly more than 60% consume food from outside and 2030% of them consume weekly, twice in a month, and monthly(N=78).

Table 6: Knowledge, Attitude, and Practice on health risk behaviour

Health risk Behaviour	Attributes	Total, n (%)	Male, n (%)	Female, n (%)
Frequency of whether the alcohol is consumed, N=119	Yes	17 (14)	16 (44)	1 (1)
	No	102 (86)	20 (56)	82 (99)
Frequency of alcohol consumption, N=17	Daily	4 (24)	4 (25)	0 (0)
	Monthly	6 (35)	6 (38)	0 (0)
	Occasionally	4 (24)	3 (19)	1 (100)
	Weekly	3 (18)	3 (19)	0 (0)
Frequency of whether the people smoke, N=104	Yes	9 (9)	4 (13)	5 (7)
	No	95 (91)	28 (88)	67 (93)
Frequency of smoking consumption, N=14	Daily	12 (86)	6 (100)	6 (75)
	Occasionally	2 (14)	0 (0)	2 (25)
How many cigarettes/bidis do you smoke? N=65	15	33 (51)	12 (35)	21 (68)
	610	17 (26)	7 (21)	10 (32)

	1115	15 (23)	15 (44)	0 (0)
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Global Physical Activity profile

Data on the global physical activity of the respondents are gathered in Table 7. Ninety percent(n=107) of participants did not engage in vigorous intensity activity at work. Involvement of moderate intensity activity during work(at least 10 minutes continuous)was by 35% of them(n=42)..Usage of bicycle (pedal cycle) or walk or for commute(at least 10 minutes continuous) is n=72, 61%; average time walking or bicycling for travel on a typical day(minutes) is 119(n=15, SD=147); males 203(n=3, SD=197); females 98(n=9, SD=115).Ninety eight percent of the participants engage in vigorous intensity sports, fitness, or recreational (leisure) activities with an average time of 178 minutes(SD=214) on a typical day. The average time of a sedentary habit on a typical day is 387 minutes (SD=549); males 457(n=29, SD=957); females 354(n= 71, SD= 214)

Table 7: Global physical activity of the respondents met in physical activity improves wellbeing.

Characteristics	Attributes	Total, n (%)	Male, n (%)	Female, n (%)
Activities At work				
The frequency of persons whose jobs require intense physical exertion that raises heart rate or respiration, such as carrying or lifting heavy objects or working in excavation or construction, for a minimum of ten minutes at a time, N=119	Yes	12 (10)	7 (19)	5 (6)
	No	107 (90)	29 (81)	78 (94)
Number of days performing activities of vigorous intensity in relation to work during the course of one week, mean =12	1	1 (8)	1 (14)	0(0)
	2	1 (8)	0 (0)	1(20)
	3	2 (17)	1 (14)	1 (20)
	4	0 (0)	0 (0)	0 (0)

	5	1(8)	0(0)	1 (20)
	6	1(8)	1 (14)	0 (0)
	7	6 (50)	4(57)	2(40)
On a specific day how much time do you spend doing dynamic strength activities in your work? (N=10)(in minutes)	Average Time	144(SD=173)	135(n=2, SD=101)	128(n=8, SD=172)
Engagement in moderate intensity physical activity at work duration, min, at least 10 minutes of continuous, n=119	Yes	42 (35)	15 (42)	27 (33)
	No	77 (65)	21 (58)	56 (67)
Moderate intensity physical activities which are considered work related are the number of days per week, N=44	1	3 (7)	0 (0)	3 (10)
	3	4 (9)	1 (7)	3 (10)
	5	2 (5)	1 (7)	1 (3)
	6	1 (2)	1 (7)	0 (0)
	7	34 (77)	11 (79)	23 (77)
Which types of activities require moderate intensity at the workplace, and for how many hours do you spend practicing them on a particular day? (N=12)(In Minutes)	Average Time	180(SD=207)	240(n=3, SD=98)	161(n=9, SD=216)
Travel to and from places				
Usage of bicycle (pedal cycle) or walk or for commute (at least 10 minutes continuous), N=119	Yes	72 (61)	19 (53)	53 (64)
	No	47 (40)	17 (47)	30 (36)
Number of days using bicycle at lease for 10 minutes in a week, N=71	1	4 (6)	0 (0)	4 (8)
	2	5 (7)	0 (0)	5 (9)

	3	7 (10)	1 (6)	6 (11)
	4	3 (4)	0 (0)	3 (6)
	5	1 (1)	1 (6)	0 (0)
	6	5 (7)	3 (17)	2 (4)
	7	44 (62)	12 (67)	32 (60)
	10	2 (3)	1 (6)	1 (2)
What proportion of your average day's travel is performed on foot or by bicycle? (N=15) (In minutes)	Average Time	119(SD=147)	203(n=3, SD=197)	98(n=12, SD=115)
Recreational Activities				
Sports, fitness or recreational activities of at least 10 minutes at vigorous intensity (where heart rate levels are raised), n = 117	Yes	2 (2)	0(0)	2 (2)
	No	115 (98)	35 (100)	80 (98)
Per week: How often were you physically active during vigorous intensity sports, fitness or recreational (leisure) activities (at least 10 minutes continuously)? N=117 (N=3)	1	1(33)	0(0)	1(33)
	5	1(33)	0(0)	1(33)
	7	1(33)	0(0)	1(33)
How many minutes in a given day are spent by the individual in vigorous intensity sports, fitness, or recreational activities? (N=3)(In minutes)	Average Time	178(SD=214)	0(0)	178(n=3, SD=214)
For how many day's in a distinctive week do you guarantee moderate intensity sporting, capability or frivolous (leisure) activity?	Yes	98)9	1(2)	8(10)
	No	108(92)	34(98)	74(90)

In a typical week, how many days do you engage in moderate intensity sports, fitness, or leisure activities?	0.5	1(11)	0(0)	1(11)
	4	9(22)	0(0)	9(22)
	5	1(11)	0(0)	1(11)
	7	4(44)	0(0)	4(44)
	30	1(11)	0(0)	1(11)
On an average day, how much time do you spend on moderate intensity sports, fitness, or leisure activities? (N=6) (in minutes)	Average time	171(SD=245)	171(n=3, SD=0)	171(n=3, SD=219)
Sedentary behaviour				
On a typical day, how much time do you usually spend socializing or relaxing? (in minutes) (N=100)	Average Time	387(SD=549)	457(n=29, SD=957)	354(n= 71, SD= 214)

3.1.8 Perceived stress Scale, Mo risky Medication Adherence scale, Pittsburgh Sleep Quality Index

Table 8 shows the stress level, adherence to the treatment, and quality of sleep of the participants. Half (n=58) of the sample population suffer from moderate levels of stress; male (n=14, 39%), female (n= 47, 56%). Moderate level of adherence is shown by 71%(n=85) of the respondents. Disturbance in sleep was experienced by 65%(n=60) of the sample population; men (n=20, 61%); female (n=39, 65%).

Table 8: PSS for assessing

Scales	Attributes	Total, n (%)	Male, n (%)	Female, n (%)
Perceived stress scale score (PSS), N=120	High Perceived Stress	2 (2)	1 (3)	1 (1)
	Moderate Stress	60 (50)	14 (39)	47 (56)

	Low Stress	58 (48)	21 (58)	36 (43)
Morisky Medication Taking Adherence Scale (MMAS4), N=120	Good	35 (29)	13 (36)	22 (26)
	Moderate	85 (71)	23 (64)	62 (74)
Pittsburgh Sleep Quality Index (PSQI), N=93	Sleep disturbance	60 (65)	20 (61)	39 (65)
	No sleep disturbance	33 (35)	13 (14)	21 (35)

3.2 Health Belief Model:

The present study has adopted the health belief model (HBM) as the framework of the study. HBM is a social psychological health behaviour change model that explains and predicts health pertaining behaviours, especially in receiving health services. The Health Belief Model suggests that individuals are most likely to engage in preventive health behaviours if they perceive a health threat as serious, believe they are personally susceptible, and consider the benefits of taking action to outweigh the costs. People's beliefs influence their health-related actions and behaviour. The HBM based intervention is considered the most effective as it addresses individuals' specific perceptions about their health and describes their health behaviour. The health belief model contains six components as

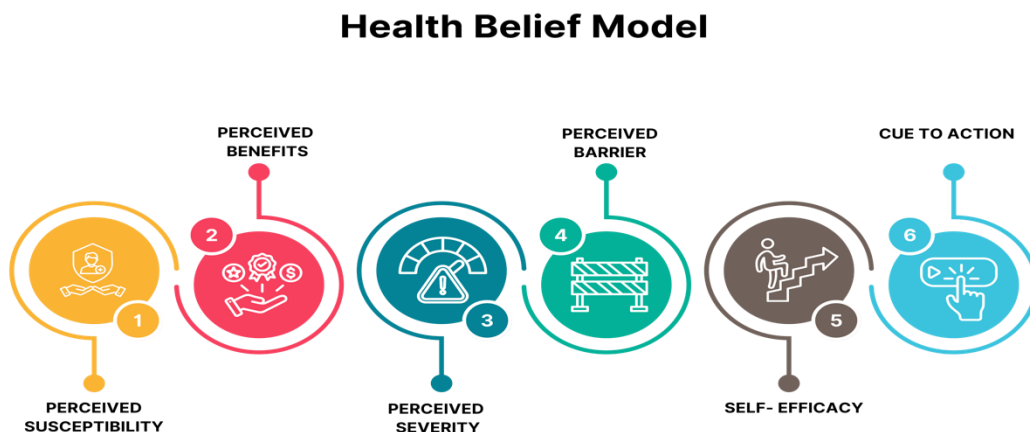


Figure4.

3.2.1 Present Study and HBM:

Following the health belief model, a person's motivation to follow a positive health behaviour encompasses three factors, known as individual perceptions, modifying factors, and the likelihood of action. The comprises of these three factors cause occurring health behaviour of any individual. Individual perception comprises individual perception of severity and barriers to health, modifying factors include demographic variables, cue to action, and perceived susceptibility, whereas the likelihood of action comprises perceived benefits minus perceived barriers. The present study follows a framework constructed based on the same model as shown in Figure (2).

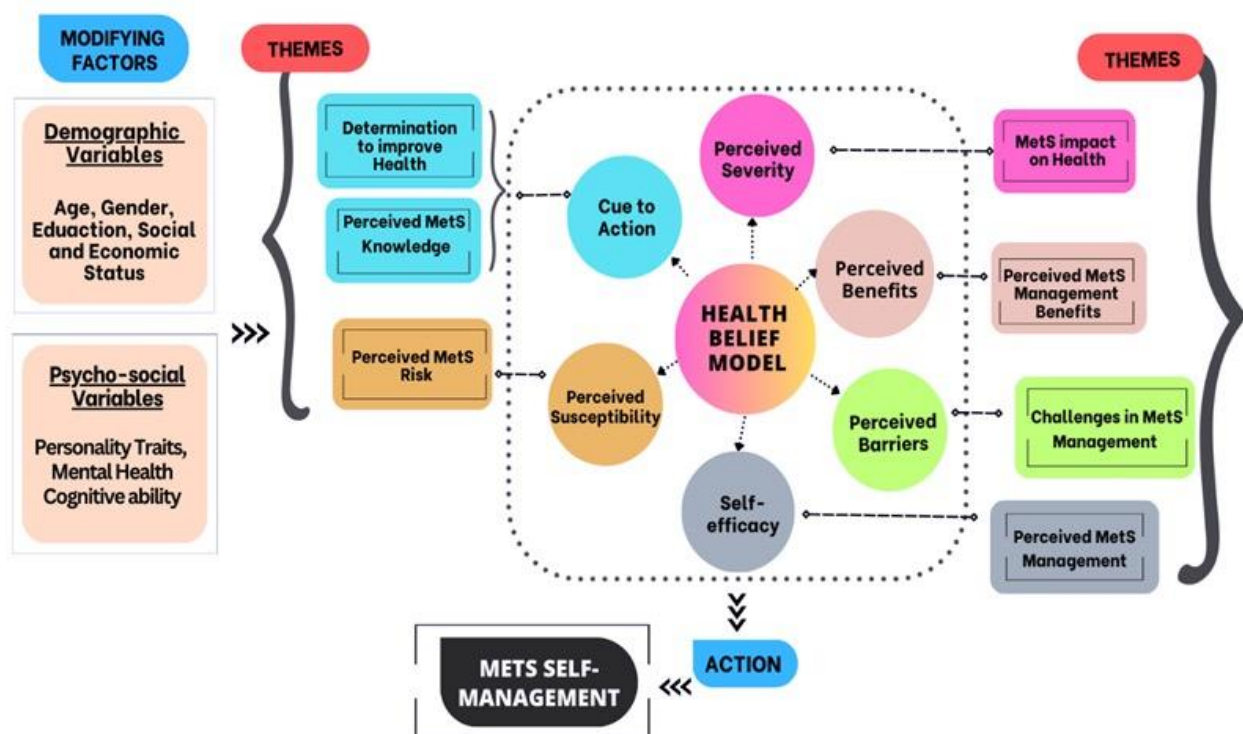


Figure 4.2. The framework of the present study

3.2.2 Thematic Analysis:

The researchers went through the interview transcripts several times and performed the first identity of the text units during this process. Data redundancy was supported which meant that one

and the same text sequence could be assigned to several codes for a better understanding of the received information. In deductive reasoning, where the present study adopted the HBM, the initial codes that emerged from the interviews were grouped into major categories derived from the model. Secondary codes followed from the primary codes germane to the same main themes inductively developed from the data set. Last, all the defined themes and subthemes were checked against the initial codes and transcribed textual materials to retain all the information retrieved within the overall textual data and keep focus on interrelations between them.

Table Thematic Matrix of the study:

Open Coding	Axial Coding	HBM based Themes
Genetic predisposition	Perceived MetS risk	Perceived Susceptibility
Stress		
Lack of Sleep		
Dietary choices		
Alcohol/tobacco consumption		
Comorbidities		
Sedentary behaviour/inactivity		
Tiredness and lethargy	Perceived MetS impact	Perceived Severity
Fear of worse health		
Food restrictions		
Deteriorating health		
Medication side effect		
Worsening Economic conditions		
Comorbidities		
Time constraints	Challenges in MetS self-management	Perceived Barriers
Physical hindrance		
Unhealthy dietary choices		

Outside food		
Lack of Sleep		
Medicine distrust		
Failing to Medication adherence		
Medicine side effects		
Inactive lifestyle		
Family Environment		
Family economic status		
Dietary modification improves health	Perceived MetS management benefits	Perceived Benefits
Maintaining a routine improves health		
Physical activities improve MetS condition		
Medicine compliance helps MetS condition		
Economic benefits		
Better productivity		
Self-monitoring	Perceived MetS Self-management	Self-efficacy
Medicine adherence and compliance		
Timely diagnosis		
Walking, Exercise, and Yoga		
Controlled diet		
Restricting sugar & salt intake		
Quitting outside food Habits		
Quitting alcohol and smoking		

Unawareness of MetS syndrome	Perceived MetS Knowledge	Cue to Action
Lack of MetS education		
Curiosity to know about MetS self-management	Determination to improve MetS health	
Determination to follow the diet plan and activities cue		

3.2.3 Thematic Analysis based on the Health Belief Model:

a. Perceived Barriers to MetS Self-management:

The study participants reported perceiving lack of time, physical ailments, unhealthy dietary choices, deprived sleep, lack of medication adherence, medicine side-effects, sedentary lifestyle, family environment, and low family economy as health barriers. The sedentary lifestyle is reported to be associated with household responsibilities, bodily weakness, joint pain, intentional avoidance of activity, extensive labour jobs, and considering walking while commuting as physical activity. The above factors are also attributed to dietary choices nevertheless dietary abstinence and nutrition value to the diet are hindered by budgetary constraints. Moreover, stress eating was also found evident

“Sometimes I feel so angry; thus, I crave to eat something tasty from outside”

Many participants who had been taking their BP, and sugar medication for over five years could remember the names of medication, while others were unaware of the medicine’s name. Some added that if they feel better, they stop taking medicines.

“Yes! Ever since I felt the benefit of physical activities, I stopped taking medicines.”

Most of the participants reported quitting alcohol, nonetheless, past consumption was also acknowledged. Some participants reported frequency consumptions spanning days, weeks, months, and occasional instances. It is reported that participants succumb to sugar despite efforts, however, some added jaggery as a substitute. Salt is added by some participants to their food despite knowing their high BP condition. Further, the taste preferences of other family members including kids were found to influence sugar and salt intake. Participants reported outside food consumption due to cravings, boredom, anger, demands, and frustration with home cooked food. Some participants consider poor health as a fate that is not modifiable by human efforts merely.

Most of the participants reported the unavailability of phones and smartphones to receive health information on asked whether participants wanted to have more information regarding MetS self-management, some participants said that they did not require information as they already knew it. Intriguingly, a woman said that due to *parda* (face veil), she is unable to go for walks outside.

“We have a veil system in our community due to which I cannot go out for a walk, as men are always gathered there.”

b. Perceived Severity to MetS Self-management:

The perceived severity faced by the study participants is enumerated as worsening health, food restrictions, medication side effects, poor economic conditions, and comorbidities.

In the study, 83% of participants reported that they do not ever get their cholesterol tested. 41% of participants have never weighed their body weight. 66% of the participants reported that they had been diagnosed with diabetes before this study. 58% of the participants were found to have a sugar range of more than 200mg/dl among which 63% were male and 56% were females. Among n=78 participants 87% were undergoing medication however, 92% were male and 85% were female participants. Further, 55% of participants were found to have high BP before taking part in the study, among which 61% were female whereas 39% were males.

Participants reported that due to MetS condition, they feel restless, leg pain, and weakness which hampers their physical activity at large. In addition, participants seemed hopeless due to abstinence from their favourite food items including sugar and salt, several of the participants who learned about their increased sugar status for the first time were found to be frightened and were on the verge of accepting it. After learning that they have MetS, they were anxious to learn more about it. According to the findings, people typically have a health check-up in case of any medical emergency or when any health check-up camp persists in their locality. Nobody obtains a diagnosis for new symptoms until falling ill. Many study participants could not identify their own MetS symptoms. Additionally, those individuals who were seriously afflicted by the condition found undergoing routine examinations as well as treatment, in addition, seem to be involved in self-management by either controlling their diet or doing physical activities.

On medication adherence, when participants learned about their sugar or BP condition many of them started regular check-ups. Few participants ever weighed themselves due to the appearance of the symptoms further; none ever tested their cholesterol, not even heard of it. Participants

experienced perceived severity including tiredness, lethargy, declining health, dietary restrictions, medication side effects, financial difficulties, and comorbidities.

Comorbidities cause hopelessness to self-management, e.g. a woman on medication for liver treatment said that she doesn't want to live which is why she does not take any medicine other than liver related medicines.

c. Perceived Susceptibility MetS Self-management:

The study participants accepted that recurring stressful life events, sleep disturbance, dietary choices, Genetic predisposition, alcohol/tobacco consumption, comorbidities, sedentary behaviour/inactivity, lack of perceived improvement in health, irritation on small things, medication ineffectiveness are the perceived sceptical factors that cause MetS, however, participants believe that amelioration in these factors can improve the depriving MetS condition. 38% of participants reported having MetS due to stress whereas 18% stated the responsible factors caused by unhealthy diet. However, 23% of participants were not sure about the reasons. The PSS scale shows that a total number of 56% and 39% of women and men experience moderate stress. Only 9% of participants reported to be involved in physical activity.

On asking about Smoking or tobacco consumption, some participants shared that in the past they were involved in smoking but as age increased, they minimized the number of cigarettes however some participants reported that they have quitted tobacco and cigarettes completely after learning about their deteriorating health.

"I used to smoke in the past...67 years back"

Nevertheless, most of the participants accepted that their dietary choices affect their health significantly.

On asking whether doctors change the medicine when it is required? Many of the participants perceive that during the treatment their health condition is not improving but declining.

A participant reported a worsened health condition after a treatment change by his doctor.

"...Ever since I started the new medication, my sugar has increased, and now my health deteriorates as soon as take the new medicines."

On asking whether participants have any side effects of treatment. People reported that their illness does not improve with medicines.

A woman said that due to the high dose of medication prescribed by her doctor, she is having to feel constant dizziness and also has a disturbed stomach after having medicine for sugar.

d. Perceived Benefits to MetS Self-management:

They perceive that the inclusion of self-healthcare improves their health condition profoundly. The study participants reported that they consume milk, curd, or cheese often on a weekly or monthly basis. Sugar intake among the participants was found from moderate to less. Those participants who were already aware of their sugar condition were found to have controlled it. However, some participants reported less consumption of salt with restrictions on adding salt over cooked food. Some participants reported that controlling their diet patterns was significantly positive, they also reflected that outside food hurts their health and adds additional costs to a household budget. Some believe that there is no harm in medication, and it improves health. Further, participants reported that doctors do not change the medication until they consider it necessary. The perceived benefits that participants have around MetS dietary modification (25%), maintaining routine and reducing stress (20%), Physical activities (29%), and medicine compliance (17%) help to improve MetS condition and enhance home economy and productivity. Participants also engaged in physical activity such as exercise, morning walks, and yoga. A participant said

“Earlier I did not feel cold in my body due to high BP, ever since I started regular walking and exercise, I feel the cold in my body now and wear a sweater as well.”

e. Self-Efficacy to Self-management of MetS:

Self-efficacy about MetS self-management included self-monitoring, medicine adherence and compliance, timely diagnosis, walking, exercise, yoga, controlled diet, restricting sugar & salt intake, quitting outside food habits, quitting alcohol and smoking

Ever since the participants came to know about their sugar and high B.P. related health condition, many of the participants (75%) reported starting having self-healthcare practices which include dietary abstinence (26%), such as avoiding outside food, containing sugar intake, minimizing salt intake, avoiding rice, and potato also oily food items in addition including home remedies (10%) such as powder of jambul kernels (Jamun), Neem leaves juice, and Bitter gourd (Karela) juice, and ayurvedic remedies (14%). In the present study, the Morisky adherence scale 36% of males and 26% of females were found to have good medication adherence while 64% of males and 74%

females had moderate adherence with medication. In contrast to this, some of the participants were found to be involved in morning walks (19%), yoga (7%), and exercise. Few participants admitted that they do aerobics until perspiring. Participants accepted that regular exercise improves their Mets condition. In addition, the participants under the age of 60 years were initially found to deny having MetS which resulted in screening. Later, these people became interested in learning more about the MetS and its self-management. It was found that people under the age of 60 years were more receptive to managing their own MetS. Most of the population over 60 years old was already taking medicine for high blood pressure or chronic hyperglycaemia, so they were not overly astonished to learn that they had acquired MetS. Furthermore, some of the respondents had sugar testing kits and routinely checked their blood sugar levels, while others had BP monitors to monitor their blood pressure. Also, people who have diabetes or high blood pressure for a longer period said that they stop taking their medications once they see improvements in those health symptoms after receiving treatment.

This is also reported by the participants that they have more reliance on government hospitals for treatments. Participants are using self-management techniques such as dietary abstinence, restricted sugar consumption, alleviated physical activities, home remedies such as powder of jambul kernels (Jamun), Neem leaves juice, and Bitter gourd (Karela) juice, and ayurvedic remedies after clinicians have confirmed that they have high blood sugar and high blood pressure. Barriers to self-management were identified as lethargy, time constraints, dietary, failure to adhere to medication, medicine side effects, physical hindrance, inactive lifestyle, and stressful family environments.

f. Cue to action for MetS Self-management:

Cue to action has included awareness of Mets syndrome, lack of Mets education, curiosity to know about Mets self-management, and determination to follow the diet plan and activities among the study participants. The present study found that most of the participants (98%), encompassing males (97%) and females (98%), were not familiar with the term Metabolic syndrome (MetS) however they were aware (89%) of the health risk caused by High Blood Pressure (BP), sugar, and obesity independently. However, they were unable to observe and explain how these factors clustered together to cause this syndrome known as Metabolic syndrome. A study found that 98% of people were unaware of the term MetS encompassing 97% of males and 98% of female

participants. 89 % of participants reported perceiving MetS as a health risk factor 63% reported that they can follow the advice provided to them by media sources. The participants were found more likely to obtain the information in the form of videos on WhatsApp, SMS on the phone, and phone calls on their or relatives' mobile phones. People said that they sometimes watch health related information using YouTube videos or TV. The information contains mainly diet, yoga, and exercise. Frequency of receiving messages weekly (65%), daily (19%), taking advice from media sources 29% only reported in positive, by 68% through TV and 28% through YouTube on diet (10%), Physical activities (19%) and weight management (13%). The study found that 81% of participants had mobile among which 92% were males and 76% were female participants. Only 60% of participants had internet access and 85% were not aware of the text sent through mobile phones. Additionally, 62% were not able to read mobile messages among which 70% were females. 92% of people were unable to use any mobile app to manage their MetS health. 98% of participants showed interest in receiving information on self-management for MetS. The majority (28%) of participants wanted to receive messages on diet followed by stress reduction (21%), Physical activity (13%), weight management (12%), and sleep management (10%). The majority of the participants wanted information through a video message (35%), call (26%), or SMS (23%), and WhatsApp message (10%).

3.3 Understanding Influences on Self-Management Practices Among

Individuals with MetS:

Chi-Square Test for Gender, Geographical Region, and Education Level

-Hypotheses

Null Hypothesis (H0): There is no significant association between gender, geographical region, and education level.

Alternative Hypothesis (H1): There is a significant association between gender, geographical region, and education level.

Contingency Table

Geographical Region	Education Level	Male	Female
South Zone	Uneducated	0	6
South Zone	Primary School	0	3

South Zone	Middle School	3	6
South Zone	Higher Education	0	1
West Zone	Uneducated	2	16
West Zone	Primary School	7	11
West Zone	Middle School	10	17
West Zone	Higher Education	0	2
North Zone	Uneducated	6	32
North Zone	Primary School	2	0
North Zone	Middle School	5	6
North Zone	Higher Education	1	0

Chi-Square Test Results

- **Chi-Square Statistic (χ^2):** 22.29
- **P-value:** 0.022
- **Degrees of Freedom (dof):** 11
- **Expected Frequencies:**

Geographical Region	Education Level	Expected Male	Expected Female
South Zone	Uneducated	1.59	4.41
South Zone	Primary School	0.79	2.21
South Zone	Middle School	2.38	6.62
South Zone	Higher Education	0.26	0.74
West Zone	Uneducated	4.76	13.24
West Zone	Primary School	4.76	13.24
West Zone	Middle School	7.15	19.85
West Zone	Higher Education	0.53	1.47
North Zone	Uneducated	10.06	27.94
North Zone	Primary School	0.53	1.47
North Zone	Middle School	2.91	8.09
North Zone	Higher Education	0.26	0.74

Interpretation:

Since the p-value (0.022) is less than the significance level of 0.05, we reject the null hypothesis. This means there is a significant association between gender, geographical region, and education level.

Chi-Square Table and Interpretation

Geographical Region	Education Level	Observed Male	Observed Female	Expected Male	Expected Female
South Zone	Uneducated	0	6	1.59	4.41
South Zone	Primary School	0	3	0.79	2.21
South Zone	Middle School	3	6	2.38	6.62
South Zone	Higher Education	0	1	0.26	0.74
West Zone	Uneducated	2	16	4.76	13.24
West Zone	Primary School	7	11	4.76	13.24
West Zone	Middle School	10	17	7.15	19.85
West Zone	Higher Education	0	2	0.53	1.47
North Zone	Uneducated	6	32	10.06	27.94
North Zone	Primary School	2	0	0.53	1.47
North Zone	Middle School	5	6	2.91	8.09
North Zone	Higher Education	1	0	0.26	0.74

Interpretation:

- The chi-square test results indicate a significant association between gender, geographical region, and education level among the urban slum population with MetS.
- This means that both gender and geographical region significantly influence the education level of individuals in the study.

The chi-square analysis conducted to explore the association between gender, geographical region, and education level among the urban slum population with metabolic syndrome (MetS) in Delhi reveals significant findings, aligning with the second objective of the thesis. The results demonstrate a statistically significant relationship ($\chi^2 = 22.29$, $p = 0.022$) between these variables, indicating that gender and geographical region are influential factors in determining the education levels of individuals within this demographic. Specifically, the analysis shows disparities in education levels across different zones and between genders, with notable variations in the distribution of educational attainment. For instance, higher proportions of uneducated individuals

were observed among females in the North Zone, whereas the West Zone displayed a relatively balanced distribution across educational levels for both genders. These findings highlight the complex interplay between sociodemographic factors and self-management practices, suggesting that targeted interventions considering gender and regional disparities could enhance educational outreach and support for individuals with MetS in urban slum areas. This significant association underscores the necessity for tailored public health strategies that address the unique needs of different subpopulations to improve overall health outcomes and self-management capabilities.

Chapter 4: DISCUSSION

This thesis's discussion section compares the results with similar studies; similarities and differences have been identified. For example, the research findings highlighted that there was poor health literacy concerning Metabolic Syndrome (MetS) among the urban slum populace; this is similar to Reddy et al. (2016), who established that health illiteracy was a hindrance to disease self-management.

Likewise, the analysed thesis refers to the positive impact of m-Health on MetS self-management, as there are earlier studies of Pandey et al. (2017) who proved the use of text message interventions in increasing medication and exercise compliance.

Many of the issues summed up in this thesis regarding alcohol use, diet, and physical activity can also be found with reference to other works, such as Mahadzir et al. (2022), who highlighted the role of lifestyle and diet choices in MetS health.

Nonetheless, the thesis mentions clear results, which are non-use of dressing culture for physical activities outside the house for women. This will underscore the need for culturally appropriate approaches demonstrated by Mathews et al., (2016) to promote exercise within the culturally accepted standards.

In conclusion, the discussion section of the thesis effectively synthesises the study's findings with

the current literature, thus supporting the argument about the research's potential impact on MetS management in urban slum populations.

Study aimed to elucidate the self-management practices of Metabolic Syndrome (MetS) among the urban slum population of Delhi, guided by the Health Belief Model (HBM) (Rosenstock, 2005; Janz & Becker, 1984). The key outcomes revealed intricate details about sociodemographic profiles, health status, knowledge, attitudes, and practices (KAP) regarding MetS, technology use in health management, dietary and physical activity habits, and health risk behaviours. These findings offer a comprehensive view of the challenges and resources available for MetS management in this setting.

4.1 Socio Economic and Cultural Influences

The findings highlight the complexity of health barriers, indicating a need for tailored interventions addressing individual challenges. The interplay of socioeconomic factors, cultural norms, and personal beliefs influences health behaviours (Johnson et al., 2023). Efforts to promote physical activity should consider diverse contexts, including sedentary behaviours rooted in daily responsibilities and economic restrictions (Sallis et al., 2016). Mahadzir et al. (2022) comprehended that lifestyle and dietary choices have a major impact on MetS health among individuals.

The predominance of women in the study sample, coupled with a high rate of individuals with limited formal education, also points to the critical need for gender sensitive and education level specific interventions (Rani et al., 2016). The health status outcomes, including prevalent obesity and uncontrolled metabolic risk factors, necessitate community tailored health promotion strategies focusing on nutrition, physical activity, and regular health check-ups (Selvaraj, 2019). This approach aligns with findings from Lo et al. (2023), who identified similar challenges in MetS self-management in a Taiwanese context, emphasizing the universal need for targeted health interventions across diverse populations.

4.2 Knowledge, Attitudes, and Practices (KAP) Towards MetS

The lack of familiarity with the term "Metabolic Syndrome" among the study participants establishes a significant gap in health awareness and literacy (Reddy et al., 2016). This finding is crucial for designing effective educational interventions that not only introduce the concept of MetS but also elucidate its risk factors, consequences, and management strategies. From an economic socio health perspective, investing in educational programs can be seen as a preventive measure (Becker & Maiman, 1975).

4.3 Technology's Role in Enhancing Health Management

Medication adherence emerged as a critical issue, with participants discontinuing medication without full awareness of its implications (Vahdat et al., 2016). Healthcare providers emphasize the importance of sustained medication use, accompanied by patient education to enhance health literacy (Pandey et al., 2017). The study's outcomes on technology use for health management present an optimistic pathway for improving MetS self-management (Yadav, 2019). Pandey et al. (2017) delineated in their study that text message reminders have been proven to enhance medication and exercise adherence rates.

The widespread ownership and use of mobile phones among participants offers a promising platform for health education and intervention delivery (Rawal, 2023). Utilizing SMS and video messages for disseminating health information and reminders could address both economic considerations and accessibility, providing a cost-effective method to reach a wider audience. This approach could be particularly effective in enhancing medication adherence and exercise rates, as demonstrated by Pandey et al. (2017).

4.4 Addressing Behavioural and Lifestyle Factors

Alcohol consumption patterns and struggles with dietary choices, particularly sugar intake,

highlight the significance of behavioural interventions (Schliemann & Woodside, 2019). Recognizing the impact of family influences on diet, interventions should extend to entire households, promoting healthier choices collectively (Furst et al., 1996). The cultural barrier of dressing culture restricting outdoor physical activity for women necessitates culturally sensitive strategies to encourage exercise within acceptable norms (Mathews et al., 2016; Peng et al., 2023). Community based programs could offer inclusive alternatives, promoting women's health without compromising cultural values (Thompson et al., 2016). Further, understanding the perceived contributors to MetS from a socioeconomic lens highlights the interconnectedness of lifestyle factors and their impact on health (Lee, 2022).

Stressful life events, sleep disturbances, dietary choices, and sedentary behaviour have socioeconomic implications, influencing healthcare expenditures and work productivity. Addressing these factors through targeted interventions may lead to improved socioeconomic outcomes, including reduced absenteeism and enhanced work performance. This finding coincides with the findings of the study conducted by Bhalwar (2020).

4.5 Economic Implications of Health Behaviours

Interventions focusing on increasing health literacy and proactive self-monitoring align with economic considerations (Rosenstock, 1966). Preventive measures, such as regular health checkups and tailored educational programs, can potentially reduce the economic burden associated with advanced MetS cases (Buttorff et al., 2017). Moreover, efforts to improve self-efficacy, particularly through counseling on medication adherence and stress management, may contribute to long-term economic benefits by preventing complications and reducing the need for intensive healthcare interventions (Bandura, 1977).

In conclusion, adopting an economic socio-health perspective in addressing MetS not only emphasizes the importance of preventive measures but also underscores the potential for cost-effective interventions that can positively impact both individual wellbeing and overall economic outcomes (Becker & Maiman, 1975; Rosenstock, 1966). The study's outcomes illuminate the multifaceted challenges in managing MetS within urban slum populations, highlighting the interplay between sociodemographic factors, health literacy, behavioural practices, and economic

considerations. Tailored interventions that leverage technology for education and reminders, address lifestyle and behavioural factors through community engaged approaches and consider the economic benefits of improved MetS management are essential.

Chapter 5: Conclusion and Recommendations

The present research was focused on exploring the behavioural strategies concerning self-management of MetS among the urban slum dwellers of Delhi using the lens of HBM. The study had two main objectives: The study had two main objectives:

Conclusion:

To identify the interaction between behavioural determinants (unhealthy diet, physical activity, stress, sleep) and environmental factors: However, the research established that these factors enjoy a significant interaction. The participants' dietary practices, physical activity, perceived stress, and sleep quality were assessed, and elevated levels of the negative health indicators were found. Many of these behaviours were attributed to the physical environment like the availability of healthy food to cook or frozen food, availability of play areas to encourage active play and people's living conditions.

To understand how these factors, influence self-management practices among individuals with MetS: The study established that such behavioural and environmental factors had a highly negative impact the self-management practices. They failed to have knowledge on the measures to take, and even if they had the knowledge, they did not believe in themselves to have the ability to stick to the necessary change and practice in as regards to their healthy behaviour. Also, sociocultural factors like family environment and cultural practices were other determinants concerning self-management.

Based on the conclusions drawn from this study, the following recommendations are proposed:

Recommendations

Develop and implement targeted health education programs: These programs should thus call for awareness among the general public regarding MetS, its causes, and self-management procedures. The information should be in a format that will suit the literacy level of the target group, which in this case is the urban slum dwellers.

Promote healthy lifestyle behaviours: These should form the basis of developing other interventions because they can directly link to change in the population's eating **behaviour**, physical activity, and stress, and sleep quality. The suggested interventions have to keep in mind the environmental challenges that the slum populace within urban areas is bound to encounter and possible ways of mitigating them.

Enhance self-efficacy: Interventions should be made which will help people achieve control with knowledge, skills, and confidence pertaining to MetS. This could comprise of therapy sessions, group meetings, and a lot of training sessions.

Address sociocultural factors: These approaches should be culturally applicable and take into account outside pressures from a patients' family and friends. Involve the families and the community members in the health promotion could be helpful.

Improve access to healthcare services: Hence, attempts should be made to increase availability of adequate and quality health care services in the urban slum segment. Thus, it incorporates routine health checks, MetS screening, and necessary medical management and subsequent monitoring.

However, if the stated recommendations are put into practice, it is possible to achieve better self-management of MetS resulting in a decreased load of this chronic condition among the urban slum dwellers of Delhi.

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