EXPLORING NUTRITIONAL STATUS, LIFE STYLE AND QUALITY OF LIFE PATTERNS IN PERIMENOPAUSAL WOMEN OF URBAN VADODARA

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EXPLORING NUTRITIONAL STATUS, LIFE STYLE AND QUALITY OF LIFE PATTERNS IN PERIMENOPAUSAL WOMEN OF URBAN VADODARA

A Dissertation Submitted in Partial Fulfilment of the Requirement for the Degree of Masters of Science
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CERTIFICATE

This is to certify that the research work presented in this thesis has been carried out independently by Ms. Poonam Pohani under the guidance of Prof. (Dr.) Komal Chauhan in pursuit of Master's Degree in Foods and Nutrition (Dietetics) and this is her original work.

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Poonam Pohani

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ABBREVATIONS

BMI – Body Mass Index

CVD – Cardiovascular Disease

EAR – Estimated Average Requirement

GPAQ – Global Physical Activity Questionnaire

HC – Hip Circumference

ICMR – Indian Council of Medical Research

MENQOL – Menopause-Specific Quality of Life

MT – Menopausal Transition

NFHS – National Family Health Survey

NIN – National Institute of Nutrition

RDA – Recommended Dietary Allowance

VF – Visceral Fat

WC – Waist Circumference

WHR – Waist-Hip Ratio

WHO – World Health Organization

ABSTRACT

Perimenopause is a significant transitional phase in a woman's life, characterized by hormonal fluctuations that impact metabolism, body composition, and overall well-being. This period is often marked by symptoms such as hot flashes, mood disturbances, fatigue, and metabolic shifts, which can influence daily functioning and long-term health outcomes. Lifestyle choices, dietary patterns, and socio-economic conditions play a crucial role in shaping the experience of perimenopause, making it essential to evaluate the interplay between these factors. Given the increasing prevalence of obesity, nutritional deficiencies, and sedentary habits among urban women, a comprehensive assessment is necessary to develop effective interventions that support health and quality of life during this stage.

This cross-sectional study was conducted among 250 perimenopausal women residing in urban Vadodara, selected through a combination of snowball and purposive sampling across four zones of the city. Data collection involved a semi structured questionnaire covering socio-demographic details, anthropometric and body composition measurements, dietary assessment using a 24-hour recall and food frequency questionnaire, and Quality of life related to menopausal symptoms was assessed using the Menopause-Specific Quality of Life (MENQOL) scale. Physical activity evaluation through the Global Physical Activity Questionnaire (GPAQ).

The broad objective of this study was to assess the nutritional status, dietary habits quality of life of perimenopausal women and physical activity patterns of perimenopausal women residing in urban Vadodara. Specifically, the study aimed to explore the relationship between socio-economic status and dietary intake, identify common nutritional deficiencies, evaluate the impact of nutritional status on health outcomes and perimenopausal symptoms, and assess the frequency of key food groups and nutrient consumption through food frequency questionnaires.

The findings revealed critical health concerns among the participants. A notable 8% of proportion were aged 30-35 years showing that menopause is occurring earlier for some women. A substantial proportion (73.6%) were classified as obese, with 26.4% falling into the Grade 3 obesity category. The mean BMI was 30.35 kg/m², and central obesity was prevalent, with a mean waist circumference of 88.45 cm and a waist-to-hip ratio of 0.86, indicating a heightened risk of metabolic complications. Dietary assessment

showed excessive carbohydrate intake (241.8 g/day, exceeding 185% of the RDA) alongside inadequate protein consumption (41.2 g/day, covering only 89.6% of the RDA). A large majority (78%) regularly consumed processed and fast foods, while intake of essential micronutrient-rich foods such as millets, legumes, and leafy vegetables was notably low. Physical activity levels were alarmingly insufficient, with 94.8% of participants engaging in minimal activity, increasing their susceptibility to weight gain and related health risks. The MENQOL assessment revealed that menopausal symptoms were significantly impacted by both age and BMI. Women with a higher BMI had more severe symptoms across all MENQOL domains, particularly in vasomotor (mean score: 7.24) and physical health (mean score: 5.66), suggesting that excess weight may intensify menopausal discomfort. Age-wise analysis of MENQOL scores indicated that symptoms were moderate in the 36-40 age group, slightly reduced in the 41-45 age group, possibly due to temporary adjustment mechanisms, and then sharply increased in the 46-50 age group. The highest mean scores were recorded in this group, particularly for vasomotor symptoms (hot flashes in 96.4%, night sweats in 95.6%), physical complaints (fatigue in 80%, joint pain in 92.4%), and psychosocial distress (irritability in 70.4%, memory lapses in 69.2%). Additionally, central obesity was associated with higher psychosocial and sexual domain scores, indicating a link between abdominal fat accumulation and increased emotional burden, mood swings, and diminished sexual well-being.

These findings underscore the urgent need for targeted nutritional and lifestyle interventions to improve the health and quality of life of perimenopausal women. Emphasizing balanced dietary intake, increasing awareness of physical activity benefits, and implementing structured health programs could play a pivotal role in mitigating the adverse effects of perimenopause. Addressing these factors holistically through public health strategies and individualized counselling could lead to significant improvements in long-term health outcomes for women in this crucial life stage.

CHAPTER 1

INTRODUCTION

"There is no chance of the welfare of the world unless the condition of women is improved. It is not possible for a bird to fly on one wing"

-Swami Vivekananda

Women's health is a crucial factor influencing the overall health of society. Over the past few decades, it has emerged as a significant concern (UN 1995). Certain health conditions are unique to women, leading to negative consequences that they alone endure. These conditions, including menarche, pregnancy, childbirth, and menopause, are both biological and social phenomena that pose health risks and necessitate appropriate medical care. The treatment of women and the societal status they hold profoundly impact their health outcomes.

Gender inequality, whether independently or in conjunction with biological differences, heightens women's susceptibility to various health risks (WHO 2009). Many women are unable to reach their full potential due to persistent health and social inequities, as well as deficiencies within the healthcare system. Although women generally have longer life expectancies than men in both developed and developing nations (WHO 2007), India stands out as one of the few countries where life expectancy at birth is nearly equal for both genders (Velkoff and Adlakha 1998), highlighting the concerning health status of women in the country.

India is currently experiencing a demographic transition marked by declining fertility and mortality rates, which has resulted in a growing adult population. Women constitute approximately 48.41% of the total population, with projections indicating a rise to 48.8% by 2036 (The Global Economy, 2023; ABP Live, 2023). Alongside this, the population structure is witnessing a noticeable shift in the age profile of women, with an increasing number entering midlife. Consequently, a growing number of women are entering the post-reproductive phase of life. However, health programs and policies in the country have largely been centered on reproductive health, with more recent attention directed towards aging, primarily focusing on women above the age of 60

(Ingle & Nath, 2008; Nayar, 2009; Boralingaiah et al., 2012). This trend highlights a critical gap in healthcare policies addressing the needs of middle-aged women.

The end of a phase and the beginning of another can bring up some tension, stress, curiosity and excitement. If the individual decides to face the phase positively, it can do wonders. A positive perspective and looking forward to a fresh start add more colour and joy to our lives than moaning about the difficulties and frustrations as suggested by the broaden and build theory. As said, positive affectivity broadens one's awareness and encourages novel, varied, and exploratory thoughts, actions, ideas and social bonds (Fredrickson, 2004). It is very important to face each challenge of life, be it mental or physical, with positivity, hope and resilience.

Menopause, much like menarche, represents a crucial biological and social transition in a woman's life. The hormonal changes occurring during this phase have direct and indirect effects on various health aspects, including quality of life, body composition, and cardiovascular risk (WHO, 2007). Despite its significance, menopause remains an overlooked aspect of women's health in India, receiving limited attention from both policymakers and researchers.

However, unlike other biological transitions such as menarche or pregnancy, menopause often arrives without prior preparedness or sufficient societal discourse. While pregnancy is celebrated and supported with medical interventions and social care, menopause remains shrouded in silence, leaving many women to navigate this transformative phase alone. The sudden hormonal shifts, coupled with limited awareness and inadequate healthcare support, make this transition even more challenging.

Advent of menopause is an inevitable and crucial phase in a woman's life. It marks the reproductive senescence in human females. The World Health Organization (WHO) report on menopause research defined 'Natural menopause' as permanent cessation of menstruation resulting from the loss of ovarian follicular activity.

Menopause is defined by the World Health Organization (2023) as the permanent cessation of menstruation resulting from the loss of ovarian follicular activity. It is confirmed only after 12 consecutive months of amenorrhea, with no other physiological or pathological cause, and typically occurs between the ages of 45 and 55 years.

More recent estimates reflect an even greater demographic shift. In 2020, there were approximately 985 million women aged 50 years and older globally, and this number is projected to increase to 1.65 billion by 2050 (MacLennan et al., 2024). According to the WHO (2023), women aged 50 and above accounted for 26% of the global female population in 2021, up from 22% in 2010. This substantial growth in the population of postmenopausal women underscores the critical need for gender-responsive health policies, especially in developing regions where the majority of these women reside.

The word 'menopause' generally denotes to the entire menopausal transitional years, not just to one day or point. Menopause can occur naturally due to loss of follicular activity in ovaries (Richardson et al 1987, Gallicchio et al 2006) or menopause can be induced by surgical procedures such as hysterectomy or bilateral oophorectomy (Bachmann 2001, Reich 2001).

In India also it has been found that women lack enough knowledge about the symptoms, their effects and management (Karmakar et al., 2017). The Indian menopause society notes it in their study, "Quality of life among menopausal women: A community-based study in a rural area of West Bengal" (2017). Sagar et al., (2013) studied the lack of awareness regarding the menopausal transition period and the reasons behind it in "Study of menopausal symptoms and perceptions about menopause among women at a rural community in Kerala". The researchers mention the high importance and need for further studies in this area. The late realization and the lack of readiness to take proper remedial steps make the problem even worse, and it might even have a worse effect on their quality of life too (Gayathripriya et al., 2018).

The biological basis of menopause are changes that occur in the structure and function of the ovary. Ovarian failure leading to menopause is a gradual process that usually starts several years before menopause (Burger et al 2002). Overall, there is evidence of falling ovarian hormone production with reciprocal increase in the pituitary gonadotropins. The major ovarian hormones are divided into two classes:

1. Steroids a. Estradiol [Estrone (E1), estradiol (E2), and estriol (E3) are three endogenously produced estrogens. Estradiol (E2) is produced by the dominant ovarian follicle during the monthly menstrual cycle and is the most potent natural estrogen. Estrone (E1) is the dominant form of estrogen during menopause]. b. Progesterone

2. Peptides (non-steroidal substances), particularly the inhibits (suppresses synthesis and secretion of follicular stimulating hormone) and the activins (stimulates follicular stimulating hormone).

The number of ovarian follicles present in the ovary, and thus the number of ovarian granulosa cells available for hormone secretion appears to be a critical determinant of age at menopause. The supply of oocytes is finite: about 7 million germ cells can be found in the ovaries of the human foetus at the fifth month of intrauterine life but these cells do not thereafter divide. The rate of follicle decline is approximately linear on a semi-logarithmic scale until the age of about 35-40 years (Gougeon 1984). It accelerates thereafter, until after the menopause, when essentially no follicles remain (Richardson et al 1987). It is thus evident that the post-menopausal ovary no longer contains granulosa cells.

The transition into menopause, while biological, is deeply intertwined with socio-cultural factors. In many communities, menopause remains a taboo topic, leading to a lack of open discussions and support. Women often find themselves navigating this significant life stage with limited guidance, relying on fragmented knowledge and anecdotal experiences. The absence of structured healthcare interventions further deepens the challenges, leaving many women unprepared for the physical, emotional, and psychological effects of menopause. Given this reality, it becomes crucial to understand the factors influencing the age at menopause and how they shape women's experiences globally and within India.

In Western nations, the average age at natural menopause typically falls between 50 and 51 years (McKinlay, 1996). However, in countries such as the Philippines, Papua New Guinea, India, Pakistan, Thailand, and several regions of Africa, menopause tends to occur at an earlier age, ranging from 45 to 49 years (Goodman et al., 1985; Randhawa et al., 1987; Johnson et al., 1990; Okonofua et al., 1990; Sukwatana et al., 1991; Kwawulcume et al., 1993; Wasti et al., 1993).

A variety of factors have been linked to the timing of menopause, including socio-economic conditions (Gold et al., 2001; Kaczmarek, 2007; Li et al., 2012), educational background (Beser et al., 1994; Luoto et al., 1994; Li et al., 2012), and marital status (Beser et al., 1994; Gold et al., 2001). Additionally, reproductive and physiological elements such as parity (Thomas et al., 2001; Dratva et al., 2009; Gold, 2011),

menstrual cycle patterns (Kaczmarek, 2007; Henderson et al., 2008), and the onset of menarche (Li et al., 2012) have been associated with menopausal age. Genetic influences, including maternal and sibling menopausal history, also play a crucial role (Torgerson et al., 1994; Snieder et al., 1998). Other contributing factors include oral contraceptive usage (Torgerson et al., 1994; Gold et al., 2001), dietary habits (Nagata et al., 2000; Nagel et al., 2005), physical exercise (Dorjgochoo et al., 2008), smoking (Van Noord et al., 1997; Li et al., 2012), and body mass index (Henderson et al., 2008; Li et al., 2012).

Research in Singapore revealed that the mean age at menopause was 49.0 years, with no significant differences among Chinese, Malay, and Indian women. The study also indicated that a higher number of childbirths delayed menopause (Loh et al., 2005). In Central and Eastern Europe, women with higher education, vitamin and mineral supplementation, and prior oral contraceptive use tended to experience menopause later, whereas those who smoked, avoided alcohol, or engaged in low physical activity entered menopause at an earlier age (Stepaniak et al., 2013). Furthermore, breastfeeding and alcohol consumption have been found to contribute to an earlier onset of menopause among Caucasian women (Dvornyk et al., 2006).

Polish women had a median menopausal age of 51.25 years. Early menarche, shorter menstrual cycles, smoking, limited education, and poor health perception were linked to an earlier onset, while oral contraceptive use and higher parity were linked to a delayed menopause (Kaczmarek, 2007). A study from Italy identified a mean menopausal age of 50.9 years, with early menopause being associated with smoking and having no children (Meschia et al., 2000). Another study in the multi-ethnic community of Hilo, Hawaii, reported a median menopause age of 53.0 years, noting that women who smoked and were unmarried a decade before the survey were more likely to experience menopause earlier (Sievert et al., 2013).

A cohort study conducted by Kutenaee et al. (2023) examined 894 postmenopausal Iranian women aged 35 to 70 years. The study reported a mean age at natural menopause of 48.31 ± 6.34 years. Several factors were found to influence menopausal age. A higher number of pregnancies was associated with a later onset of menopause, whereas women with a history of cardiac disease, lower socioeconomic status, and rural residence experienced menopause at an earlier age. Among women experiencing

premature menopause, those with diabetes had a higher mean menopausal age (35.68 ± 2.92 years) compared to non-diabetics (33.82 ± 3.06 years). Conversely, women with a history of infertility had a significantly lower menopausal age (29.13 ± 5.22 years) compared to those without infertility issues (34.84 ± 2.826 years). The study highlights the complex interplay of reproductive, health, and socioeconomic factors in determining menopausal age among Iranian women (*Kutenaee et al., 2023*).

In the Indian context, multiple studies have investigated the age at natural menopause and its influencing factors. Pal and Desai (2021) conducted a systematic review analysing data from ten community-based studies between 2009 and 2020, estimating the average age at menopause to be 46.6 years. Mozumdar and Agrawal (2015) examined data from three rounds of the National Family Health Survey (1992–93, 1998–99, and 2005–06) and found that the overall prevalence of menopause remained consistent across these periods. They identified factors such as occupations in farming, lack of formal education, belonging to scheduled castes or tribes, underweight status, higher parity, and motherhood before the age of 16 as being associated with a higher prevalence and earlier onset of menopause among Indian women.

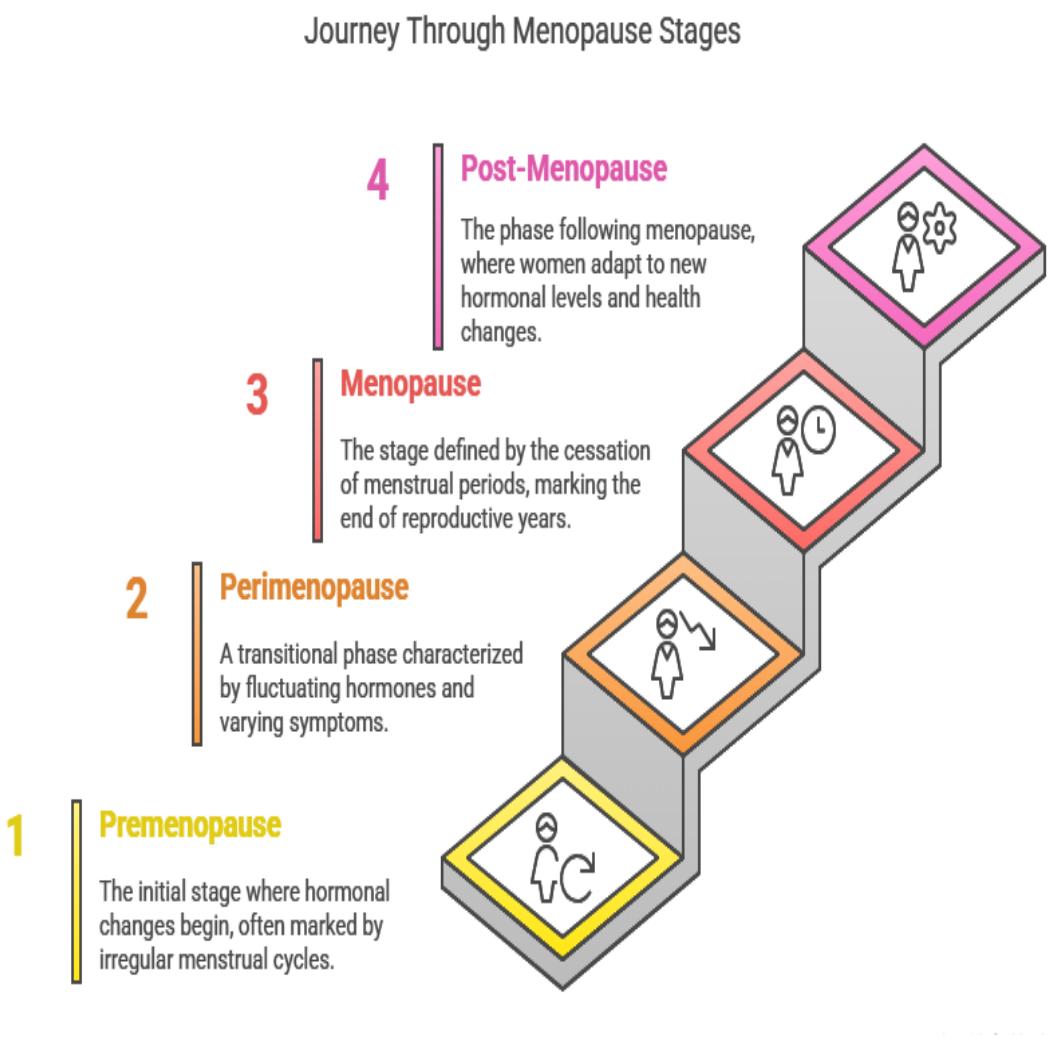
Additionally, a comprehensive survey conducted by the Indian Menopause Society, as reported by Borker et al. (2016), determined the average age of menopause among Indian women to be 46.2 years, notably lower than the average of 51 years observed in Western countries. This study also highlighted correlations between earlier menopause and factors such as lower socioeconomic status, marital status, and parity. Collectively, these studies indicate that the average age at natural menopause among Indian women is approximately 46.2 to 46.6 years, with significant associations with socio-economic and reproductive factor.

Given the significant variations in the timing of menopause worldwide and the complex factors influencing it, understanding these patterns is crucial in addressing women's health concerns. These considerations directly inform the classification of menopause stages, as recognized by the Indian Menopause Society, which aims to enhance awareness and support for women navigating these transitions.

The Indian menopause society is the body that focuses on the problems women face during their midlife, especially the menopausal transition. The major goal is to increase

awareness regarding menopause and aging through public health and education activities. The Indian Menopause Society has classified the stages of menopause in to

Figure 1.1 Journey Through Menopause Stages



Source the Indian menopause society

Premenopause "Reproductive period prior to menopause" (Johnson, 2020). The period before the beginning of the drastic hormonal fluctuations is called premenopause. The whole reproductive period in a girl's or woman's life could be included in the term "premenopause". The girl enters the premenopausal period when she reaches puberty, the period during which the hormonal and other physical changes start to set in. During this stage, the body makes itself ready for reproduction. Right from this stage, the body can be said to be in the premenopausal period.

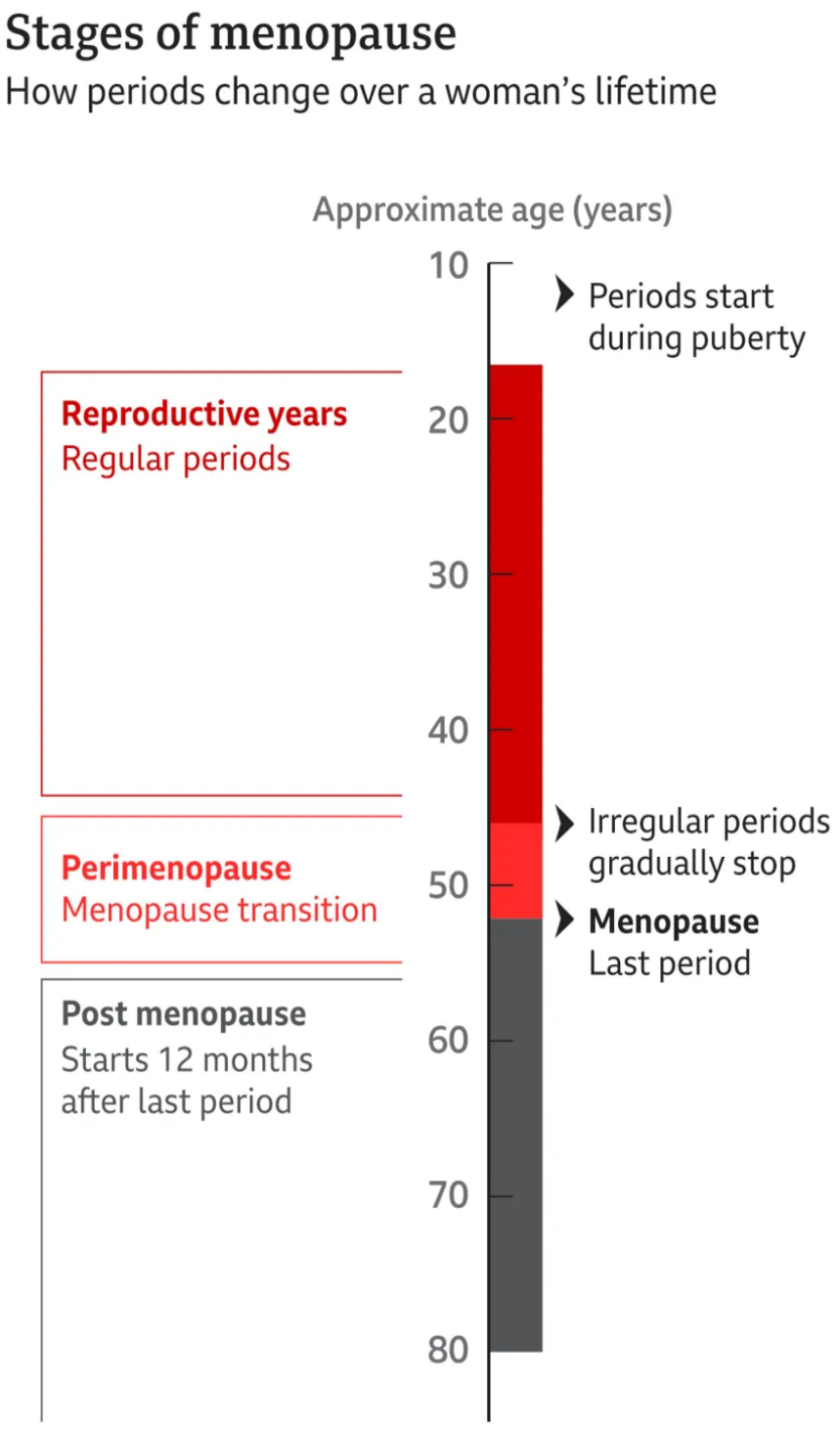
Perimenopause "3-5 years before and one year after menopause" (Johnson, 2020). 'Peri' means around. The years, leading to menopause during which the hormonal fluctuations and changes in the physical conditions start, can be said to be 'perimenopause'. This stretch of her life shows exorbitant changes both in physiology and psychology. Researchers have found that the climacteric syndrome affects 90% of the women in the age range of perimenopause (Brukwicka et al., 2016). The need to give this span of life, the care it demands has become essential due to many reasons. This period marks the beginning of a profound shift in a woman's biological cycle, signalling the onset of menopause-related changes that require deeper understanding.

Peri-menopause is defined as the period immediately prior to the menopause (when the endocrinological, biological and clinical features of approaching menopause commence) and the first year after menopause. The term 'menopausal transition' refers to the period before the final mensuration period when variability in the menstrual cycle is usually increased (McKinlay et al 1992, McKinlay 1996).

Women, unlike the earlier years, have come out of their homes and are showing their talent in all domains. They are part of every job that were never theirs', years ago. So, it is really important to know how the bodily changes during a particular period and take necessary steps to deal with the imperative changes, to help them be competent enough to cope with the demands. There are reports in which women demand more information about menopause even at their workplace, which they believe will help them cope better with the work-body change balance (Beck et al., 2019). In the particular study, it was seen that only 20% of women were informed about the phase and more women were interested in knowing more about it.

Compared to the earlier years, the life expectancy has gone up. In the last century and even years preceding it, the need for studying about menopause was not much needed as the life span was around 40 years or so. Now that the average life expectancy has gone up to 70 years (70.2 as per the National Health Profile, 2019) women spend one third of their life after menopause. Henceforth, the time has come that the difficulties faced by women during the perimenopause get the attention and become equipped. This extended post-menopausal phase highlights the importance of addressing perimenopausal challenges proactively, ensuring a smoother transition into later year.

Figure 1.2 Stages of Menopause



Source Briggs, P. (n.d.). *Fast facts for patients: Menopause* (2nd ed.). BBC.

Perimenopause is an often-overlooked yet profound physiological transition, marking the gradual cessation of ovarian function and heralding the end of reproductive capability. Following puberty, the female body undergoes another momentous transformation during menopause, characterized by significant endocrine and physiological alterations.

While menopause itself is a defined endpoint, perimenopause is a more ambiguous and unpredictable phase, where symptoms and changes fluctuate before stabilizing.

During this transitional phase, the ovarian follicles—under the influence of follicle-stimulating hormone (FSH)—experience a progressive decline in activity. As follicular atresia ensues, residual oestrogen production persists but remains insufficient to maintain the intricate hormonal equilibrium required for the subsequent phases of the menstrual cycle. In response to this diminishing estrogenic output, the pituitary gland compensates by amplifying FSH secretion. However, the absence of luteinizing hormone (LH) secretion disrupts the luteal phase, leading to the cessation of progesterone synthesis. While vestigial oestrogen levels may still circulate, the abrupt depletion of progesterone exacerbates the physiological disequilibrium, manifesting in a cascade of somatic and psychological ramifications. This intricate interplay of hormonal dysregulation induces a spectrum of corporeal and neuropsychological manifestations, ranging from vasomotor disturbances to cognitive and emotional perturbations. As this phase unfolds, the effects extend beyond biological adjustments, influencing emotional stability, social interactions, and overall well-being. The silent turbulence of perimenopause underscores the complexity of this phase, often presenting as an unseen battle within the female body—one that demands greater scientific inquiry and awareness. As this phase unfolds, the effects extend beyond biological adjustments, influencing emotional stability, social interactions, and overall well-being.

The silent turbulence of perimenopause underscores the complexity of this phase, often presenting as an unseen battle within the female body—one that demands greater scientific inquiry and awareness.

The perimenopausal transition is marked by a multitude of physiological, psychological, and psychosocial changes, the intensity of which differs among individuals (Woods & Mitchell, 2005). Research indicates that depressive symptoms frequently reemerge during this phase, contributing to emotional distress. Additionally,

somatic symptoms are highly prevalent, as documented in various studies (Callegari et al., 2007). Furthermore, the severity of these symptoms has been found to escalate in direct correlation with inadequate social and familial support, exacerbating the overall impact of perimenopause (Blümel et al., 2004).

Hot flashes and night sweats, collectively known as vasomotor symptoms, are among the most prevalent and distressing symptoms experienced during perimenopause. A systematic review by Zhang et al., 2024 reported that the global prevalence of hot flashes varies significantly, with higher-income countries showing a prevalence of 49.72%, while low-income countries report a prevalence of 65.93%. This variation may be attributed to genetic, environmental, and lifestyle factors.

Perimenopause is characterized by significant changes in menstrual cycle regularity due to hormonal fluctuations. Women may experience shorter or longer cycles, heavier or lighter bleeding, and skipped periods. These variations are attributed to erratic ovulation and declining ovarian function. Understanding these changes is crucial, as they can impact a woman's reproductive planning and overall health.

Irregular menstrual cycles are a hallmark of perimenopause, characterized by variations in cycle length, missed periods, or unpredictable bleeding patterns. These changes result from fluctuating hormone levels as ovarian function declines. Research has explored the implications of such irregularities:

- **Menstrual Irregularity and Cardiovascular Risk**: A study by Zhu et al. (2021) found that women with irregular menstrual cycles had a 20% higher risk of developing heart disease and a 17% higher risk of diabetes compared to those with regular cycles. The research suggests that menstrual irregularities in women in their forties may serve as early indicators for adverse cardio-metabolic outcomes
- **Hormonal Profiles in Perimenopause**: Kaur and Goel (2019) conducted a comparative evaluation of menstrual patterns and hormonal profiles in normal and abnormal perimenopause. The study observed a progressive increase in follicle-stimulating hormone (FSH) and luteinizing hormone (LH), along with a decrease in estradiol levels from early to late perimenopause, correlating these hormonal changes with menstrual irregularities.

- **Modifiable Risk Factors**: Research by Lee et al. (2018) demonstrated that factors such as smoking, obesity, and stress were significantly associated with menstrual cycle irregularity. Women exhibiting multiple risk factors had a 1.7 times higher likelihood of experiencing irregular menstruation.

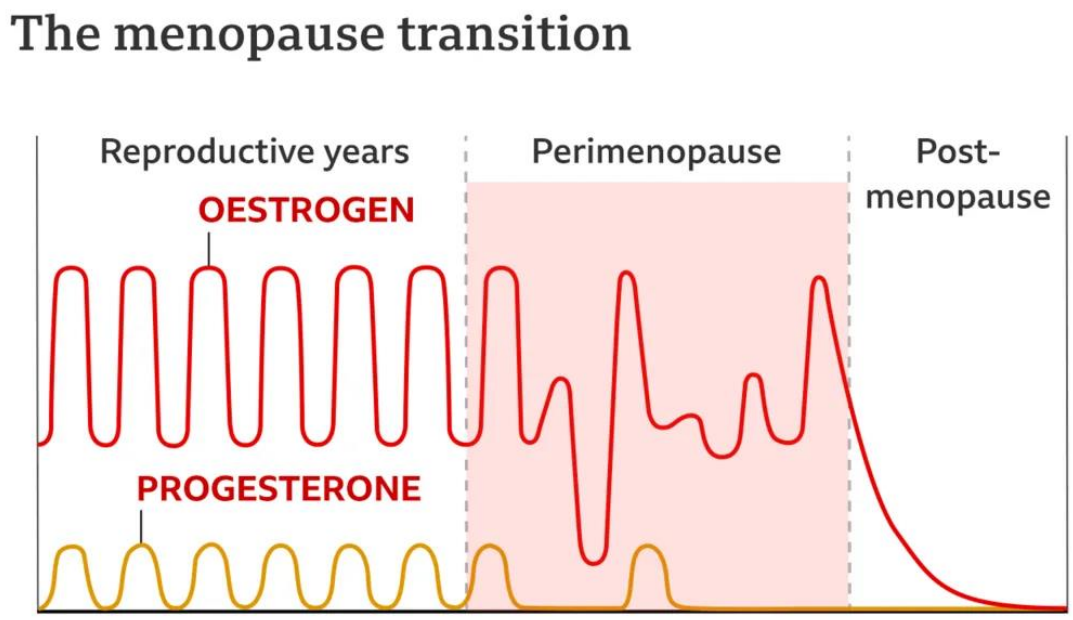
Additionally, early initiation of smoking and higher pack-years were linked to premature menopause. Sleep problems are commonly reported during perimenopause, often linked to hormonal changes and night sweats. A study by Mulhall and Anstey, 2018 found that 31.5% of midlife women reported sleep problems, with prevalence increasing across menopausal stages.

Addressing sleep disturbances is vital, as they can exacerbate other perimenopausal symptoms and negatively affect quality of life.Joint and muscle pain are frequently reported during perimenopause, often attributed to hormonal fluctuations. The systematic review by Zhang et al., 2024 identified joint and muscular discomfort as the most prevalent symptom, affecting 65.43% of women globally. These symptoms can impact daily activities and overall well-being.

Declining oestrogen levels during perimenopause can lead to vaginal dryness, itching, and discomfort during intercourse, collectively known as genitourinary syndrome of menopause (GSM). A study by Sharma and Khan, 2019 reported that vaginal dryness was a common symptom among menopausal and perimenopausal women. These changes can significantly impact sexual health and quality of life.

Perimenopause is characterized by substantial hormonal fluctuations that precipitate numerous physiological changes within the female body. While the primary focus has been on endocrine alterations, particularly the progressive decline in oestrogen levels, there remains significant scope for research into additional factors influencing these physiological manifestations. Individual experiences and symptomatology during this transition vary considerably.

Figure 1.3 The Menopause Transition and Hormonal Shift



Source Briggs, P. (n.d.). *Fast facts for menopause*. BBC.

Estrogen, a crucial hormone in maintaining homeostasis, plays a fundamental role in regulating various physiological systems. Pioneering research in behavioral endocrinology has established estrogen's influence on mood regulation, cognitive function, and sexual behaviors/responses (Razmara et al., 2007). The decline in estrogen levels during perimenopause has been associated with systemic inflammatory responses, which contribute to an elevated risk of cardiovascular disease, osteoporosis, and metabolic disorders. A study by Zárate et al. (2020) highlighted that women undergoing menopausal transition exhibited increased abdominal adiposity, elevated triglycerides, total cholesterol, low-density lipoprotein (LDL) cholesterol, fasting glucose levels, insulin resistance, body mass index (BMI), and blood pressure. These findings underscore the extensive impact of hormonal changes on metabolic health during perimenopause. Furthermore, fluctuations in estrogen have been implicated in neuroinflammatory processes, which may exacerbate mood disorders and cognitive decline. The intricate relationship between estrogen depletion and neuroinflammation warrants further investigation to elucidate underlying mechanisms and develop targeted therapeutic interventions. In addition to hormonal influences, psychosocial

determinants such as stress, lifestyle choices, and socioeconomic status may further modulate physiological responses during perimenopause. Comprehensive research integrating these variables is essential to gaining a holistic understanding of perimenopausal symptomatology and informing effective management strategies. In conclusion, perimenopause encompasses a broad spectrum of physiological changes, primarily driven by hormonal fluctuations, particularly estrogen decline. However, the heterogeneity in individual experiences highlights the need for continued research into additional contributing factors. A nuanced understanding of these changes is imperative for developing personalized approaches to support women navigating this complex life stage.

Perimenopause brings several potential complications related to cardiovascular health, bone health, mental health, reproductive health, and overall quality of life. Below is a detailed, research-based examination of these complications:

During perimenopause, declining estrogen levels can affect cardiovascular health. Estrogen is known to have a protective effect on the cardiovascular system, and its decline can increase the risk of cardiovascular diseases.

Cardiovascular Risk: A study by Manson et al. (2015) in *JAMA* found that women in perimenopause have an increased risk of developing cardiovascular diseases due to the decline in oestrogen levels. This study observed that risk factors like high blood pressure and high cholesterol become more prevalent during perimenopause (Manson, J. E., 2015).

Research by Collins et al. (2013) in explains that oestrogen influences lipid metabolism, endothelial function, and inflammatory markers, and its decline can lead to adverse changes in these parameters, contributing to cardiovascular risk (Collins, P., 2013).

The decline in estrogen during perimenopause accelerates bone loss, increasing the risk of osteoporosis and fractures.

Bone Loss: A study by Eastell et al. (2007) found that women can experience significant bone loss during the perimenopausal period, with up to 20% of bone density loss occurring within the first 5-7 years after menopause (Eastell, R., 2007).

Osteoporosis Risk: Research by Riggs et al. (2004) highlights that the rapid bone loss during perimenopause is a critical period for the development of osteoporosis and underscores the importance of early intervention (Riggs, B. L., 2004).

Hormonal fluctuations during perimenopause can impact mood and mental health, with some women experiencing symptoms of depression.

Depression Rates: A study by Schmidt et al. (2015) found that about 20% of women report depressive symptoms during perimenopause. This research indicates that hormonal changes can contribute to mood disorders, requiring targeted mental health support (Schmidt, P. J., 2015).

Mood Disorders: Research by Freeman et al. (2014) in discusses the link between perimenopausal hormonal fluctuations and mood disorders, emphasizing the need for psychological support and intervention (Freeman, E. W., 2014).

Although fertility declines with age, women in perimenopause can still conceive. Irregular menstrual cycles and hormonal changes can complicate fertility and family planning.

Fertility: A study by Gnoth et al. (2005) in *Human Reproduction* found that fertility declines but does not completely cease during perimenopause. The study emphasizes that women may still conceive, though the likelihood decreases with age (Gnoth, C., 2005).

Menstrual Irregularities: Research by Nelson et al. (2011) highlights that irregular menstrual cycles are common in perimenopause and can impact family planning and fertility understanding (Nelson, H. D., 2011).

Perimenopausal symptoms such as hot flashes, sleep disturbances, and vaginal dryness can significantly impact a woman’s quality of life.

Symptoms Impact: A study by Melby et al. (2012) in *Maturitas* found that symptoms like hot flashes, sleep problems, and vaginal dryness can profoundly affect daily functioning and emotional well-being. The study underscores the importance of managing these symptoms to maintain quality of life (Melby, M. K., 2012).

Overall Well-being: Research by Santoro et al. (2011) highlights how perimenopausal symptoms impact overall well-being and emphasizes the need for effective management strategies (Santoro, N., 2011).

As the body navigates the turbulent waters of perimenopause, the physiological shifts extend beyond hormonal fluctuations, weaving into the fabric of daily life. From the erratic rhythms of menstrual cycles to the unrelenting waves of hot flashes and the silent toll on bone and cardiovascular health, perimenopause presents a complex interplay of challenges. The body, once accustomed to hormonal equilibrium, now faces an unpredictable landscape—one that influences mood, sleep, metabolism, and overall well-being.

Yet, amidst this transformation, the power of proactive intervention emerges. While the physiological changes of perimenopause are inevitable, their impact is not unchangeable. Science has illuminated a path where lifestyle and nutrition serve as powerful allies, offering a means to buffer the intensity of symptoms and safeguard long-term health. What a woman eats during this period can influence not only how she feels today but also her resilience against future health risks, from osteoporosis to heart disease.

Perimenopause is a period of significant hormonal and metabolic changes, and nutrition plays a crucial role in managing symptoms, preventing long-term health risks, and enhancing overall well-being. While hormonal fluctuations are inevitable, research suggests that dietary interventions can mitigate the severity of symptoms and support physiological adaptation during this transition.

The perimenopausal phase, marking the transition to menopause, is a critical period in a woman's life that brings about various physiological, psychological, and lifestyle changes. It typically occurs between the ages of 40 and 55 and is characterized by hormonal fluctuations, particularly declining estrogen levels, which can significantly impact women's nutritional needs, physical health, and overall quality of life (Avis et al., 2015).

During this transition, women are more vulnerable to weight gain, bone density loss, cardiovascular changes, mood disturbances, and vasomotor symptoms like hot flashes and night sweats (Santoro et al., 2015). These changes can be compounded by socio-

cultural and lifestyle factors such as poor diet, physical inactivity, and stress. Moreover, the dietary needs of perimenopausal women are often not adequately met, leading to increased risks of nutritional deficiencies, particularly in calcium, vitamin D, iron, and protein intake (Kumar et al., 2018).

Nutrition is a fundamental aspect of maintaining health and well-being, particularly during perimenopause. As women undergo hormonal changes, their nutritional needs can shift significantly. Proper nutrition during this period can help alleviate symptoms, mitigate risks associated with bone density loss, cardiovascular health, and metabolic changes. Nutrient-rich diets may contribute to a smoother transition.

Nutritional strategies that include high-fiber foods and lean proteins can help manage weight and body composition, which can be challenging during perimenopause due to metabolic changes (K. A. Johnson et al., 2020). Research shows that calcium and vitamin D are crucial for maintaining bone density and reducing the risk of osteoporosis during perimenopause. Studies suggest that women who consume adequate calcium and vitamin D have better bone mineral density compared to those with deficiencies (L. M. H. Adams et al., 2021). Omega-3 fatty acids and monounsaturated fats are linked to improved cardiovascular health and reduced risk of heart disease. Perimenopausal women may experience an increased risk of cardiovascular issues, making these nutrients particularly beneficial (J. M. Kris-Etherton et al., 2022).

Nutritional strategies that include high-fibre foods and lean proteins can help manage weight and body composition, which can be challenging during perimenopause due to metabolic changes (K. A. Johnson et al., 2020).

Foods rich in phytoestrogens, such as soy and flaxseeds, may help alleviate some menopausal symptoms by mimicking oestrogen effects in the body (M. A. Taku et al., 2021). Adequate intake of B vitamins, particularly B6 and B12, has been associated with improved mood and cognitive function. Perimenopausal women may experience mood swings and cognitive changes, making these nutrients important (P. R. Deuster et al., 2023). A diet rich in antioxidants, such as vitamins C and E, can help combat oxidative stress and inflammation, which are associated with aging and hormonal changes (R. A. Smith et al., 2023).

Justification for the study

- While there is extensive research on menopause and its effects on women's health, there is a significant gap in the literature concerning the peri-menopausal phase. Peri-menopause, the transitional period leading up to menopause, involves complex hormonal changes that can impact women's nutritional needs, health behaviours, and overall well-being
- The hormonal changes during perimenopause can affect metabolism and bone health, making it important to understand and address nutritional needs to manage symptoms and avoid long-term health issues.
- Hormonal shifts during this period can increase the risk of deficiencies in important nutrients like calcium and vitamin D, highlighting the need for appropriate dietary adjustments.
- Proper nutrition can help reduce symptoms such as hot flashes and mood swings, leading to an improved quality of life during this transitional stage.

Objectives

Broad objective: To Assess the Nutritional Status, Physical Activity Pattern, Dietary Habits and Quality of life of the Perimenopausal Women residing in Urban Vadodara.

Specific objective:

- To assess the relationship between socio-economic status and dietary intake among peri-menopausal women.
- To assess the dietary habits of perimenopausal women and identify common nutritional deficiencies
- To assess the current nutritional status and its effect on health outcomes and perimenopausal symptoms, such as hot flashes and mood swings.
- To assess the frequency of consumption of key food groups and nutrients using food frequency questionnaires.

The literature reviewed on the above objectives is presented in the next chapter.

CHAPTER 2

REVIEW OF LITERATURE

Perimenopause is a natural phase in a woman's life that marks the gradual shift from reproductive years to menopause. It is characterized by hormonal fluctuations, primarily involving oestrogen and progesterone, which lead to various physiological and emotional changes. This stage can begin several years before menopause, typically in the 40s, though it may start earlier or later for some women.

During this time, menstrual cycles often become irregular, with variations in flow and frequency. Women may also experience symptoms such as hot flashes, night sweats, mood swings, sleep disturbances, and changes in metabolism. The intensity and duration of these symptoms vary among individuals, influenced by factors like genetics, lifestyle, and overall health. Additionally, perimenopause is associated with shifts in bone density, cardiovascular health, and cognitive function, highlighting the broader impact it has on well-being.

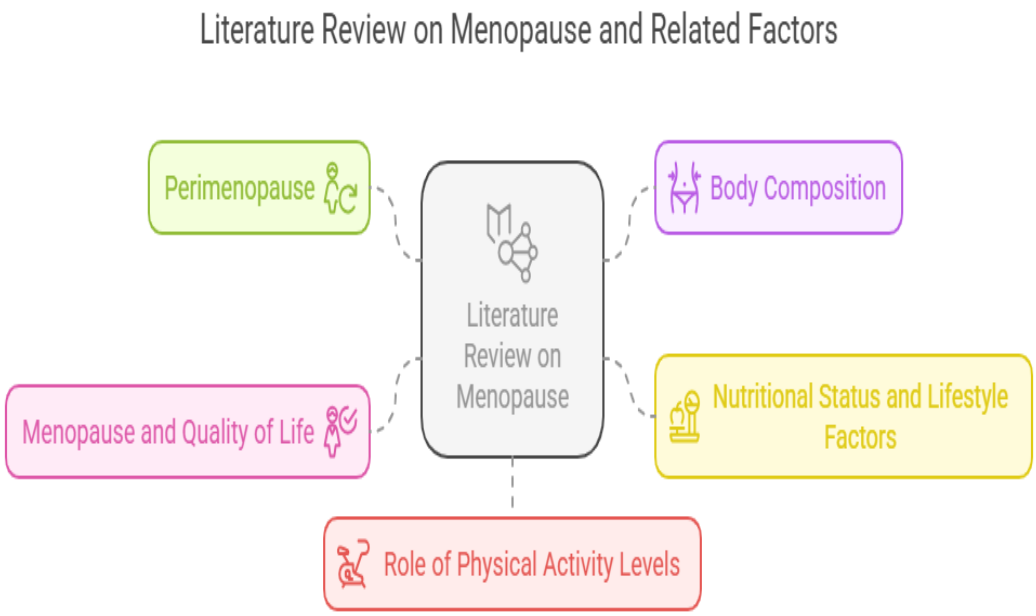
Understanding this phase is essential for women to navigate its challenges effectively. Lifestyle adjustments, including a balanced diet, regular exercise, and stress management, can help ease symptoms. Medical interventions, such as hormone therapy or alternative treatments, may also be considered based on individual needs. As this stage leads to menopause, awareness and proactive management play a key role in maintaining quality of life.

This study was conducted to explore the nutritional status, physical activity levels, and quality of life patterns of perimenopausal women residing in urban Vadodara. Perimenopause is a phase characterized by hormonal changes that affect various aspects of health, including metabolism, body composition, and overall well-being. Understanding the dietary habits, physical activity levels, and lifestyle patterns of women during this stage is essential for promoting better health outcomes.

The study includes data collection on sociodemographic factors, lifestyle patterns, physical activity levels, and quality of life status to assess how these elements influence the well-being of perimenopausal women. It also examines body composition, including weight, BMI, fat percentage, and muscle mass, to evaluate the impact of perimenopause on physical health. Additionally, dietary habits and nutrient intake are

analysed to identify patterns in food consumption and their potential role in managing perimenopausal symptoms. The study aims to establish relationships between diet, physical activity, body composition, and quality of life status.

The relevant review of literature of current study has been presented under the below given topics:



2.1 Perimenopause

Perimenopause is a stage before menopause when the body's reproductive hormones gradually fluctuate, leading to noticeable changes in menstrual patterns, energy levels, and overall health. Women may experience symptoms such as irregular cycles, temperature fluctuations, mood variations, and sleep disturbances.

A study conducted by Harlow et al. (2012) examined the stages of reproductive aging and their impact on women's health. The research focused on refining the classification of reproductive aging stages by analyzing hormonal changes and menstrual cycle patterns. The findings revealed that perimenopause varies significantly among women, with symptoms such as irregular cycles, hot flashes, and mood fluctuations being commonly reported. The study emphasized that the severity and duration of these symptoms depend on multiple factors, including hormonal shifts and individual health conditions. The refined staging system proposed in this study aimed to improve the

understanding of reproductive aging and assist in better management strategies for perimenopausal symptoms.

Similarly, a study conducted by Venkatesh et al. (2020) assessed the prevalence and severity of perimenopausal symptoms among Indian women. The research included women aged 40 and above, collecting data on menopausal symptoms using structured interviews and standardized assessment tools. The findings indicated that around 70% of the participants experienced perimenopausal symptoms, with joint and muscular discomfort (56%), physical and mental exhaustion (71.5%), and anxiety (80%) being the most commonly reported issues. The study also highlighted that woman with higher BMI, tobacco use, and depression were more likely to experience severe symptoms. The research concluded that lifestyle factors play a crucial role in determining the intensity of symptoms and emphasized the need for awareness programs, lifestyle modifications, and mental health support to improve the well-being of perimenopausal women.

In this context, the Indian Menopause Society (IMS) plays a pivotal role in improving the lives of women going through perimenopause and menopause. The IMS has been at the forefront of advocating for women's health during this critical stage by raising awareness, providing educational resources, and offering expert guidance to healthcare providers. Recognizing that lifestyle factors like diet, exercise, and mental health can influence the severity of symptoms, the IMS promotes a holistic approach to managing perimenopause. Through its initiatives, the IMS encourages regular screenings, mental health support, and lifestyle modifications, which align closely with the findings from studies like Venkatesh et al.'s.

The IMS also addresses the lack of awareness in underserved areas, conducting community outreach programs to educate women about perimenopausal symptoms and the importance of seeking timely medical advice. This approach is crucial, as many women are unaware of the resources available to them or feel uncertain about the changes they are experiencing. By providing a platform for healthcare professionals and offering a range of educational tools, the IMS ensures that perimenopausal women in India receive the care they need to manage their health effectively. Ultimately, the Indian Menopause Society’s efforts help bridge the gap between medical knowledge and everyday health challenges faced by women in this important life stage.

2.2 Body Composition

Body composition undergoes significant changes during perimenopause and menopause, largely due to the hormonal fluctuations that occur as estrogen levels decline. These changes often include an increase in body fat, particularly around the abdominal area, and a decrease in lean muscle mass. The loss of estrogen during menopause can lead to a reduction in muscle mass, which is linked to a slower metabolism. This means that many women experience weight gain, even if their eating habits and physical activity levels remain the same.

In particular, the increase in abdominal fat, also known as visceral fat, can be concerning as it is associated with higher risks for metabolic disorders like type 2 diabetes, heart disease, and other health conditions.

The study conducted by **Lovejoy et al. (2008)** at the Pennington Biomedical Research Center examined changes in body composition, fat distribution, and energy balance in women transitioning through menopause. Over four years, 103 Caucasian and 53 African-American premenopausal women were monitored to assess the effects of hormonal shifts, particularly declining oestrogen levels. The findings revealed an overall increase in subcutaneous abdominal fat (SAT) with aging, but postmenopausal women showed a significant rise in visceral fat (VAT), which poses higher health risks. A sharp decline in serum oestradiol levels was noted in the postmenopausal group, along with reduced physical activity starting a few years before menopause.

Dietary changes were also observed, with higher energy, protein, and carbohydrate intake before menopause, followed by a decline around menopause onset. Additionally, energy expenditure (EE) decreased with age, with postmenopausal women showing a more pronounced drop in sleeping EE and fat oxidation, contributing to increased fat storage. This study provides valuable insights into how menopause specifically influences body fat distribution, metabolism, and lifestyle behaviors.

The study conducted by **Marlatt et al. (2022)** reviewed the effects of the menopausal transition on women's health, focusing on hormonal changes and body composition shifts that contribute to increased cardiometabolic risk. The review highlighted a significant decline in circulating estrogen, particularly estradiol, alongside an increase in follicle-stimulating hormone (FSH) during perimenopause. These hormonal shifts

were linked to higher energy intake and lower energy expenditure, leading to weight gain. The study found that this weight gain primarily results from increased fat mass, particularly abdominal fat accumulation, which is associated with greater metabolic health risks. Additionally, the authors pointed out the high prevalence of obesity among women, with rates of **43.3% in those aged 40 to 59 years and the same percentage in women aged 60 and above** in the United States. This review underscores the importance of understanding menopausal body composition changes to mitigate associated health risks.

Kodoth et al. (2022) conducted a comprehensive review examining the detrimental alterations in body composition during the menopausal transition and their association with cardiovascular disease (CVD) risk. The review underscored that menopause is a critical period marked by significant weight gain, which substantially elevates the likelihood of developing CVD in postmenopausal women. A multifactorial interplay of hormonal fluctuations—primarily the decline in estrogen—alongside behavioural shifts in diet and physical activity, as well as the natural progression of aging, contributes to these changes. The synthesis of existing studies revealed that women, on average, experience an annual weight gain of approximately 1.5 pounds throughout midlife (ages 50–60), irrespective of their baseline body size or racial/ethnic background. Furthermore, the review emphasized the disproportionate burden of obesity among women, with an age-adjusted prevalence of 40.4%, notably surpassing that of men (35%). These findings highlight the necessity for targeted interventions to mitigate menopause-related metabolic and cardiovascular risks.

Dehghan et al. (2021) conducted a prospective study utilizing data from the Oxford Biobank to investigate body composition changes during the menopausal transition. Over a follow-up period of approximately 5.1 years, 97 women were assessed using DEXA scans to evaluate pre- and postmenopausal body composition. Despite minimal changes in overall body weight, the study revealed significant alterations in fat distribution and muscle mass. Visceral adipose tissue (VAT) exhibited the most pronounced proportional increase, rising by 22%, signifying a shift toward a more android fat distribution pattern. Subcutaneous abdominal fat increased by 13%, whereas leg fat mass showed a comparatively smaller increase of 5%. Alongside fat redistribution, the study also identified a decline in total lean mass, particularly a reduction in skeletal muscle mass, most notably in the legs. These findings emphasize

the pronounced accumulation of visceral fat and concurrent loss of lean mass, highlighting the metabolic implications of menopause-related body composition changes.

Another study conducted by Costa et al. (2020) examined body composition changes in postmenopausal women, particularly those not receiving hormone therapy. Over a six-month period, the study observed a significant increase in trunk body fat, rising from 40.1% to 41.4%, while total body fat increased from 37.4% to 38.4%. These findings suggest a tendency toward greater total fat accumulation and a shift in fat distribution toward the central region in postmenopausal women. The study highlights the metabolic implications of menopause-related fat redistribution, emphasizing the importance of targeted interventions to manage central adiposity and associated health risks.

2.3 Nutritional Status and Life Style Factors of Menopause

Diet and nutritional status are critical factors in managing the physiological changes associated with perimenopause. As women transition through this phase, fluctuating estrogen levels often result in alterations to metabolism, body composition, and nutrient absorption, which can increase the risk of weight gain, loss of lean muscle mass, and metabolic disturbances. A well-balanced, nutrient-dense diet that includes appropriate amounts of protein, healthy fats, fiber, vitamins, and minerals plays a significant role in mitigating these changes, promoting muscle retention, metabolic health, and overall well-being. Additionally, adequate intake of calcium and vitamin D is vital for maintaining bone health, while essential fatty acids and antioxidants may help reduce inflammation and mitigate cardiovascular risks. Conversely, poor dietary habits, such as excessive consumption of processed foods and added sugars, can exacerbate issues like weight gain, insulin resistance, and inflammation, further complicating the health challenges faced during perimenopause. Therefore, maintaining a balanced and nutrient-rich diet is crucial for optimizing nutritional status, alleviating symptoms, and supporting long-term health outcomes during this transition.

The study conducted by Liao et al. (2024) was a community-based observational study, China, aimed at assessing the one-year trajectory of nutritional status in perimenopausal women. The study included 2,760 participants and utilized repeated measurements of key nutritional indicators, including body composition, at 6-month intervals over one

year. The findings revealed a progressive decline in overall nutritional status, marked by increases in weight and fat mass alongside decreases in skeletal muscle, total body water, and protein levels. Specifically, the average weight of participants increased from 56.05 kg to 57.02 kg, while fat mass rose from 17.99 kg to 20.49 kg, suggesting a shift towards greater adiposity. Simultaneously, skeletal muscle mass declined from 20.30 kg to 19.19 kg, total body water reduced from 27.87 L to 27.00 L, and protein levels dropped from 7.39 kg to 7.06 kg, reflecting a gradual loss of lean mass and hydration status.

These findings highlight the significant body composition changes that occur during perimenopause, emphasizing the increased risk of sarcopenia, metabolic alterations, and potential long-term health consequences such as cardiovascular disease and insulin resistance. The observed trends suggest that nutritional and lifestyle interventions are crucial in mitigating the negative impacts of perimenopause on body composition. Additionally, the study underscores the importance of continuous monitoring of nutritional status and muscle health in perimenopausal women to develop effective strategies for maintaining overall well-being during this transitional phase.

The study conducted by Byrne-Kirk et al. (2024) was a cross-sectional study in Australia that examined the relationship between adherence to a Mediterranean-style diet and the severity of menopausal symptoms among perimenopausal and menopausal women aged 40–60 years. The study included 207 participants, with dietary adherence assessed using the Mediterranean Diet Adherence Screener (MEDAS), menopausal symptoms measured through the Menopause Rating Scale (MRS), and health-related quality of life (HRQoL) evaluated via the SF-36 survey.

The findings indicated that participants had low to moderate adherence to the Mediterranean-style diet, and overall adherence was not significantly associated with menopausal symptom severity. However, lower consumption of sugar-sweetened beverages was linked to fewer joint and muscle complaints, suggesting a potential benefit of reducing added sugars. Additionally, higher adherence to the Mediterranean diet correlated positively with the physical function subscale of HRQoL, implying that dietary choices could influence functional well-being. The study also found that a greater intake of legumes was associated with improved physical function, while lower consumption of red and processed meat was linked to better general health outcomes.

These findings emphasize the importance of dietary composition in supporting overall health during the menopausal transition, even if general adherence to the Mediterranean diet does not directly impact menopausal symptom severity. The study underscores the potential role of specific dietary modifications, such as reducing processed foods and sugar-sweetened beverages while increasing legume intake, in enhancing physical function and quality of life in midlife women.

The study conducted by Singhania et al. (2020) was a community-based cross-sectional study in rural North India, aimed at assessing the prevalence of overweight and obesity among middle-aged women (aged 40-60 years) and its association with menopausal symptoms and sociodemographic variables. The study included a sample of 400 women, with menopausal symptoms assessed using the Menopausal Rating Scale (MRS). The findings revealed that 35.5% of menopausal women were classified as overweight or obese.

The research demonstrated that overweight and obesity were significantly associated with joint and muscular discomfort, hypertension, literacy level, and socioeconomic status. Furthermore, the study highlighted that the severity of both somatic and urogenital symptoms was significantly higher in overweight and obese women compared to those with a healthier weight. In addition, it was found that the age of menopause was significantly higher among overweight women, suggesting that excess body weight may be linked to delayed menopause onset. These findings underscore the impact of overweight and obesity on both physical health and the experience of menopausal symptoms, highlighting the need for targeted health interventions in this demographic.

The study conducted by Dunneram et al. (2018) examined the relationship between dietary intake and the age at natural menopause using data from the UK Women's Cohort Study, a large prospective study that included women aged 40-65 years who experienced natural menopause during the 4-year follow-up period. Dietary intake was assessed at baseline using a comprehensive 217-item food frequency questionnaire. The findings revealed that the mean age at natural menopause was 50.5 years.

The study identified significant dietary associations with the timing of natural menopause. Specifically, higher intake of oily fish and fresh legumes was linked to a later onset of natural menopause, while greater consumption of refined pasta and rice

was associated with an earlier onset. For instance, the study found that increased oily fish intake was associated with a delay of 3.3 years per portion/day, and higher consumption of fresh legumes corresponded to a delay of 0.9 years per portion/day. These findings suggest that dietary patterns may influence the timing of menopause, with healthy food choices potentially promoting a later onset of menopause.

Martins et al. (2021) examined the relationship between food consumption, categorized by processing level, and menopausal symptoms in 288 postmenopausal women. The study revealed that a higher intake of ultra-processed foods, such as sugar-sweetened beverages and sausages, was significantly associated with more severe vasomotor symptoms like hot flashes, sexual dysfunction, and memory issues. In contrast, a diet rich in vegetables was linked to a reduction in symptoms, including depressive mood, vasomotor problems, and sleep disorders. Notably, women consuming more vegetables also reported a better overall quality of life, including improved physical health and mental well-being.

The findings highlighted that ultra-processed foods could exacerbate menopause symptoms and negatively affect both physical and mental health, while whole foods, particularly vegetables, may help alleviate symptoms and improve health outcomes. Moreover, a balanced diet that minimizes processed food intake could contribute to overall well-being, suggesting dietary modifications as a useful strategy in managing menopause. This study underscores the importance of nutrient-dense, unprocessed foods in supporting menopausal health and improving quality of life for postmenopausal women.

Peng et al. (2020) conducted a cross-sectional study in China to investigate the relationship between self-reported food preferences and psychological well-being in perimenopausal women. The study categorized dietary habits into groups such as sweet, spicy, fruits, vegetables, dairy, and high-protein foods, while psychological well-being was measured using psychometric scales. The findings revealed that women who preferred sweet and spicy foods reported higher levels of anxiety and depression, while those with greater consumption of fruits, vegetables, and dairy had better mental well-being and life satisfaction.

Additionally, women consuming high-protein foods experienced greater emotional stability. Diets rich in whole foods were found to correlate with improved psychological

outcomes, while diets high in processed and sugary foods were associated with increased distress. These findings suggest that dietary choices play a critical role in managing mood disturbances during perimenopause, indicating that nutritional interventions could be an effective strategy to improve mental health during this transitional phase.

A comprehensive review by Davis et al. (2012) examined the impact of the menopausal transition on body weight and composition. The study found that while menopause itself does not directly cause weight gain, the associated hormonal changes, particularly decreased estrogen levels, lead to an increase in total body fat and a redistribution of fat to the abdominal area. This shift contributes to heightened risks of cardiovascular and metabolic diseases. The review also noted that estrogen therapy might mitigate these changes by reducing overall fat mass and improving insulin sensitivity. However, further research is necessary to identify individuals who would benefit most from such treatments

Jull et al. (2014) conducted a systematic review to evaluate the effectiveness of exercise and nutrition interventions in managing body weight during the menopausal transition. The analysis included studies with varying designs and quality. Findings suggested that combined exercise and dietary interventions could prevent increases in body adiposity typically observed during this life stage. However, the authors emphasized the need for more high-quality research to draw definitive conclusions and to develop evidence-based recommendations for lifestyle modifications aimed at weight management in perimenopausal women.

2.4 Menopause and Quality of Life

Menopause marks a significant transition in a woman's life, often accompanied by physiological, psychological, and social changes that can affect overall quality of life (QoL). The decline in oestrogen levels during menopause leads to various symptoms, including vasomotor disturbances (hot flashes and night sweats), psychosocial challenges (mood swings, anxiety, and depression), and physical discomfort (joint pain, fatigue, and sleep disturbances). These symptoms can disrupt daily activities, emotional well-being, and social interactions, ultimately influencing a woman's perception of her health and life satisfaction.

Quality of life during menopause is shaped by multiple factors, including lifestyle choices, dietary habits, physical activity levels, and access to healthcare interventions. Women who adopt healthy behaviours, such as engaging in regular exercise, maintaining a balanced diet, and seeking medical or psychological support, often report better QoL outcomes. Additionally, sociocultural factors play a crucial role, as societal attitudes toward menopause and the availability of support systems can either alleviate or exacerbate menopausal challenges.

Rajagopal et al. (2019) conducted a community-based cross-sectional study in Komarapalayam, Tamilnadu, India, to assess the quality of life and depression severity in women transitioning through menopause. The study involved 150 women aged 40-60 years, with a distribution of 19.3% aged 40-45, 18% aged 46-50, 32.6% aged 51-55, and 30% aged 56-60. Quality of life was evaluated using the MENQOL questionnaire, and depression severity was assessed using the PHQ-9. The results indicated that peri-menopausal women had the lowest quality of life and the highest depression scores among the groups.

Common menopausal symptoms experienced by participants included hot flushes (93.3%), night sweats (73.3%), and sweating (76.6%). Post-menopausal women most frequently reported decreased physical strength (96.5%), while peri-menopausal women experienced greater challenges with vaginal dryness (82.6%). The study also identified that vasomotor symptoms such as hot flashes and night sweats were the most severely felt, with the highest MENQOL scores recorded in this category.

Additionally, the study highlighted that socioeconomic factor, such as employment status and marital condition, played a role in the menopausal experience, with housewives reporting poorer quality of life compared to employed women. Furthermore, peri-menopausal women exhibited the highest levels of depression, suggesting that the transition into menopause is a particularly vulnerable period. The study emphasized the need for comprehensive educational programs and interventions aimed at improving the mental well-being and physical health of menopausal women, particularly during the peri-menopausal stage. This research underscores the critical importance of mental health care and physical wellness strategies in managing the challenges of menopause in India.

Smail, Jassim, and Shakil (2020) conducted a study in the United Arab Emirates to evaluate the menopause-specific quality of life among Emirati women. the study employed a cross-sectional design and surveyed 200 Emirati women using the Menopause-Specific Quality of Life (MENQOL) questionnaire. The findings revealed that 72% of participants reported experiencing vasomotor symptoms, with hot flashes and night sweats being the most prevalent. Psychosocial symptoms, including mood swings and irritability, affected 68% of the respondents, while physical symptoms such as joint pain and fatigue were reported by 81% of the women. Additionally, sleep disturbances emerged as a significant concern, severely impacting overall well-being.

The study highlighted the need for targeted healthcare interventions to address the specific challenges faced by menopausal Emirati women. The findings underscored the importance of culturally sensitive healthcare strategies, tailored to the unique experiences of women in the UAE, to improve their menopausal health and overall quality of life.

Nayak et al. (2012) conducted a cross-sectional study in selected coastal areas of Karnataka, India, to assess the quality of life of perimenopausal women. The study included 209 women aged 40 to 60 years from local women's organizations and self-help groups. The methodology involved using a self-administered 29-item MENQOL questionnaire to collect data on socio-demographic factors, menstrual history, and menopausal symptoms.

Women with surgical menopause, those receiving hormone therapy, or those with certain medical conditions were excluded from the study. The mean age of the group was 48.30 ± 5.30 years. The study population included 33 (15.8%) obese, 77 (36.8%) overweight, 88 (42.1%) normal weight, and 11 (5.3%) underweight women. Most women (95.7%) were married, and 3.8% were separated. The women had varying numbers of children: 4.3% had no children, 17.7% had one child, 58.4% had two children, and 19.6% had more than two children. In terms of education, 35.4% were graduates/postgraduates, 48.8% had intermediate/high school education, and 15.8% had middle/primary school education. 41.6% of the women were employed, and 58.4% were housewives. 61.7% of the women were premenopausal, and 38.3% were postmenopausal. Physical and psychosocial symptoms were more commonly reported.

Borker et al. (2013) conducted a community-based cross-sectional house-to-house survey in Kerala, India, from January to October 2009, to determine the prevalence of menopausal symptoms and perceptions about menopause among women. The study included 106 postmenopausal women staying more than 6 months at Anjara Kandy Data was collected using a pretested questionnaire administered by a trained social worker. The mean age of attaining menopause was 48.26 years.

The key findings revealed that 90.7% of women reported experiencing emotional problems, including crying spells, depression, and irritability. Additionally, 72.9% of participants reported suffering from headaches, while 65.4% experienced lethargy. Urinary issues were also prevalent, with 58.9% of women reporting dysuria. Cognitive concerns were evident, as 57% of respondents reported forgetfulness. Furthermore, 53.3% of women experienced musculoskeletal problems such as joint and muscle pain. Sexual health concerns were reported by 31.8% of participants, including decreased libido and dyspareunia. Genital problems, such as itching and vaginal dryness, affected 9.3% of the women, while 8.4% experienced changes in their voice. Only 22.4% of the women knew the correct cause of menopause.

A study by Shringarpure et al. (2022) conducted in Vadodara, the research assessed 290 peri-menopausal women, equally divided between rural and urban settings, to examine the distribution of menopausal symptoms. The study found that psychosomatic symptoms such as fatigue, sleep disturbances, and irritability were more prevalent among urban women, while rural women reported higher instances of insomnia and body aches. In contrast, musculo-skeletal and genito-urinary symptoms, including joint pain and urinary urgency, were common across both populations with no significant difference. The authors noted that factors like differing lifestyles, socio-economic status, and health-seeking behaviors likely influenced the symptom patterns. The study concluded by emphasizing the importance of customized healthcare strategies to address these rural-urban differences in menopausal health.

Gupta et al. (2023) conducted a community-based cross-sectional study in the rural and urban areas of Lucknow, India, from February 2020 to January 2021, to identify factors affecting the quality of life (QoL) of 200 menopausal women aged 45-65 years. Data was collected using the MENQOL questionnaire The study revealed several significant findings. Vasomotor symptoms were most prevalent in women aged 45–49 years, those

with higher education levels, and individuals from upper and upper-middle socioeconomic classes. The study also found that 68% of women reported sexual symptoms, with higher mean scores observed in women aged 55–59 years, married participants, and those who were overweight or obese. Additionally, chronic diseases were linked to higher MENQOL scores, indicating a poorer quality of life in women suffering from conditions such as hypertension and diabetes. Lastly, lifestyle modifications were found to improve QoL, with women who had not adopted healthy habits reporting higher MENQOL scores ($P < 0.001$).

2.5 Understanding the Role of Physical Activity Levels

Physical activity levels (PAL) play a crucial role in managing menopausal health. During menopause, hormonal changes lead to a variety of physical and psychological symptoms, including weight gain, hot flashes, mood disturbances, and increased risk of cardiovascular issues. Regular physical activity helps alleviate many of these symptoms by promoting weight management, improving cardiovascular fitness, and strengthening bones, which helps reduce the risk of osteoporosis. Additionally, exercise enhances mental health by decreasing anxiety, depression, and improving sleep quality. As women transition through menopause, consistent physical activity becomes an essential component of maintaining overall well-being and improving quality of life during this stage. Encouraging physical activity is vital for managing menopausal symptoms and supporting long-term health.

Skrzypulec et al. (2010) conducted an observational study to examine the relationship between physical activity levels and climacteric symptoms in menopausal women. The study involved 336 healthy women aged 45-55 years, who completed questionnaires covering socioeconomic and obstetric/gynecological history, physical activity levels (via the International Physical Activity Questionnaire), and menopausal symptoms (measured using the Blatt-Kupperman Index). Participants were classified into low, moderate, and high physical activity groups.

The results indicated that higher physical activity was associated with fewer and less severe climacteric symptoms. Notably, 52.08% of women in the high activity group reported no climacteric symptoms. Women in the low activity group had more severe symptoms across all domains. In various activity domains (work, transportation, domestic chores, leisure), moderate and high physical activity levels correlated with

fewer symptoms. The study concluded that regular physical activity significantly reduces menopausal symptoms, highlighting its importance as a health intervention for women during menopause. It emphasizes the need to promote physical activity to improve health and alleviate symptoms during this stage of life.

Lee et al. (2017) conducted a cross-sectional study in South Korea to investigate the relationship between physical activity and menopausal symptoms in perimenopausal women. The study involved 602 women aged 45-55 years who were recruited from a community health center between June and November 2016. Physical activity levels were assessed using the International Physical Activity Questionnaire (IPAQ), while menopausal symptoms were evaluated using the Menopausal Symptom Scale (MSS). The average age of participants was 49.2 ± 3.1 years, with an average body mass index (BMI) of 23.1 ± 2.9 kg/m². The study found that 60.4% of women reported low physical activity levels, 25.3% engaged in moderate physical activity, and 14.3% participated in high physical activity. Results showed that women in the moderate physical activity group had significantly lower scores on the psychosocial and physical domains of menopausal symptoms compared to those with low activity levels. However, no significant associations were observed between physical activity and vasomotor or sexual symptoms. This study highlighted the potential benefits of moderate physical activity in alleviating physical and psychosocial menopausal symptoms.

Wu et al. (2023) conducted a cross-sectional online survey in northwest China to examine the association between physical activity and the severity of menopausal symptoms in middle-aged women. The study included 468 women aged 45 to 60 years, with an average age of 49.5 ± 4.9 years and a mean BMI of 21.7 ± 2.5 kg/m². The findings revealed that 74.8% of participants experienced menopausal symptoms, with 54.3% reporting moderate to severe symptoms.

A strong negative correlation was observed between physical activity levels and the severity of menopausal symptoms. Specifically, higher physical activity levels, along with a satisfactory perceived health status, were associated with less severe symptoms. In contrast, perimenopausal and postmenopausal status were identified as potential risk factors for more severe symptoms. It was seen that increasing moderate-to-high levels of physical activity may help reduce the severity of menopausal symptoms in middle-aged women.

Dąbrowska-Galas et al. (2019) conducted a cross-sectional study to explore the relationship between physical activity across various life domains and the experience of menopausal symptoms in middle-aged women. The study involved 305 women aged 40-65 years, all of whom were attendees at women's health clinics in Silesia, Poland. Physical activity was assessed using the International Physical Activity Questionnaire (IPAQ), which evaluated activity levels in leisure time, work, transportation, and household activities, while menopausal symptoms were measured using the Menopause Rating Scale (MRS). The average age of participants was 48.47 ± 6.32 years. The results revealed a significant association between menopausal stage and the total MRS score, particularly with the urogenital and somato-vegetative sub scores. A notable finding was that 59.66% of postmenopausal women reported high physical activity levels, compared to 72.90% of premenopausal women, who reported low activity levels. Furthermore, women with higher physical activity levels had a lower prevalence of severe urogenital symptoms.

The study suggests that physical activity, particularly during leisure time, is associated with a reduced intensity of menopausal symptoms, particularly in postmenopausal women. Engaging in higher levels of physical activity may help alleviate the severity of menopausal symptoms.

2.6 Departmental Studies

Nair and Shah et al. (2011) conducted a study to evaluate the impact of phytoestrogen-rich foods on menopause management through nutrition education. The study, involving 1,000 middle-aged women from Vadodara, identified phytoestrogens in fenugreek, flaxseeds, pomegranate, and yam, and assessed their effects on menopausal symptoms through supplementation trials. The findings revealed that supplementation with pomegranate and yam improved menopause-related symptoms such as anxiety, physical exhaustion, and joint pain, highlighting the potential benefits of phytoestrogen-rich foods in alleviating menopausal discomfort.

Iyer and Elayath et al. (2013) examined metabolic changes across menopausal stages and explored dietary strategies for managing hyperlipidemia. The study, conducted in Vadodara and Ahmedabad, found that postmenopausal women exhibited higher rates of diabetes, insulin resistance, high LDL cholesterol, and metabolic syndrome. Additionally, clinical settings showed a greater prevalence of severe obesity and

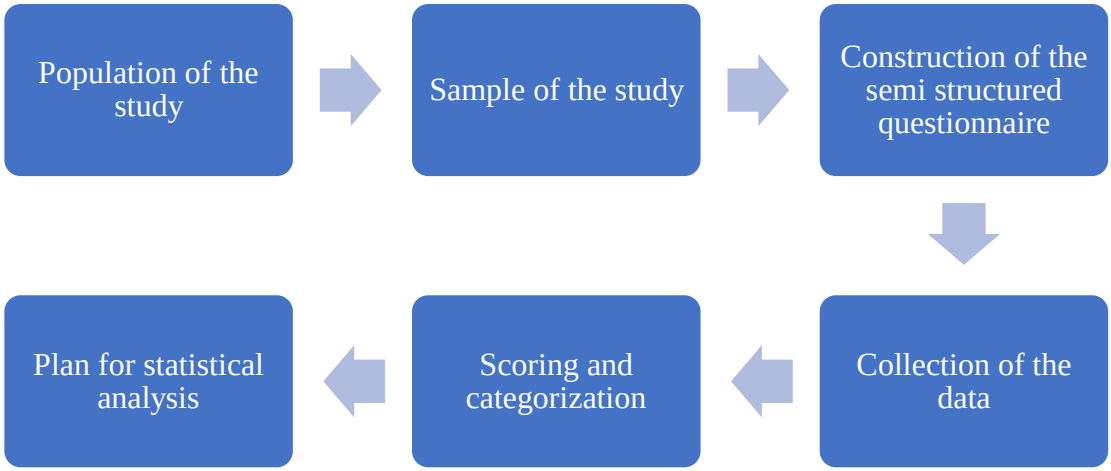
metabolic disorders compared to free-living populations. Wheatgrass powder supplementation was evaluated for its potential benefits, emphasizing the importance of dietary interventions in managing menopause-related health risks.

In summary, this chapter has provided a comprehensive understanding of menopause, its associated physiological and psychological changes, and the multifaceted impacts it has on women's health and well-being. It has also explored various determinants that influence women's experiences during this transitional phase, such as nutritional status, physical activity, and overall quality of life. While menopause has been the primary focus, the specific nuances and challenges faced by women in the perimenopausal stage have only been briefly touched upon, setting the stage for a more detailed exploration. Building upon this foundation, the next chapter outlines the methodology adopted for the present study, including the research design, sampling methods, tools for data collection, and procedures used for data analysis.

CHAPTER 3

MATERIALS AND METHODOLOGY

The present study was undertaken to study the **"Exploring Nutritional Status, Life Style and Quality of Life Patterns in Perimenopausal Women of Urban Vadodara."** This chapter states the study design and discusses the method and materials that are used to accomplish the stated objectives.



Sample size: 250 participants

- Required sample size was obtained using formula N=(Z)2 pq /d2
- Where $z^2 = 4$
- p= 0.161 (prevalence rate 16.1%) (Iyer and Elayath et al. (2013)
- q= 1-p which is 0.839
- d^2= 0.025 (Confidence level of 95%, assuming a margin of error of 5 %)
- Sample size 216 is obtained Considering 10% attrition, the sample size is round of to 250

Sampling Technique: The sample size was selected through Snowball Sampling.

Study design: This study was Cross Sectional Study, based in Urban Vadodara.

The study was conducted across the four zones of Vadodara: **North**, **East**, **West**, and **South**, which include different wards:

- **North zone**: Ward 1, 2, 3, 7
- **East zone**: Ward 4, 5, 6, 14, 15
- **West zone**: Ward 8, 9, 10, 11, 12
- **South zone**: Ward 16, 17, 18, 19

Inclusion criteria

- Females age between 30-50 years
- Females who are willing to give consent

Exclusion criteria:

- Female suffering PCOS AND PCOD
- Lactating mothers.
- Women on HRT on any other hormonal therapy.
- Females suffering from thyroid.
- Patients undergone Hysterectomy or Oophorectomy.
- Patients undergone chemotherapy.

A total of 250 participants were enrolled in the study.

Written informed consent (Annexure I) was taken from the subjects who agreed to participate in the study. (IECHR/FCSc/M.Sc./10/2024/46)

The following information was collected through the semi structured questionnaire (Annexure II)

Table 3.1 Tools and Techniques

SL. NO.	PARAMETERS	TOOLS
1	**Background information**	Pre tested questionnaire

2	**Socio – economic status**	Kuppuswamys Socio economic scale (2024)
3	**Anthropometric Measurement**	Standard methods for height, weight, BMI, waist/hip ratio
4	**Body Composition**	Karada scan
5	**Dietary profile**	Semi structure questionnaire (dietary practices, 3days 24 hr. recall, Food frequency questionnaire)
6	**Physical pattern**	Global physical activity questionnaire (GPAQ)
7	**Quality of life scoring**	Menopausal quality of life rating scale (MEN-QOL)

Section1: Socio Demographic Information

The study collected detailed socio-demographic data to understand the background characteristics of perimenopausal women. This section of the questionnaire gathered information on age, education level, occupation, religion, marital status, number of children, type of family, and number of family members.

The educational and occupational status of both the participant and the head of the family were assessed to determine socio-economic positioning. The updated Kuppuswami Scale (2024 version) was utilized to categorize socio-economic status based on education, occupation, and monthly family income.

The questionnaire also recorded the marital and family structure, distinguishing between nuclear, joint, and extended families to analyse potential socio-cultural influences on lifestyle and health behaviours. The monthly family income was categorized into six levels according to the revised Kuppuswami classification, ensuring an accurate representation of financial status and its impact on dietary and health-related outcomes.

Section2: Anthropometrics And Body Composition

Anthropometric and body composition measurements were conducted to evaluate the nutritional and health status of the participants. Standardized procedures were followed to ensure accuracy and consistency in data collection.

The following parameters were assessed:

- **Weight (kg):** Measured using a calibrated digital weighing scale, with participants wearing light clothing and no footwear.
- **Height (cm):** Measured using a non-stretchable measuring tape.
- **Body Mass Index (BMI):** Computed using the formula:

  BMI = Weight (kg) / (Height (m)^2)

  The Asia-Pacific classification by the World Health Organization (WHO) was used for BMI categorization:

Sr. No.	BMI Category	Reference
1.	Underweight	<18.5 kg/m²
2.	Normal weight	18.5–22.9 kg/m²
3.	Overweight	23.0–24.9 kg/m²
4.	Obese	≥25.0 kg/m²

- **Waist Circumference (cm):** Measured at the midpoint between the lower rib and the iliac crest. According to the International Diabetes Federation (IDF) guidelines, a waist circumference ≥80 cm was considered an indicator of central obesity for Asian women.
- **Hip Circumference (cm):** Measured at the widest part of the buttocks using a non-stretchable measuring tape.
- **Waist-to-Hip Ratio (WHR):** Calculated as:

  WHR= waist circumference / hip circumference
  Based on the American Diabetes Association (ADA), a WHR ≥0.81 indicated increased health risks for Asian women.

Body Composition Analysis

Body composition was assessed using the **Karada Scan Body Composition Monitor** (Omron Healthcare). This bioelectrical impedance analysis (BIA)-based device provided detailed insights into various body components, including:

- **Body Fat Percentage (%):** Categorized as per Omron Healthcare's classification:

Sr. No	Category	Body Fat (%)
1.	Low	<20%
2.	Normal	20-29%
3.	High	30-39%
4.	Very high	≥ 40%

- **Visceral Fat Level:** Evaluated on a **1–30 scale**,

Sr. No	Risk Category	Scores Range
1.	Healthy	1-9
2.	Moderate	10-14
3.	High risk	≥15

- **Skeletal Muscle Mass (%):** Interpreted using Omron's classification for healthy muscle distribution among women.

Skeletal Muscle Mass Percentage for Women

Sr. no.	Age Group	Low (%)	Normal (%)	High (%)
1.	**18–39 years**	<24%	24–30%	>30%
2.	**40–59 years**	<23%	23–29%	>29%
3.	**60+ years**	<22%	22–28%	>28%

Section 3: Food Pattern

This section examines the dietary habits of perimenopausal women, focusing on meal regularity, junk food consumption, and supplement intake.

- Meal Pattern: Assesses whether meals are taken regularly or irregularly, impacting overall nutritional status.
- Junk Food Consumption: Evaluates frequency, type, and reasons for intake, considering its potential increase during perimenopause due to cravings, stress, or convenience.
- Nutritional Supplements: Identifies commonly used supplements, their dosage, and frequency to assess potential deficiencies or overuse.

Section 4: Dietary Habits Assessment (Food Frequency Questionnaire & 24-Hour Recall)

This section evaluates the dietary intake patterns of perimenopausal women using two key tools:

1. **Food Frequency Questionnaire (FFQ)**
    - Assesses the consumption frequency of different food groups, including cereals, pulses, vegetables, fruits, dairy, nuts, flesh foods, fats, and processed foods.
    - Helps identify common dietary patterns, nutritional deficiencies, and reliance on processed foods.
2. **24-Hour Dietary Recall (3 Days)**
    - Records detailed meal-wise intake over three non-consecutive days, capturing food types, portion sizes, and cooking methods.
    - Enables a quantitative assessment of nutrient intake and dietary adequacy.

Section 5: MENQOL (Menopause-Specific Quality of Life)

The Menopause-Specific Quality of Life (MENQOL) Questionnaire is a validated tool used to assess the impact of menopause on women's daily lives. It consists of 29 questions categorized into four key domains:

1. **Vasomotor Symptoms (3 questions)**

- Includes hot flashes, night sweats, and sweating episodes that significantly affect comfort and sleep quality.

2. **Psychosocial Symptoms (7 questions)**
    - Assesses mood swings, irritability, anxiety, difficulty in concentrating, and feelings of depression or loneliness, which impact mental well-being.
3. **Physical Symptoms (16 questions)**
    - Covers body aches, fatigue, sleep disturbances, weight gain, bloating, headaches, joint pain, and changes in skin or hair texture, influencing overall health and daily activities.
4. **Sexual Symptoms (3 questions)**
    - Evaluates changes in libido, vaginal dryness, and discomfort during intercourse, affecting intimate relationships.

Section 6: Global Physical Activity Questionnaire (GPAQ)

The Global Physical Activity Questionnaire (GPAQ), developed by the World Health Organization (WHO), is a standardized tool used to assess physical activity levels across different domains of daily life. It helps evaluate the intensity, frequency, and duration of physical activity among individuals.

The GPAQ consists of 16 questions divided into three domains:

1. **Work-Related Physical Activity (6 questions)**

a person's occupation, including walking and lifting heavy loads.

2. **Travel-Related Physical Activity (3 questions)**

Evaluates walking or cycling as a mode of transport to work, markets, or other destinations.

3. **Leisure-Time Physical Activity (6 questions)**

Measures moderate and vigorous physical activities undertaken during leisure time, such as sports, exercise, or recreational activities.

Additionally, one question assesses sedentary behaviour, including the total time spent sitting or reclining during the day, which is crucial for understanding lifestyle habit

Table 3.2 Statistical Analysis

Section	Test/Statistic Used	Purpose
Socio Demographic Information	Descriptive statistics (frequency, percentage)	To summarize the socio-demographic characteristics of the participants (e.g., age, marital status, education).
Anthropometric Assessment	Descriptive statistics (mean, standard deviation)	To describe the anthropometric measurements of participants (e.g., weight, height, BMI, waist circumference).
Food Pattern	Descriptive statistics (frequency, percentage)	To analyze the distribution of dietary preferences and junk food consumption patterns among participants.
Dietary Assessment	Descriptive statistics (frequency, percentage)	To present the distribution of nutrient intake relative to the Recommended Dietary Allowance (RDA).
Dietary Assessment	One-way ANOVA	To determine if dietary intake variables differ significantly across socioeconomic status (SES) groups.
Assessment of Menopause Specific Quality of Life	Descriptive statistics (frequency, percentage)	To summarize the prevalence of menopausal symptoms and the distribution of MENQOL scores.

Assessment of Menopause Specific Quality of Life		To assess the association between MENQOL domain scores and categories.
Assessment of Menopause Specific Quality of Life	Regression analysis	To examine the relationship between BMI and MENQOL domain scores.
Assessment of Menopause Specific Quality of Life	One-way ANOVA	To examine differences in MENQOL domain scores across age groups and SES groups.
Assessment of Physical Activity Level	One-way ANOVA	To assess the relationship between physical activity levels and MENQOL domain scores.

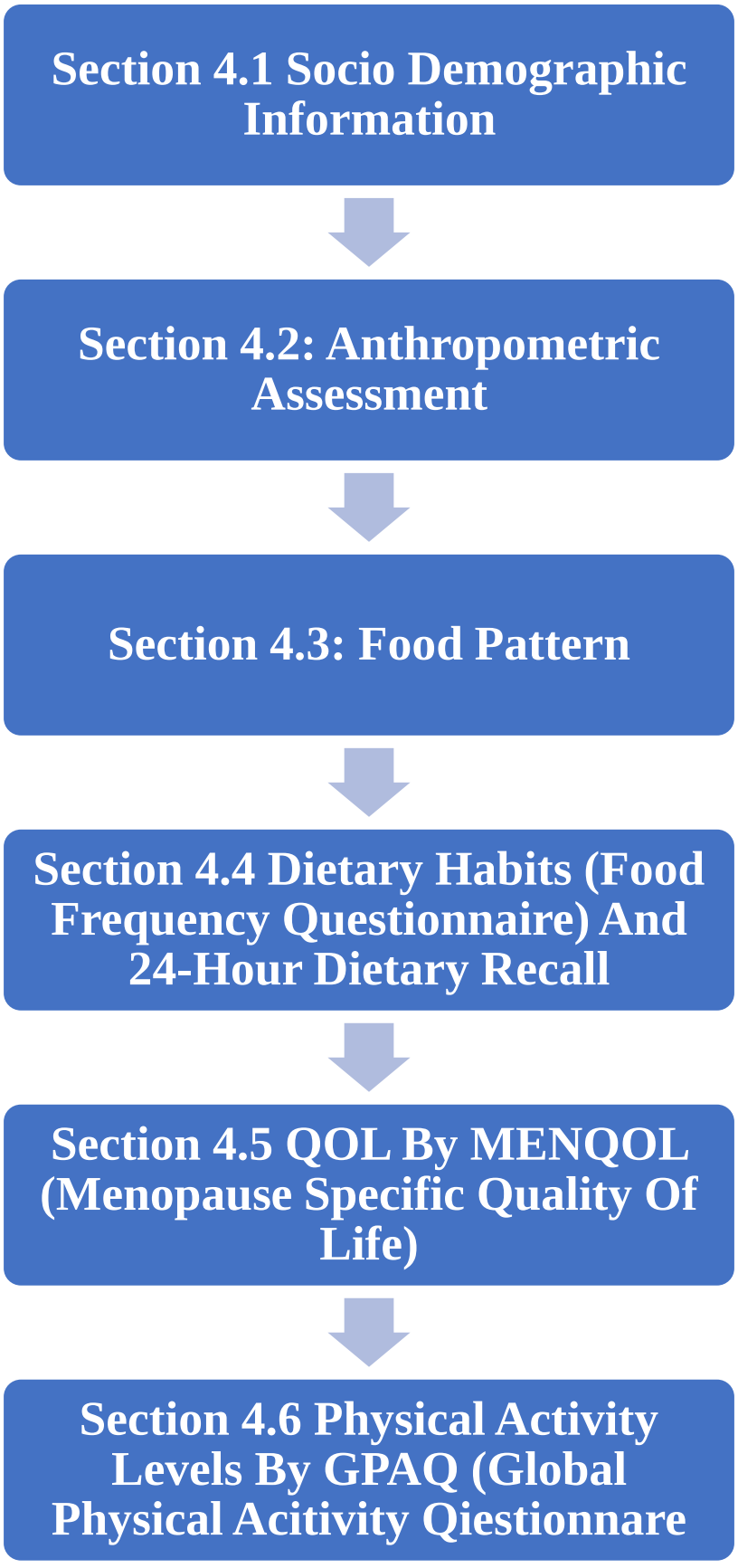
CHAPTER 4

RESULTS AND DISCUSSION

Perimenopause is a significant transitional phase in a woman's life, marked by hormonal changes that can impact overall health, nutritional status, and quality of life. Women in this stage often experience symptoms such as hot flashes, mood swings, fatigue, sleep disturbances, and changes in metabolism. These factors, along with lifestyle habits and socio-economic conditions, play a crucial role in determining their well-being.

A balanced diet and an active lifestyle are essential in managing perimenopausal symptoms. Nutrients such as calcium, vitamin D, and phytoestrogens have been linked to improved bone health, hormonal balance, and reduced severity of symptoms. However, dietary habits, physical activity levels, and access to nutrition vary widely among individuals, especially in urban settings where lifestyle factors and socio-economic status influence health outcomes.

This study explores the impact of nutritional status, diet, physical activity levels, and socio-economic conditions on the health and well-being of perimenopausal women in Vadodara. The findings highlight common nutritional deficiencies, physical activity trends, and their association with perimenopausal symptoms. The results are presented and discussed in detail as per the following sections:


Section 4.1 Socio Demographic Information
Section 4.2: Anthropometric Assessment
Section 4.3: Food Pattern
Section 4.4 Dietary Habits (Food Frequency Questionnaire) And 24-Hour Dietary Recall
Section 4.5 QOL By MENQOL (Menopause Specific Quality Of Life)
Section 4.6 Physical Activity Levels By GPAQ (Global Physical Acitivity Qiestionnare

Section4.1: Socio Demographic Information

A semi structured questionnaire was used to obtain socio demographic information of the participants. The assessment included information age, marital status, religion, education, occupation and current source of income.

Table 4.1.1: Socio-Demographic Characteristics of the Participants (n=250)

Sr. No.	Variable	Category	Frequency	Percentage
1.	Socio Economic Status	Upper class	20	8
		Upper middle class	146	61.09
		Lower middle	79	31.6
		Upper lower class	5	2.09
		Lower class	0	0.00
2.	Religion	Hindu	238	95.2
		Muslims	10	4
		Christan	2	0.8
3.	Age In Years	30-35	20	8
		36-40	45	18
		41-45	65	26
		46-50	120	48
4.	Education	Graduation	101	40.4
		Secondary school	73	29.2
		Primary school	39	15.6
		Post graduation	37	14.8
5.	Marital Status	Married	225	90.0
		Divorced	25	10.0
		Single	0	0.0
6.	Occupation	Homemaker	198	79.2
		Employed	29	11.6

		Self-employed	23	9.2
7.	**Type Of Family**	Nuclear	159	63.6
		Joint	91	36.4
8.	**Number Of Children**	Two	133	53.2
		More than two	59	23.6
		One	58	23.2

Table 4.1.1 revealed the percentage distribution of the selected perimenopausal women residing in urban Vadodara according to various socio-demographic characteristics. It shows that the majority of participants (61.09%) belong to the upper middle class, followed by 31.6% in the lower middle class. A smaller proportion (8%) falls under the upper class, while only 2.09% belong to the upper lower class, and none to the lower class. This indicated that most participants came from economically stable backgrounds.

The table also revealed that nearly half (48%) of the participants fell into the 46-50 years age group, while 26% belonged to the 41-45 years category, 18% to the 36-40 years category, and 8 to the 30-35 years group. This suggested that a significant proportion of the participants were in the later stages of perimenopause. Additionally, it showed that 40.4% of participants had completed graduation, 29.2% had studied up to secondary school, 15.6% had primary school education, and 14.8% had attained post-graduation, indicating a relatively high literacy level among the participants.

Furthermore, 90% of participants were Married, while 10% are Divorced, with none being Single. It also shows that a significant proportion (79.2%) are Homemakers, while 11.6% are Employed, and 9.2% are Self-employed, suggesting that the majority are primarily engaged in domestic responsibilities.

The table further reveals that nuclear families (63.6%) were more common than joint families (36.4%), highlighting a shift toward smaller households. Additionally, it showed that 53.2% of participants had two children, 23.6% had more than two children, and 23.2% had one child.

Highlights

The majority of participants (61.09%) belonged to the upper middle class, with a high literacy rate, as 40.4% had completed graduation and 14.8% attained post-graduation.

Most participants (48%) were aged 46-50 years, indicating they were in the later stages of perimenopause. Additionally, 90% were married, and 79.2% were homemakers, highlighting their primary engagement in domestic roles.

Nuclear families (63.6%) were more common than joint families (36.4%), and over half (53.2%) of the participants had two children, reflecting family structure trends in urban Vadodara.

Notably, 8% of participants were aged 30-35 years, indicating that menopause is occurring earlier for some women.

Section 4.2: Anthropometric Assessment

Anthropometric measurements were taken to evaluate the body composition and nutritional status of the participants. This assessment included measurements of weight, height, body mass index (BMI), waist circumference, hip circumference, and waist-to-hip ratio.

Table 4.2.1: Anthropometric and Body Composition Measurements of the Participants (n=250)

Sr. no	Variable	n	Mean	SD
1	**Weight (kg)**	250	71.20	18.37
2	**Height (cm)**	250	155.33	6.16
3	**BMI (kg/m^2)**	250	30.35	7.02
4	**Waist Circumference (cm)**	250	88.45	16.07

5	**Hip Circumference (cm)**	250	102.66	22.01
6.	**Waist-Hip Ratio**	250	0.86	0.05

Table 4.2.1 presented the anthropometric and body composition measurements of the perimenopausal women. The mean weight of the participants was 71.20 kg with a standard deviation of 18.37 kg, while the mean height was 155.33 cm with a standard deviation of 6.16 cm.

The mean BMI was 30.35 with a standard deviation of 7.02, indicating a high prevalence of overweight and obesity. The mean waist circumference was 88.45 cm with a standard deviation of 16.07 cm, and the mean hip circumference was 102.66 cm with a standard deviation of 22.01 cm. The waist-to-hip ratio had a mean value of 0.86 with a standard deviation of 0.05. These findings indicated a trend of increased body weight and central adiposity among the participants.

Table 4.2.2 BMI Distribution Based on The Asia-Pacific Classification of The Participants (n=250)

BMI was assessed using the Asia-Pacific classification to categorize participants into underweight, normal weight, overweight, and obesity groups.

Sr. no	Category	n	%
1.	**Under weight**	2	0.8
2.	**Normal weight**	35	14
3.	**Over weight**	29	11.6
4.	**Obese grade 1**	64	25.6
5.	**Obese Grade 2**	54	21.6
6.	**Obese Grade 3**	66	26.4

Table 4.2.2 illustrates the BMI distribution of perimenopausal women based on the Asia-Pacific classification. The data revealed that 0.8% of the women were underweight, while 14% had a normal BMI. Around 11.6% of the participants were classified as overweight. Obesity was highly prevalent in the study population, with 25.6 %of women falling under Obese Grade 1, 21.6% under Obese Grade 2, and 26.4%

under Obese Grade 3. The combined prevalence of obesity across all categories accounted for 73.6% of the participants.

Table 4.2.3 Age wise BMI Category distribution of the Participants (n=250)

The distribution of BMI across different age groups was analysed to understand variations in body weight trends with age. This helps assess the prevalence of overweight and obesity in different age categories and their potential impact on health risks among the participants.

SR. No	BMI Category	30-35 (n)	36-40 (n)	41-45 (n)	46-50 (n)
1	**Normal weight**	3 (1.2)	2 (0.8)	12 (4.8)	18 (7.2)
2	**Overweight**	3 (1.2)	7 (2.8)	10 (4.0)	9 (3.6)
3	**Obese Grade 1**	7 (2.8)	13 (5.2)	20 (8.0)	24 (9.6)
4	**Obese Grade 2**	7 (2.8)	10 (4.0)	10 (4.0)	27 (10.8)
5	**Obese Grade 3**	0 (0.0)	11 (4.4)	13 (5.2)	42 (16.8)
6	**Underweight**	0 (0.0)	2 (0.8)	0 (0.0)	0 (0.0)

*Figures in parenthesis denotes the percentages

Table 4.2.3 illustrates the age-wise distribution of BMI categories among perimenopausal women. The data revealed that 14 of the participants had a normal BMI, with the highest proportion observed in the 46-50 years age group (7.2%), followed by 41-45 years (4.8%). A lower prevalence of normal BMI was noted in the 30-35 years (1.2%) and 36-40 years (0.8%) age groups.

This suggests that while normal weight was more common in the older age group (46–50 years), it still represented a small proportion, indicating an overall lower prevalence of normal BMI across all age categories.

Obese Grade 1 was observed in 39.6%of the women, with the highest prevalence in the 46-50 years age group (9.6%), followed by 41-45 years (8.0%), 36-40 years (5.2%), and 30-35 years (2.8%). This rising trend in obesity with increasing age could be associated with hormonal changes during perimenopause, decreased physical activity,

And dietary transitions.
It indicates that middle-aged women are particularly vulnerable to weight gain and related health complications**.**

Obese Grade 2 accounted for 21.2 of the participants, with the highest proportion in the 46-50 years age group (10.8%). This again reflects a progressive increase in obesity severity with age, especially during the late perimenopausal years, emphasizing the need for targeted nutritional and lifestyle interventions.

Obese Grade 3 was reported in 26.4 of the participants, with the highest prevalence in the 46-50 years age group (16.8%), followed by 41-45 years (5.2%) and 36-40 years (4.4%). No cases of Obese Grade 3 were observed in the 30-35 years age group. The absence of Grade 3 obesity in the youngest group and its sharp rise in older age groups may indicate the cumulative effect of long-term poor dietary habits and sedentary lifestyle.

The prevalence of overweight was 11.6, with the highest proportion in the 41-45 years age group (4.0%), followed by 36-40 years (2.8%), 46-50 years (3.6%), and 30-35 years (1.2%).

Underweight was observed in only 0.8 of participants, all of whom belonged to the 36-40 years age group. This indicates that undernutrition is not a major concern among this population, while overweight and obesity appear to be the dominant nutritional issues.These findings indicate an increasing trend of obesity with advancing age, with the 46-50 years age group showing the highest prevalence across all obesity categories.

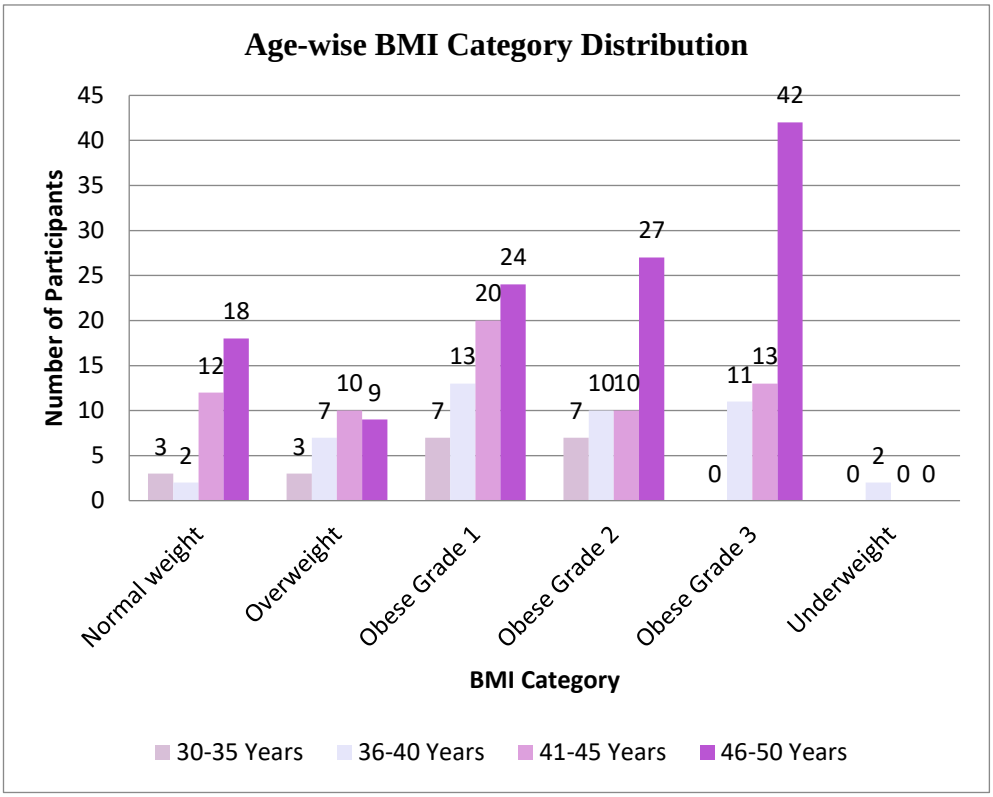
This finding can be supported by the research conducted by F. Karolina et al. (2020) the study revealed that obesity prevalence increased significantly with advancing age, with 43.3% of women aged 40–59 years being classified as obese. The research further highlighted that weight gain during perimenopause was associated with hormonal changes, decreased physical activity, and altered dietary habits. The findings emphasized the need for lifestyle interventions to manage weight gain and prevent obesity-related health risks in perimenopausal women.

Another study that supports these findings is by R. Sharma and A. Gupta (2019) it was found that the proportion of overweight and obese women increased from 4% in younger age groups to 34% in middle-aged and older women. The research also

indicated that factors such as low physical activity, high carbohydrate intake, and sedentary lifestyles contributed to the rising obesity rates. The study emphasized the need for targeted nutritional and behavioural interventions to address obesity during perimenopause.

According to the findings of K. Patel and S. Mehta (2018), 35.5% of menopausal women were either overweight or obese, with 26% classified as overweight and 9.5% as obese. The study observed a progressive increase in BMI with age, with perimenopausal women experiencing significantly greater weight gain compared to premenopausal women. It concluded that early intervention strategies, such as dietary modifications and increased physical activity, are essential in preventing obesity-related health complications in perimenopausal women.

Figure 4.2.1 Age Wise BMI Category Distribution



Body Composition:

Body composition was assessed to evaluate the distribution of fat mass, lean mass, and overall body composition among the participants.

This analysis provides valuable insights into nutritional status, obesity prevalence, and metabolic health risks.

Understanding body composition is particularly important during perimenopause, as hormonal changes can lead to alterations in fat distribution, muscle loss, and an increased risk of metabolic disorders. Assessing these parameters helps in identifying individuals at risk of obesity-related complications

Table 4.2.4 Body Composition of The Participants (n =250)

Sr. no	Variable	n	Mean	SD
1	**Total Fat (%)**	250	38.03	5.70
2	**Visceral Fat**	250	13.47	8.10
3	**Resting Metabolism (RM)**	250	1411.82	275.79
4	**Body Age**	250	54.85	11.84
5	**Subcutaneous Fat (Whole Body)**	250	44.17	16.27
6	**Subcutaneous Fat (Trunk)**	250	31.29	6.25
7	**Subcutaneous Fat (Arms)**	250	43.94	10.61
8	**Subcutaneous Fat (Legs)**	250	44.10	8.31
9	**Skeletal Muscle (Whole Body)**	250	30.52	10.64
10	**Skeletal Muscle (Trunk)**	250	20.59	6.95
11	**Skeletal Muscle (Arms)**	250	27.90	12.49
12	**Skeletal Muscle (Legs)**	250	33.81	5.03

Table 4.2.4 presents the percentage distribution of body composition parameters among the study participants. The findings indicate that the mean total body fat percentage was 38.03%, highlighting a high level of adiposity among the participants. Visceral fat levels averaged 13.47, which is a significant concern as excess visceral fat was associated with an increased risk of metabolic disorders. The average resting metabolism (1411.82 kcal/day) showed considerable variation, suggesting differences in energy expenditure among individuals.

Subcutaneous fat distribution varied across body regions, with the highest accumulation observed in the whole body (44.17%), followed closely by the arms (43.94%) and legs (44.10%). Trunk subcutaneous fat was comparatively lower at 31.29%, but still indicative of central fat deposition, which is linked to increased health risks. Skeletal muscle mass was also assessed, with the lowest percentage recorded in the trunk region (20.59%), while the arms (27.90%) and legs (33.8%1) exhibited relatively higher

values. However, the overall skeletal muscle percentage (30.52%) suggests lower muscle mass, which could impact strength and mobility.

The mean body age of 54.85 years was notably higher than expected, indicating a possible decline in metabolic health and physical fitness.

This finding can be supported by the research conducted by Ambikairajah et al. (2019), which examined fat mass changes during menopause. The study revealed that menopausal transition was associated with an increase in total body fat and a redistribution of fat towards the abdominal region. This aligns with the present study's findings, where participants exhibited high total fat (38.03%) and visceral fat (13.47%), indicating an increased risk for metabolic complications. The study further emphasized that these changes are primarily due to declining oestrogen levels, which contribute to the accumulation of visceral adipose tissue and increased cardiovascular disease risk.

Another study that supports these findings is by Woods et al. (2020), which explored the relationship between lean body mass (LBM) and menopausal symptoms. It was found that lower LBM was significantly associated with increased vasomotor symptoms (VMS), including hot flashes and night sweats. The present study's results, showing a low skeletal muscle percentage (30.52%) with the lowest values in the trunk region (20.59%), align with these findings. This suggests that reduced muscle mass during menopause can exacerbate metabolic issues and contribute to overall discomfort.

These studies collectively reinforce the importance of maintaining muscle mass, reducing visceral fat, and supporting metabolic health to mitigate the adverse health impacts of menopause. The findings emphasize the need for targeted lifestyle interventions, including resistance training and balanced nutrition, to preserve muscle mass, manage fat redistribution, and support overall metabolic function effectively.

Table 4.2.5 Body Fat Percentage Categories of the participants (n=250)

Sr. no.	Category	n	%
1.	High	121	48.41
2.	Very High	101	40.48
3.	Normal	28	11.11

4.	Low	0	0.00

Table 4.2.5 presents the distribution of participants based on their body fat percentage. The majority of participants exhibited elevated levels of body fat, with 48.41% falling under the "High" category and 40.48% categorized as "Very High." Only 11.11% of participants had a "Normal" body fat percentage, while none were reported to have "Low" body fat. These findings indicate that a significant proportion of the study population has excessive body fat levels, which may increase their risk for metabolic disorders and other health complications.

Table 4.2.6 Visceral Fat Level Categories of the participants (n=250)

Sr. no	Category	n	%
1.	**Healthy (1–9)**	**104**	**41.67**
2.	**Moderate Risk (10–14)**	**55**	**21.83**
3.	**High Risk (≥15)**	**91**	**36.51**

Table 4.2.6 shows the visceral fat level categories among the participants. A considerable percentage (41.67%) had visceral fat levels within the "Healthy" range (1–9). However, 21.83% were at "Moderate Risk" (10–14), and a notable 36.51% were classified under the "High Risk" category (≥15). The presence of high visceral fat levels in over one-third of the participants highlights potential concerns for cardiometabolic health, as visceral fat is closely associated with increased risk for conditions such as type 2 diabetes, hypertension, and cardiovascular disease.

Table 4.2.7. Skeletal Muscle Mass Categories of the participants (n=250)

Sr. no	Category	n	%
1.	High	109	43.65%
2.	Low	84	33.73%

3.	Normal	57	22.62%

Table 4.2.7 outlines the skeletal muscle mass distribution among the participants. A significant proportion (43.65%) had "High" skeletal muscle mass, which is generally considered favourable for maintaining metabolic health and physical function. However, 33.73% of participants were classified as having "Low" skeletal muscle mass, indicating potential risks related to sarcopenia or reduced muscle strength. The remaining 22.62% had skeletal muscle mass within the "Normal" range. These findings suggest that while a portion of the population maintains adequate muscle mass, a substantial number may be at risk for muscle-related functional decline, particularly during the perimenopausal stage.

Table 4.2.8 Relationship Between BMI and Visceral Fat Among Participants (n=250)

Sr. no.	Predictor	Estimate (β)	Standard Error (SE)	t-value	p-value	Remark
1.	Intercept	0.984	2.1340	0.461	0.645	Not significant
2.	BMI	0.412	0.0685	6.006	< 0.001	Significant

Table 4.2.8 shows that there is a significant positive relationship between BMI and visceral fat among the participants. BMI increases, the level of visceral fat also tends to increase. This suggests that individuals with higher BMI are more likely to have higher amounts of visceral fat.

Okura et al. (2023) demonstrated that visceral fat area (VFA) is strongly associated with BMI, showing that individuals with higher BMI tend to accumulate more visceral fat, which increases the risk of arterial stiffness and related cardiovascular issues.

In another study, Amato et al. (2010) introduced the Visceral Adiposity Index (VAI), which uses BMI as a key component in estimating visceral fat function and associated

cardiometabolic risk. Their findings highlight the reliability of BMI as an indicator of visceral fat accumulation.

These studies collectively reinforce the findings of Table 4.2.8, demonstrating that higher BMI is significantly associated with increased visceral fat accumulation, which in turn elevates the risk for metabolic and cardiovascular diseases.

Figure 4.2.2 BMI as a Predictor for Visceral Fat (n=250)

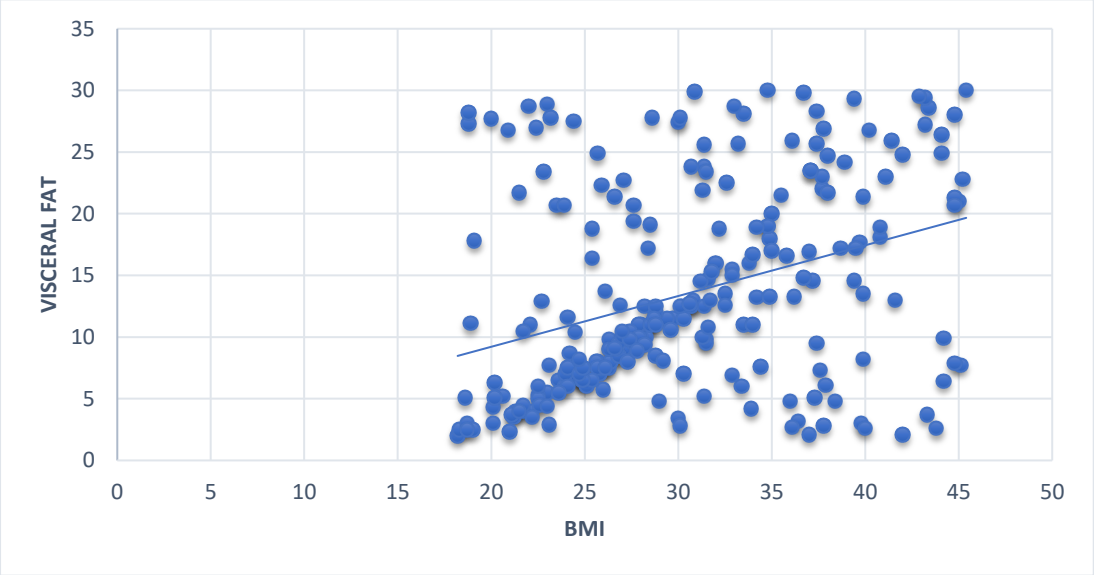


Table 4.2.9 Relationship Between WHR and Visceral Fat Among Participants (n=250)

Sr. no.	Predictor	Estimate (β)	Standard Error (SE)	t-value	p-value	Significance
1.	Intercept	20.60	9.04	2.279	0.023	Significant
2.	Waist-Hip Ratio	-8.30	10.51	-0.790	0.430	Not significant

Table 4.2.9 shows that there is no significant relationship between Waist-Hip Ratio (WHR) and visceral fat among the participants. This suggests that WHR is not a reliable predictor of visceral fat in this study.

Table 4.2.10 Body Composition Age Wise Distribution of The Participants (n=250)

The distribution of body composition parameters across different age groups was analysed to understand variations in visceral fat, total fat percentage, and waist-hip ratio

with age. This helps assess trends in fat accumulation and fat distribution, providing insights into potential health risks such as central obesity

Sr. no.	Parameter	30-35 (n=20)		36-40 (n=45)		41-45 (n=65)		46-50 (n=120)	
		Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
1.	Visceral Fat	**9.28**	**3.28**	**11.39**	**7.62**	**12.31**	**7.34**	**15.58**	**8.68**
2.	Total Fat	**37.26**	4.48	38.84	5.25	37.96	5.31	37.90	6.26
3.	Waist-Hip Ratio	**0.88**	0.05	0.85	0.05	0.86	0.04	0.86	0.05

Table 4.2.11 presented the distribution of body composition parameters across different age groups, highlighting variations in visceral fat, total fat percentage, and waist-hip ratio. The findings indicated a progressive increase in visceral fat with advancing age, with mean values rising from 9.28 in the 30-35 age group to 15.58 in the 46-50 age group. This trend suggested that visceral fat accumulation was more pronounced in older individuals, which was in line with existing research linking age-related hormonal changes and metabolic shifts to increased central adiposity. The standard deviation (SD) also increased with age, indicating greater variability in visceral fat levels among older participants.

In terms of total fat percentage, the values remained relatively stable across age groups, ranging between 37.25% and 38.84%, with slight fluctuations. The highest total fat percentage was observed in the 36-40 age group (38.84%), after which it slightly declined in the older age groups. The standard deviation increased with age, reflecting greater individual differences in fat accumulation. While total fat remained relatively consistent, the increase in visceral fat with age indicated a shift in fat distribution, which was often associated with higher metabolic risk in midlife individuals.

The waist-hip ratio remained relatively stable across all age groups, fluctuating between 0.854 and 0.877, with minor variations. The 30-35 age group had the highest mean waist-hip ratio (0.877), while the other groups showed marginally lower values. These findings suggested that despite an increase in visceral fat with age, the overall

distribution of body fat in terms of waist-to-hip proportion remained largely unchanged. The minor variations could have been attributed to differences in lifestyle, physical activity, or genetic predispositions.

The probable reason behind these findings could have been that hormonal changes, particularly declining oestrogen levels in women, contributed to increased visceral fat deposition as they aged.

The findings of this study were supported by existing research on menopause and body composition changes. Fenton A. (2021), in her study on weight, shape, and body composition changes at menopause, emphasized that menopause was associated with significant alterations in fat distribution, including increased peri-abdominal and visceral fat accumulation. These changes were attributed to declining oestrogen levels, reduced energy expenditure, and metabolic shifts, which aligned with the observed increase in visceral fat across different age groups in the present study.

Similarly, research conducted by Opoku et al. (2023) provided further evidence that menopausal transition led to central obesity, with fat shifting from peripheral to visceral storage. This redistribution of fat mass was a key factor contributing to higher cardiometabolic risks, reinforcing the findings of this study that visceral fat increased progressively with age, from 9.275 in the 30-35 age group to 15.582 in the 46-50 age group.

The Women's Health Initiative (WHI) study, published in 2023, found that while total body fat percentages remained relatively stable during menopause, there was a significant increase in visceral fat, indicating a redistribution of fat from peripheral to central regions.

Similarly, the Study of Women's Health Across the Nation (SWAN) Fat Patterning Study, published in 2010, observed that visceral fat increased during the menopausal transition and was associated with hormonal changes, particularly elevated bioavailable testosterone levels.

These studies aligned with current findings that, although total fat percentages showed only minor fluctuations across age groups, visceral fat increased significantly during menopause. This shift in fat distribution contributed to an increased risk of metabolic disorders.

Highlights

73.6% of participants were obese based on the Asia-Pacific BMI classification.

Visceral fat & central adiposity increased significantly with age, raising metabolic health concerns.

Skeletal muscle mass was lower in older participants, indicating a risk of reduced strength and mobility.

Despite total fat percentage remaining stable, there was a progressive shift from peripheral to visceral fat storage with advancing age, consistent with menopausal hormonal changes.

Section 4.3: Food Pattern

The distribution of dietary preferences among participants was analysed to understand variations in food choices. This helps assess the prevalence of vegetarian, non-vegetarian, and eggetarian diets and their potential impact on nutritional intake and health outcomes among the participants.

Table 4.3.1 Distribution of Dietary Preferences of the Participants (n=250)

Sr. no.	Dietary Preference	n	Percentages
1.	Vegetarian	210	84.0
2.	Non-Vegetarian	12	4.8
3.	Eggetarian	28	11.2

Table 4.3.1 reveals that the majority of participants follow a vegetarian diet (84.0%), while 11.2% are eggetarian, and 4.8% are non-vegetarian. This indicates a strong

preference for vegetarianism among the study population, with a relatively smaller proportion consuming eggs or non-vegetarian food.

Table 4.3.2 Frequency of Junk Food Consumptions of The Participants (n=250)

The frequency of junk food consumption among participants was analysed to understand dietary habits and their potential impact on nutritional status and health. This helps assess the prevalence of unhealthy eating patterns and their association with risks such as obesity.

Sr. no.	Frequency of Junk Food Consumption	n (Count)	(Percentage)
1.	Once a week	110	44.0
2.	2-3 times a week	85	34.0
3.	4-5 times a week	30	12.0
4.	Less than once a week	25	10.0
5.	Daily	3	1.2
6.	Never	2	0.8

Table 4.3.2 reveals that the majority of respondents (44.0%) consumed junk food once a week, followed by 34.0% who consumed it 2-3 times a week. A smaller proportion, 12.0%, reported consuming junk food 4-5 times a week, while 10.0 % consumed it less than once a week. Only 1.2% of respondents reported daily junk food consumption, and 0.8% never consumed junk food. The findings indicate that most participants had moderate junk food consumption patterns, with a notable proportion consuming it at least once or multiple times a week**.**

Table 4.3.3 Frequency Distribution of Junk Food Consumption Among Participants:

The question aimed to assess the types of junk food most frequently consumed by the participants. Respondents were allowed to select multiple options from a list that included fried snacks, sweets, fast food, sugary beverages, and packaged snacks. The

responses provide insight into dietary habits and the prevalence of processed food consumption among the study population.

Since multiple responses were allowed, the total count for each category does not sum to the total sample size. The maximum possible count for any single category was 1250 (if every participant selected it).

Sr. no.	Junk Food Category	Count
1.	Fast food (pizza, burgers, etc.)	831
2.	Chips, fries, or other fried snacks	615
3	Sweets or desserts (cakes, pastries, chocolates)	498
4.	Packaged snacks (instant noodles, biscuits, etc.)	402
5.	Sugary drinks (soda, packaged fruit juices)	354

Table 4.3.3 presented the categorized distribution of junk food consumption among respondents. The data indicated that fast food (pizza, burgers, etc.) was the most commonly consumed junk food category, with 831 responses. This suggested a strong preference for fast food among the participants.

Following this, chips, fries, or other fried snacks were also highly consumed, with 615 responses, indicating that deep-fried snacks remained a significant part of junk food consumption patterns. Sweets or desserts (cakes, pastries, chocolates) were reported by 498 respondents, showing a considerable preference for sugary treats.

Furthermore, packaged snacks (instant noodles, biscuits, etc.) accounted for 402 responses, highlighting the popularity of convenient and ready-to-eat food items. Lastly, sugary drinks (soda, packaged fruit juices) were reported by 354 respondents, suggesting a notable intake of high-sugar beverages.

The findings highlighted that fast food and fried snacks were the most preferred junk food items, followed closely by sweets and packaged snacks. This pattern suggested a reliance on processed and convenient food items, which may have had implications for dietary habits and overall health.

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Such consumption patterns are often associated with poor nutritional quality, excessive intake of calories, saturated fats, sodium, and added sugars—all of which are known contributors to non-communicable diseases (NCDs) such as obesity, type 2 diabetes, cardiovascular disease, and hypertension.

This high level of fast food and fried snack consumption may also reflect a shift in dietary preferences influenced by urbanization, time constraints, and increased accessibility of fast-food outlets.

The relatively high consumption of sugary drinks and sweets raises concerns regarding sugar overconsumption, which is particularly concerning for populations at risk of insulin resistance or metabolic syndrome

Figure 4.3.1 Frequency Distribution of Junk Food Consumption Among Participants:

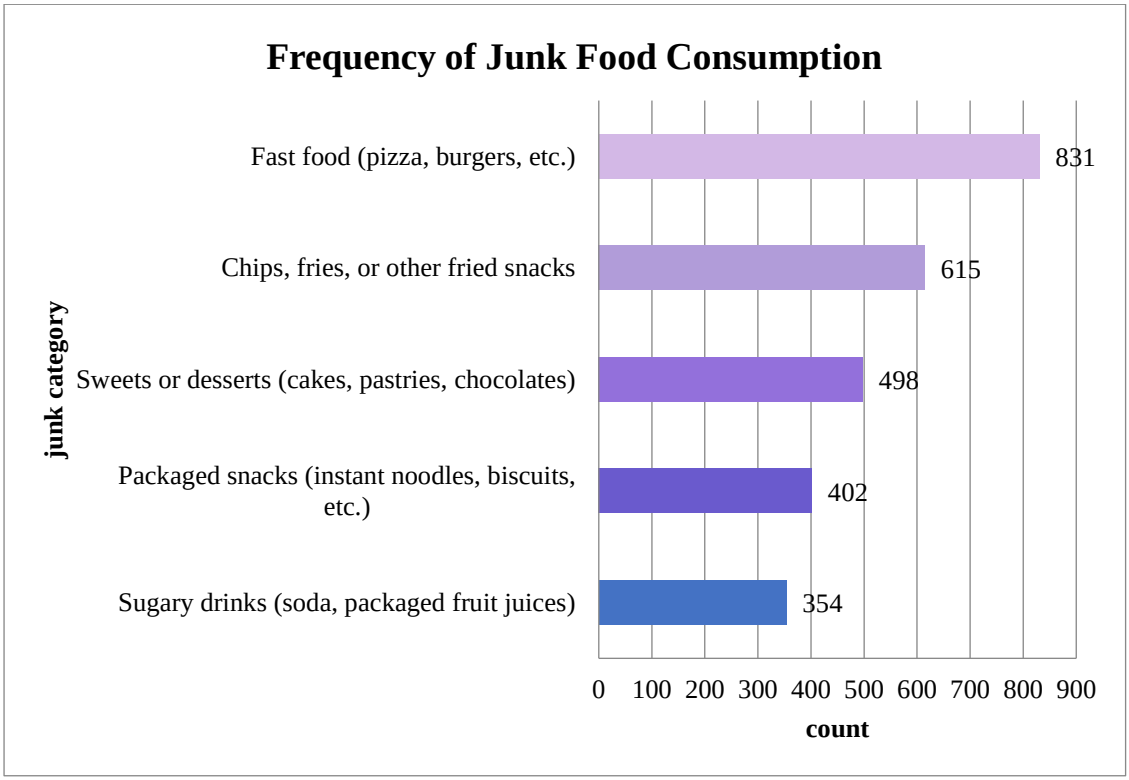

Table 4.3.4 Reasons for Junk Consumption among participants (n=250)

Sr. no.	Reason for Junk Food Consumption	Count
1.	Social gatherings	226
2.	Habit	180
3.	Convenience	167
4.	Cravings	107
5.	Stress relief	47
6.	Others	1

Table 4.3.4 presented the distribution of reasons for junk food consumption among respondents. The data indicated that the most common reason for consuming junk food was social gatherings, accounting for 226 responses. This suggested that junk food was often consumed in social settings, such as parties or group outings.

Habit was the second most reported reason, with 180 responses indicating that regular consumption had become part of their routine. Convenience closely followed with 167 responses, highlighting that junk food was often preferred due to its easy availability and quick preparation.

Cravings were another significant factor, with 107 respondents mentioning that their consumption was driven by an urge for specific tastes or flavours. Stress relief was also noted as a reason, with 47 respondents consuming junk food as a coping mechanism.

The findings were supported by Wu et al. (2020) in their study, The study highlighted the significant influence of hormonal fluctuations and psychological distress on food preferences during perimenopause. It emphasized that perimenopausal women often experienced increased cravings for high-calorie, processed foods, particularly sugary snacks and fast food, as a result of shifts in serotonin and dopamine levels. These hormonal changes contributed to emotional eating patterns, where food served as a coping mechanism for stress, mood swings, and anxiety.

The research also suggested that habitual consumption of junk food became reinforced over time, as repeated exposure to processed and high-fat foods led to a cycle of dependency, making it harder for women to transition to healthier alternatives.

The ease of availability and convenience of ready-to-eat junk food further exacerbated this pattern, as busy lifestyles and psychological factors made these options more appealing. Moreover, the study discussed the broader socio-cultural and emotional dimensions of food choices, emphasizing that food consumption during perimenopause was not solely dictated by hunger but was deeply intertwined with mental well-being and emotional needs. Women experiencing higher stress levels were more likely to consume high-sugar and high-fat foods, reinforcing the connection between psychological distress and dietary habits.

Similarly, Vincent et al. (2024) explored the connection between disordered eating behaviours and the menopausal transition, confirming that stress, anxiety, and mood swings contributed to increased emotional eating. The review highlighted that perimenopausal women were more likely to engage in binge eating episodes and seek high-fat, sugary foods as a coping mechanism.

This supported the findings that stress relief was a key motivator for junk food consumption, as hormonal imbalances exacerbated feelings of distress, leading women to resort to comfort foods to regulate their emotions.

Additionally, the studies highlighted the role of social and environmental influences in shaping dietary choices during perimenopause. Wu et al. (2020) noted that food choices were not only driven by biological cravings but also by social contexts, reinforcing the finding that social gatherings played a major role in junk food consumption. The convenience of processed food further encouraged repeated consumption, creating long-term dietary habits that became difficult to break.

Figure 4.3.2 Reasons for Junk Consumption by Participants (n=250)

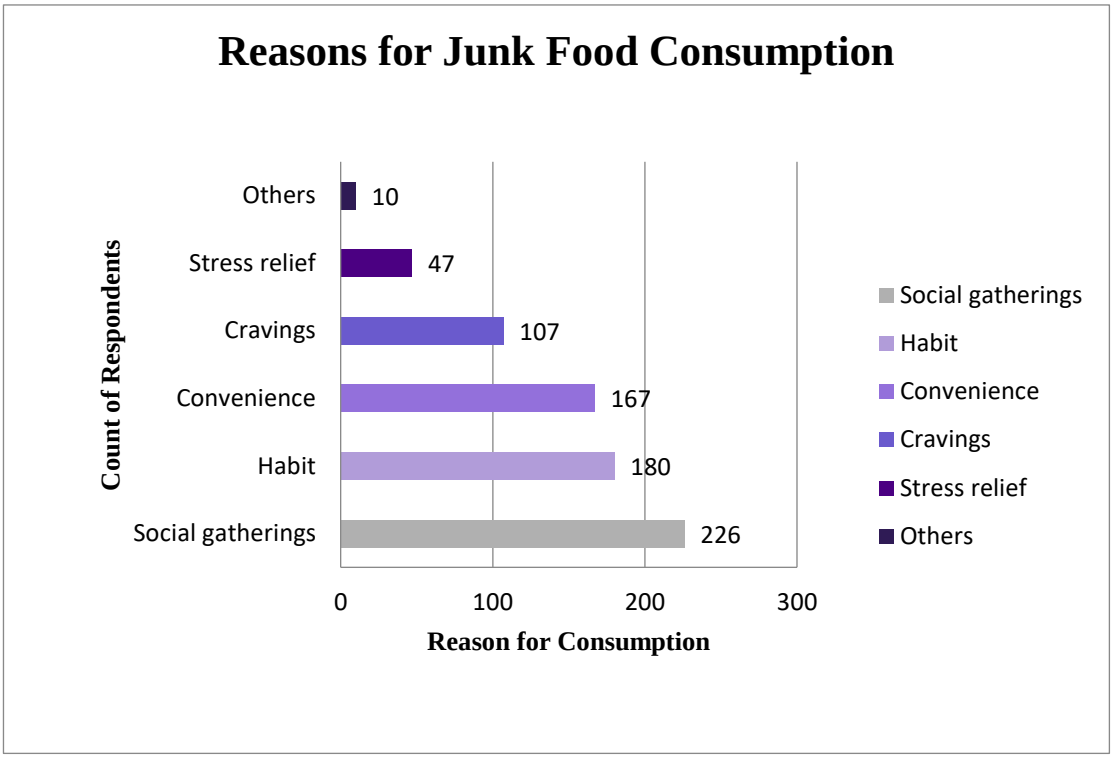

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Table 4.3.5 Impact of Irregular Meals on Junk Food Consumption Frequency:

Sr. no.	Irregular Meals Count	2-3 times a week	4-5 times a week	Daily	Less than once a week	Never	Once a week
1.	1 (Only Bed Tea Irregular)	0	0	0	2	0	0
2.	2 (Breakfast + Bed Tea Irregular)	3	0	0	4	1	13
3.	3 (Mid-Morning + Above)	11	3	0	8	0	21
4.	4 (Lunch + Above)	51	18	1	7	0	30
5.	5 (Evening Snacks + Above)	20	3	0	1	0	36
6.	6 (Dinner + Above)	1	5	0	0	0	9
7.	7 (All Meals Irregular)	0	0	0	0	0	2

A closer examination of the data reveals a distinct relationship between irregular meal patterns and the frequency of junk food consumption among respondents.

It was found that respondents who reported irregularity only in bed tea consumption displayed the least frequency of junk food intake, with the majority (66.7%) consuming

junk food less than once a week. The probable reason behind this could be that minor disruptions in early morning meal patterns may not significantly affect the overall daily dietary habits, thus limiting the inclination toward junk food consumption later in the day.

In contrast, 57.14% of respondents who reported irregularity in both breakfast and bed tea consumed junk food once a week, and 14.3% consumed it 2-3 times a week. The probable explanation for this could be that individuals missing key morning meals might experience early-day hunger pangs, leading them to opt for convenient food options such as junk food later during the day.

The trend becomes more evident among respondents with mid-morning and above meal irregularities, where 52.5% consumed junk food once a week, and a notable proportion (27.5%) consumed it 2-3 times a week. This suggests that irregularity extending into the mid-morning period may increase the likelihood of unhealthy snacking to compensate for missed meals.

A higher frequency of junk food consumption was observed in respondents who reported lunch and above irregularities, with 51 consuming junk food 2-3 times a week and 18% consuming it 4-5 times a week. The probable reason behind this could be that skipping or delaying major meals like lunch leads to significant hunger later in the day, promoting the consumption of readily available junk food items to satisfy these cravings.

Respondents who reported irregularity in evening snacks and above showed a preference for moderate junk food intake, with 60% consuming junk food once a week and 33.3% consuming it at least 2-3 times a week. The likely reason could be that disruption of evening eating patterns triggers evening or late-night snacking habits, often with junk food being the preferred choice due to its accessibility and convenience.

Those who reported dinner and above irregularities also demonstrated moderate junk food intake, with 56.3% consuming junk food once a week. This finding could suggest that irregular dinners, while impactful, may not always result in high-frequency junk food consumption, possibly because late evening irregularity might also lead to skipped meals altogether.

Interestingly, among respondents who indicated that all meals were irregular, junk food consumption remained relatively low, with only 2% respondents consuming junk food once a week and no respondents reporting higher consumption. The probable explanation could be that individuals with extreme meal irregularity may be skipping meals entirely rather than replacing them with snacks, or they may have limited access or appetite for junk food under such circumstances.

This observation also suggests that there may be a threshold of irregularity beyond which individuals may not turn to junk food, possibly due to reduced overall food intake or fatigue-related appetite suppression.
Additionally, external factors such as socio-economic limitations, food availability, or lack of awareness about nutrition may influence the absence of junk food in cases of extreme irregularity.

These findings clearly indicate a positive association between the number of irregular meals and the frequency of junk food consumption, particularly when the irregularity involves primary meals like lunch and breakfast.

As the number of skipped or irregular meals increases up to a point (e.g., 4–5 meals), the frequency of junk food consumption also increases—indicating compensatory eating behaviors likely triggered by hunger, cravings, and reduced satiety.

However, in cases of extreme irregularity (i.e., all meals being irregular), a drop in junk food consumption is noted. This paradox may point toward deeper nutritional insecurity, psychological factors like appetite loss, or erratic eating behaviors that don't necessarily translate into increased junk food intake.

These patterns may reflect an underlying cycle of disrupted eating rhythms and compensatory snacking, which can adversely impact metabolism, satiety regulation, and long-term nutritional status.

It also raises concern for potential nutrient deficiencies and increased risk of metabolic syndrome due to high intake of energy-dense but nutrient-poor foods.

Figure 4.3.3 Impact Of Irregular Meals On Junk Food Consumption (n=250)

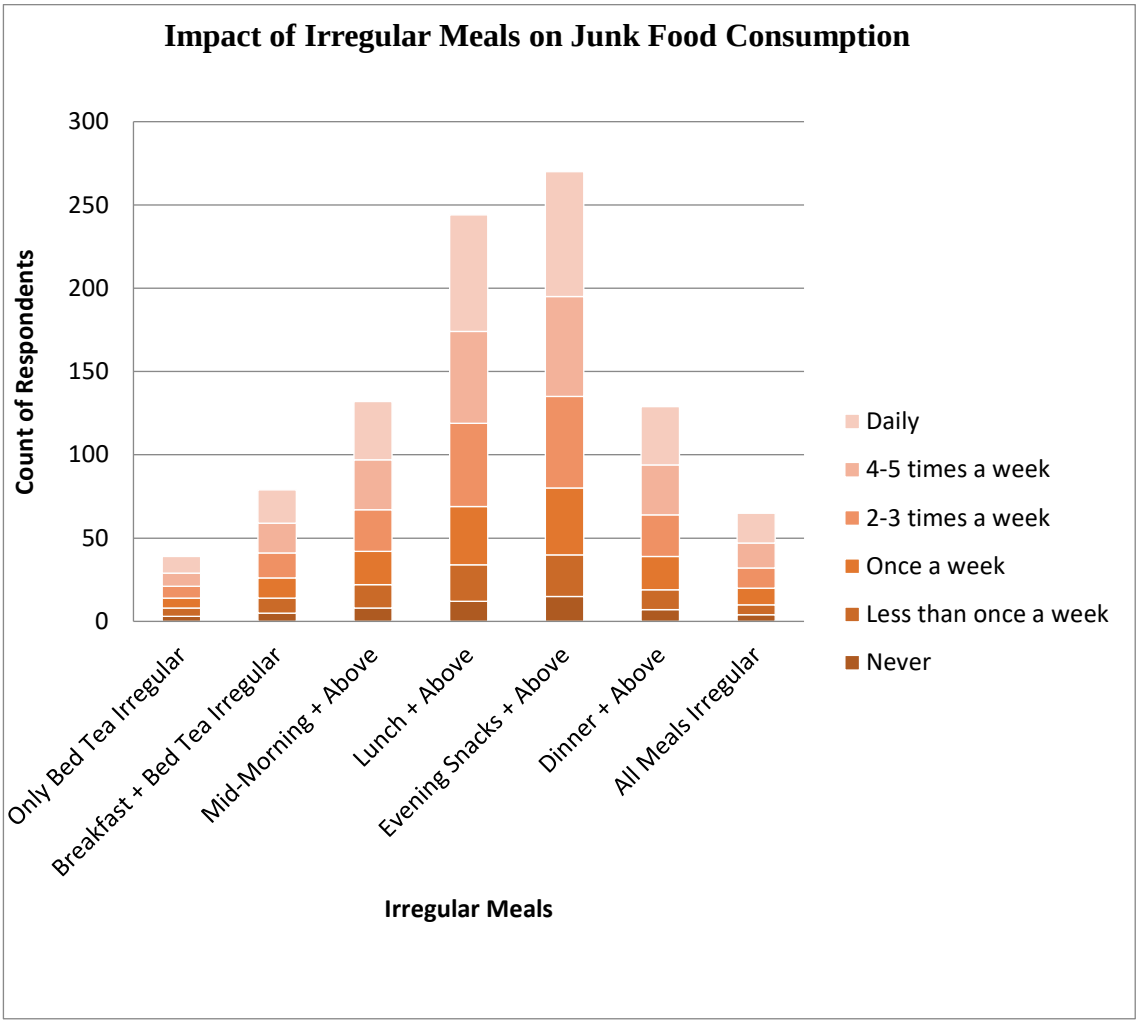


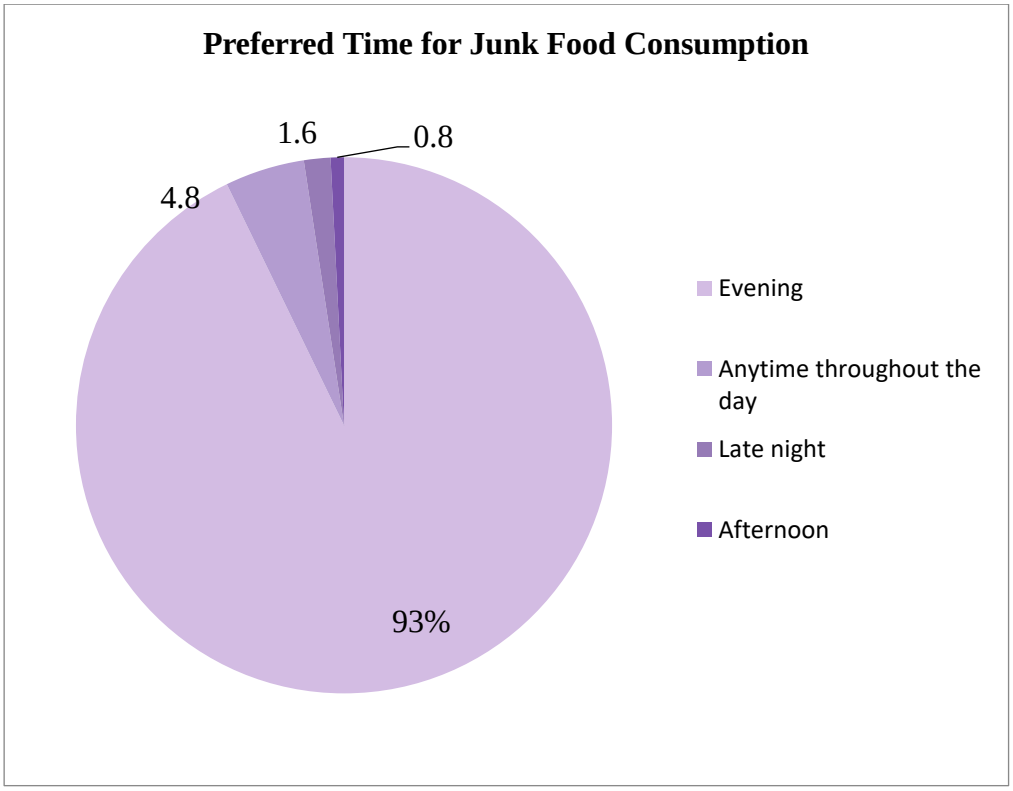
Table 4.3.6 Preferred Time for The Junk Consumption of the Participants (n=250)

Sr. No	Time of Day	n (Count)	%of Respondents
1	**Evening**	232	92.8
2	**Anytime throughout the day**	12	4.8
3	**Late night**	4	1.6
4	**Afternoon**	2	0.8

Table 4.3.6 shows that a significant majority i.e., 92.8% of the respondents reported consuming junk food most commonly during the evening, whereas a very small

proportion of respondents consumed junk food during other times of the day. Only 4.8% of respondents reported consuming junk food anytime throughout the day, followed by 1.6% who reported late night consumption, and 0.8% who reported consumption in the afternoon.

Figure 4.3.4 Preferred Time for The Junk Consumption of the Participants



Highlights

Vegetarian Dominance: 84% of participants follow a vegetarian diet, with only 4.8% being non-vegetarian.

Junk Food Habits: 44% eat junk food once a week, while 34% consume it 2-3 times weekly.

Top Reasons: Social gatherings (226 responses) and habit (180 responses) drive junk food consumption.

Peak Snacking Time: 92.8% prefer eating junk food in the evening.

Section4.4: Dietary Habits (Food Frequency Questionnaire) And 24-Hour Dietary Recall

This section assesses the dietary habits of perimenopausal women using a Food Frequency Questionnaire (FFQ) and a 24-hour dietary recall. The FFQ helps identify the frequency of consumption of key food groups and nutrients, while the 24-hour recall provides a detailed intake analysis of a typical day. These methods together offer insights into common nutritional patterns and deficiencies.

In FFQ Consumption frequency is categorized into frequent consumption, which includes daily intake, 4-5 times per week, 2-3 times per week, and once per week, and non-frequent consumption, which includes intake once per month, occasionally, or never.

Table 4.4.1 Frequency of Consumption of Different Cereals and Millets (n, %)

Food Item	Daily	4-5 Times/ Week	2-3 Times/ Week	Once/ Week	Once/ Month	Occasionally	Never
Rice Puffed	18 (7.2)	22 (8.8)	86 (34.4)	60 (24.0)	16 (6.4)	37 (14.8)	11 (4.4)
Rice Flakes	4 (1.6)	3 (1.2)	69 (27.6)	127 (50.8)	31 (12.4)	15 (6.0)	1 (0.4)
Rice Parboiled	44 (17.6)	11 (4.4)	26 (10.4)	11 (4.4)	4 (1.6)	6 (2.4)	148 (59.2)
Rice Raw Milled	195 (78.0)	8 (3.2)	28 (11.2)	12 (4.8)	-	-	7 (2.8)
Wheat Flour Whole	233 (93.2)	6 (2.4)	3 (1.2)	2 (0.8)	-	-	-
Wheat Flour Refined	-	3 (1.2)	3 (1.2)	67 (26.8)	106 (42.4)	61 (24.4)	10 (4.0)
White Bread	2 (0.8)	-	7 (2.8)	28 (11.2)	37 (14.8)	53 (21.2)	123 (49.2)
Brown Bread	2 (0.8)	4 (1.6)	10 (4.0)	37 (14.8)	58 (23.2)	55 (22.0)	84 (33.6)
Semolina	3 (1.2)	-	10 (4.0)	109 (43.6)	94 (37.6)	25 (10.0)	9 (3.6)
Maize	8 (3.2)	-	21 (8.4)	38 (15.2)	49 (19.6)	60 (24.0)	74 (29.6)
Jowar	3 (1.2)	-	17 (6.8)	49 (19.6)	38 (15.2)	66 (26.4)	77 (30.8)

Bajra	11 (4.4)	1 (0.4)	31 (12.4)	48 (19.2)	50 (20.0)	72 (28.8)	37 (14.8)

Figures in the parenthesis denotes percentages

Table 4.4.2 Frequency of Consumption of Different Pulses and Legumes (n, %)

Pulse	Daily	4-5 Times/ Week	2-3 Times/ Week	Once/ Week	Once/ Month	Occasionally	Never
Bengal gram dal	(11, 4.4)	(4, 1.6)	(105, 42.0)	(76, 30.4)	(29, 11.6)	(12, 4.8)	(13, 5.2)
Bengal gram whole	(0, 0.0)	(0, 0.0)	(38, 15.2)	(58, 23.2)	(56, 22.4)	(45, 18.0)	(53, 21.2)
Black gram dal	(0, 0.0)	(3, 1.2)	(60, 24.0)	(82, 32.8)	(36, 14.4)	(35, 14.0)	(34, 13.6)
Black gram whole	(0, 0.0)	(0, 0.0)	(24, 9.6)	(47, 18.8)	(49, 19.6)	(56, 22.4)	(72, 28.8)
Cowpea	(0, 0.0)	(0, 0.0)	(4, 1.6)	(39, 15.6)	(78, 31.2)	(84, 33.6)	(45, 18.0)
Green gram dal	(4, 1.6)	(18, 7.2)	(183, 73.2)	(38, 15.2)	(1, 0.4)	(6, 2.4)	(0, 0.0)
Peas (dry)	(0, 0.0)	(0, 0.0)	(6, 2.4)	(31, 12.4)	(62, 24.8)	(112, 44.8)	(39, 15.6)
Horse gram	(0, 0.0)	(3, 1.2)	(1, 0.4)	(35, 14.0)	(24, 9.6)	(81, 32.4)	(106, 42.4)
Lentil dal	(13, 5.2)	(15, 6.0)	(38, 15.2)	(17, 6.8)	(22, 8.8)	(57, 22.8)	(88, 35.2)
Red gram whole	(0, 0.0)	(0, 0.0)	(10, 4.0)	(42, 16.8)	(11, 4.4)	(42, 16.8)	(145, 58.0)
Rajma	(0, 0.0)	(0, 0.0)	(4, 1.6)	(20, 8.0)	(46, 18.4)	(58, 23.2)	(122, 48.8)
Soybean	(0, 0.0)	(0, 0.0)	(4, 1.6)	(19, 7.6)	(34, 13.6)	(63, 25.2)	(130, 52.0)

Figures in the parenthesis denotes percentages

Table 4.4.3 Frequency of Consumption of Different Leafy vegetables (n, %)

Leafy Vegetable	Daily	4-5 Times/ Week	2-3 Times/ Week	Once/ Week	Once/ Month	Occasionally	Never
Amaranth	(5, 2.0)	(10, 4.0)	(48, 19.2)	(82, 32.8)	(45, 18.0)	(31, 12.4)	(29, 11.6)

Bathua	(1, 0.4)	(3, 1.2)	(12, 4.8)	(42, 16.8)	(71, 28.4)	(89, 35.6)	(32, 12.8)
Coriander	(20, 8.0)	(45, 18.0)	(120, 48.0)	(38, 15.2)	(12, 4.8)	(9, 3.6)	(6, 2.4)
Curry Leaves	(18, 7.2)	(30, 12.0)	(95, 38.0)	(64, 25.6)	(18, 7.2)	(13, 5.2)	(12, 4.8)
Drumstick Leaves	(0, 0.0)	(2, 0.8)	(7, 2.8)	(29, 11.6)	(38, 15.2)	(95, 38.0)	(79, 31.6)
Fenugreek	(12, 4.8)	(24, 9.6)	(85, 34.0)	(74, 29.6)	(27, 10.8)	(15, 6.0)	(13, 5.2)
Mint	(8, 3.2)	(18, 7.2)	(74, 29.6)	(82, 32.8)	(35, 14.0)	(21, 8.4)	(12, 4.8)

Figures in the parenthesis denotes percentages

Table 4.4.4 Frequency of Consumption of Different Other vegetables (n, %)

Vegetable	Daily	4-5 Time Week	2-3 Time Week	Once Week	Once Month	Occasionally	Never
Bottle gourd	(14, 5.6)	(32, 12.8)	(98, 39.2)	(65, 26.0)	(21, 8.4)	(14, 5.6)	(6, 2.4)
Bitter gourd	(2, 0.8)	(8, 3.2)	(34, 13.6)	(75, 30.0)	(59, 23.6)	(48, 19.2)	(24, 9.6)
Brinjal	(5, 2.0)	(10, 4.0)	(42, 16.8)	(78, 31.2)	(56, 22.4)	(35, 14.0)	(24, 9.6)
Cabbage	(3, 1.2)	(9, 3.6)	(28, 11.2)	(67, 26.8)	(73, 29.2)	(54, 21.6)	(16, 6.4)
Capsicum	(1, 0.4)	(5, 2.0)	(14, 5.6)	(42, 16.8)	(82, 32.8)	(75, 30.0)	(31, 12.4)
Carrot	(7, 2.8)	(14, 5.6)	(42, 16.8)	(85, 34.0)	(56, 22.4)	(32, 12.8)	(14, 5.6)
Cauliflower	(2, 0.8)	(6, 2.4)	(22, 8.8)	(58, 23.2)	(76, 30.4)	(62, 24.8)	(24, 9.6)
Cucumber	(9, 3.6)	(21, 8.4)	(64, 25.6)	(85, 34.0)	(38, 15.2)	(24, 9.6)	(9, 3.6)
Pumpkin	(4, 1.6)	(10, 4.0)	(32, 12.8)	(74, 29.6)	(68, 27.2)	(42, 16.8)	(20, 8.0)
French beans	(6, 2.4)	(14, 5.6)	(42, 16.8)	(72, 28.8)	(64, 25.6)	(38, 15.2)	(14, 5.6)

Figures in the parenthesis denotes percentages

Table 4.4.5 Frequency of Consumption of Different roots and tubers (n, %)

Root/Tuber	Daily	4-5 Time Week	2-3 Time Week	Once Week	Once Month	Occasionally	Never
Beetroot	(4, 1.6)	(10, 4.0)	(38, 15.2)	(72, 28.8)	(64, 25.6)	(42, 16.8)	(20, 8.0)

Carrot	(7, 2.8)	(14, 5.6)	(42, 16.8)	(85, 34.0)	(56, 22.4)	(32, 12.8)	(14, 5.6)
Colocasia	(3, 1.2)	(9, 3.6)	(28, 11.2)	(67, 26.8)	(73, 29.2)	(54, 21.6)	(16, 6.4)
Potato	(18, 7.2)	(42, 16.8)	(98, 39.2)	(65, 26.0)	(21, 8.4)	(10, 4.0)	(4, 1.6)
Radish	(2, 0.8)	(8, 3.2)	(34, 13.6)	(75, 30.0)	(59, 23.6)	(48, 19.2)	(24, 9.6)
Sweet Potato	(1, 0.4)	(5, 2.0)	(14, 5.6)	(42, 16.8)	(82, 32.8)	(75, 30.0)	(31, 12.4)
Tapioca	(2, 0.8)	(7, 2.8)	(24, 9.6)	(52, 20.8)	(78, 31.2)	(64, 25.6)	(23, 9.2)
Yam	(3, 1.2)	(6, 2.4)	(22, 8.8)	(58, 23.2)	(76, 30.4)	(62, 24.8)	(24, 9.6)

Figures in the parenthesis denotes percentages

Table 4.4.6 Frequency of Consumption of Different Other vegetables (n, %)

Milk & Milk Products	Daily	4-5 Time Week	2-3 Time Week	Once Week	Once Month	Occasionally	Never
Toned Milk	(45, 18.0)	(62, 24.8)	(80, 32.0)	(34, 13.6)	(12, 4.8)	(10, 4.0)	(7, 2.8)
Full Cream Milk	(38, 15.2)	(58, 23.2)	(72, 28.8)	(42, 16.8)	(18, 7.2)	(9, 3.6)	(13, 5.2)
Skimmed Milk	(22, 8.8)	(40, 16.0)	(65, 26.0)	(48, 19.2)	(30, 12.0)	(28, 11.2)	(17, 6.8)
Curd	(50, 20.0)	(78, 31.2)	(60, 24.0)	(30, 12.0)	(12, 4.8)	(6, 2.4)	(4, 1.6)
Paneer	(10, 4.0)	(30, 12.0)	(55, 22.0)	(80, 32.0)	(42, 16.8)	(25, 10.0)	(8, 3.2)
Khoya	(2, 0.8)	(10, 4.0)	(25, 10.0)	(45, 18.0)	(60, 24.0)	(50, 20.0)	(38, 15.2)

Figures in the parenthesis denotes percentages

Table 4.4.7 Frequency of Consumption of Different nuts and oil seeds (n, %)

Nuts & Oilseeds	Daily	4-5 Time Week	2-3 Time Week	Once Week	Once Month	Occasionally	Never
Groundnuts	(30, 12.0)	(50, 20.0)	(75, 30.0)	(55, 22.0)	(20, 8.0)	(15, 6.0)	(5, 2.0)
Sesame Seeds	(10, 4.0)	(25, 10.0)	(40, 16.0)	(50, 20.0)	(45, 18.0)	(35, 14.0)	(45, 18.0)
Flaxseeds	(8, 3.2)	(18, 7.2)	(30, 12.0)	(40, 16.0)	(50, 20.0)	(45, 18.0)	(59, 23.6)

Almonds	(20, 8.0)	(40, 16.0)	(70, 28.0)	(65, 26.0)	(25, 10.0)	(15, 6.0)	(10, 4.0)
Cashew Nuts	(5, 2.0)	(15, 6.0)	(45, 18.0)	(60, 24.0)	(70, 28.0)	(40, 16.0)	(15, 6.0)
Walnuts	(3, 1.2)	(10, 4.0)	(25, 10.0)	(50, 20.0)	(65, 26.0)	(55, 22.0)	(42, 16.8)

Figures in the parenthesis denotes percentages

Table 4.4.8 Frequency of Consumption of Different nuts and oil seeds (n, %)

Fruits	Daily	4-5 Time Week	2-3 Time Week	Once Week	Once Month	Occasionally	Never
Apple	(25, 10.0)	(40, 16.0)	(65, 26.0)	(55, 22.0)	(30, 12.0)	(20, 8.0)	(15, 6.0)
Banana	(50, 20.0)	(70, 28.0)	(60, 24.0)	(30, 12.0)	(15, 6.0)	(10, 4.0)	(5, 2.0)
Papaya	(20, 8.0)	(35, 14.0)	(55, 22.0)	(50, 20.0)	(30, 12.0)	(25, 10.0)	(35, 14.0)
Grapes	(15, 6.0)	(30, 12.0)	(50, 20.0)	(55, 22.0)	(40, 16.0)	(35, 14.0)	(25, 10.0)
Mango	(35, 14.0)	(45, 18.0)	(60, 24.0)	(50, 20.0)	(25, 10.0)	(20, 8.0)	(15, 6.0)
Orange	(30, 12.0)	(50, 20.0)	(70, 28.0)	(55, 22.0)	(20, 8.0)	(15, 6.0)	(10, 4.0)
Amla	(10, 4.0)	(20, 8.0)	(40, 16.0)	(50, 20.0)	(60, 24.0)	(45, 18.0)	(25, 10.0)

Figures in the parenthesis denotes percentages

Table 4.4.9 Frequency of Consumption of Different flesh foods (n, %)

Flesh Foods	Daily	4-5 Time Week	2-3 Time Week	Once Week	Once Month	Occasionally	Never
Egg	(40, 16.0)	(60, 24.0)	(70, 28.0)	(50, 20.0)	(15, 6.0)	(10, 4.0)	(5, 2.0)
Chicken	(20, 8.0)	(45, 18.0)	(55, 22.0)	(65, 26.0)	(40, 16.0)	(25, 10.0)	(10, 4.0)
Fish	(10, 4.0)	(25, 10.0)	(40, 16.0)	(55, 22.0)	(65, 26.0)	(45, 18.0)	(20, 8.0)

Figures in the parenthesis denotes percentages

Table 4.4.10 Frequency of Consumption of Different fats and oil (n, %)

Fats and oil	Daily	4-5 Times/Week	2-3 Times/Week	Once/Week	Once/Month	Occasionally	Never

Oil (Single)	236 (94.4)	3 (1.2)	0 (0.0)	0 (0.0)	0 (0.0)	3 (1.2)	8 (3.2)
Oil (Blend)	11 (4.4)	0 (0.0)	0 (0.0)	3 (1.2)	0 (0.0)	6 (2.4)	230 (92.0)
Ghee	76 (30.4)	20 (8.0)	96 (38.4)	29 (11.6)	5 (2.0)	10 (4.0)	14 (5.6)

Figures in the parenthesis denotes percentages

Table 4.4.11 Frequency of Consumption of Different sugar and jaggery (n, %)

Sugar and jaggery	Daily	4-5 Time Week	2-3 Time Week	Once Week	Once Month	Occasionally	Never
Sugar	243 (97.2)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	7 (2.8)
Jaggery	26 (10.4)	35 (14.0)	73 (29.2)	55 (22.0)	14 (5.6)	32 (12.8)	15 (6.0)
Honey	7 (2.8)	0 (0.0)	0 (0.0)	5 (2.0)	0 (0.0)	75 (30.0)	163 (65.2)

Figures in the parenthesis denotes percentages

Table 4.4.12 Frequency of Consumption of Different RTE (n, %)

Food Item	Daily	4-5 Time Week	2-3 Time Week	Once Week	Once Month	Occasionally	Never
Biscuits	33 (13.2)	1 (0.4)	38 (15.2)	45 (18.0)	52 (20.8)	68 (27.2)	13 (5.2)
Jam /bread	7 (2.8)	2 (0.8)	24 (9.6)	67 (26.8)	82 (32.8)	32 (12.8)	36 (14.4)
Pickle	9 (3.6)	17 (6.8)	35 (14.0)	33 (13.2)	53 (21.2)	75 (30.0)	28 (11.2)
Sweets	10 (4.0)	3 (1.2)	25 (10.0)	36 (14.4)	68 (27.2)	107 (42.8)	1 (0.4)
Instant Noodles	-	3 (1.2)	12 (4.8)	65 (26.0)	42 (16.8)	49 (19.6)	79 (31.6)
Chivda	-	4 (1.6)	71 (28.4)	34 (13.6)	34 (13.6)	83 (33.2)	24 (9.6)
Gathiya	-	6 (2.4)	59 (23.6)	27 (10.8)	39 (15.6)	83 (33.2)	36 (14.4)
Ice Cream	3 (1.2)	2 (0.8)	12 (4.8)	39 (15.6)	84 (33.6)	103 (41.2)	7 (2.8)
Soft Drinks	-	-	6 (2.4)	20 (8.0)	81 (32.4)	119 (47.6)	24 (9.6)

Cornflakes	-	-	-	-	12 (4.8)	39 (15.6)	199 (79.6)
Muesli	-	2 (0.8)	-	1 (0.4)	3 (1.2)	2 (0.8)	242 (96.8)

Figures in the parenthesis denotes percentages

Tables 4.4.1 to 4.4.12 revealed that the dietary patterns of perimenopausal subjects indicated a strong preference for whole grains, pulses, and dairy products, while the consumption of millets, legumes, and certain vegetables remained relatively low. Among cereals, whole wheat flour and raw milled rice were staple foods, consumed daily by a majority, whereas refined wheat flour, white bread, and brown bread were infrequently included in the diet. Millets such as jowar, bajra, and maize were consumed only occasionally or never by over half of the population, highlighting their limited role in daily meals.

In the pulses and legumes category, green gram dal emerged as the most frequently consumed, while lentil dal and Bengal gram dal were also commonly included. However, high-protein sources like soybeans, rajma, and horse gram were rarely consumed, which might have affected overall protein intake. Among green leafy vegetables, coriander and curry leaves were widely used, while drumstick leaves and bathua were seldom included. Other vegetables such as bottle gourd, brinjal, and carrots were regularly consumed, whereas bitter gourd, capsicum, and cauliflower were eaten less frequently.

Root vegetables, particularly potatoes, were a common part of the diet, with frequent consumption reported by many individuals. In the milk and dairy products category, curd was a dietary staple, consumed frequently by over 75% of the population, whereas full cream and toned milk were also widely consumed. In contrast, skimmed milk, paneer, and khoya were only occasionally included. Among nuts and oilseeds, groundnuts were a popular choice, while other varieties were not commonly consumed.

Overall, the diet of perimenopausal subjects was characterized by a high intake of whole grains, pulses, and dairy, but limited consumption of millets, legumes, and certain vegetables.

Table 4.4.13 Average Daily Nutrient Intake of the participants (n=250)

Sr. no.	Nutrient	Average Intake	SD	RDA*	of RDA
1.	Energy	**1672.5 kcal**	364.30	**2000 kcal**	**83.6**
2.	Protein	**41.2 g**	8.36	**46 g**	**89.6**
3.	Carbohydrates	**241.8 g**	66.55	**130 g**	**186.0**
4.	Fat	**53.7 g**	12.68	**-**	**-**

***Source: Revised Short Summary Report -2024, ICMR -NIN**

The data presented in Table 4.4.13 revealed important insights into the average daily nutrient intake of the women, collected through the 24-hour dietary recall method. When comparing the average nutrient intake to the Recommended Dietary Allowances (RDA) as per the 2020 guidelines, several key patterns emerged. The average daily energy intake of the women was found to be 1672.5 kcal, which was only 83.6% of the RDA of 2000 kcal. This indicated that the women's energy intake was below the recommended level. A similar observation was made in the reference data, where the energy intake was reported to be 1504 kcal, representing 79% of the RDA. Such a deficiency in energy intake suggested an inadequate caloric supply, potentially impacting the women's overall well-being and energy levels throughout the day.

Regarding protein, the average intake was 41.2 g, which amounted to 89.6% of the RDA of 46 g. This suggested that while the protein intake was fairly close to the recommended level, it was still slightly below the RDA. The reference data also noted a lower protein intake (77.8% of the RDA), indicating that protein consumption in this population might not have been sufficient for optimal health. Protein was essential for various bodily functions, including muscle repair and immune support, so this slight deficiency might have had implications for long-term health if not addressed.

The women's average carbohydrate intake stood at 241.8 g, which exceeded the RDA of 130 g by a significant margin, reaching 186.0% of the RDA. This suggested an overconsumption of carbohydrates in their daily diet. As seen in the reference data, a high carbohydrate intake was observed in this group, where carbohydrates contributed to a large proportion of the total energy intake (55.4%). While carbohydrates were an essential nutrient, an intake that was too high, especially in relation to fats and proteins,

could have contributed to an imbalance in the overall macronutrient distribution, potentially affecting metabolic health.

The analysis of macronutrient contributions to total energy intake revealed that carbohydrates provided the highest share at 59.9%, followed by fats at 29.9% and protein at 10.2%. Although the overall energy intake was below the Recommended Dietary Allowance (RDA), the proportion of carbohydrates remained dominant. Meanwhile, fat intake, though significant, was slightly lower than ideal recommendations, and protein intake fell short of optimal levels. This distribution highlighted potential dietary imbalances, emphasizing the need for adjustments to ensure a more nutritionally balance

Figure 4.4.1: Per Cent Distribution of Calories from Macronutrients

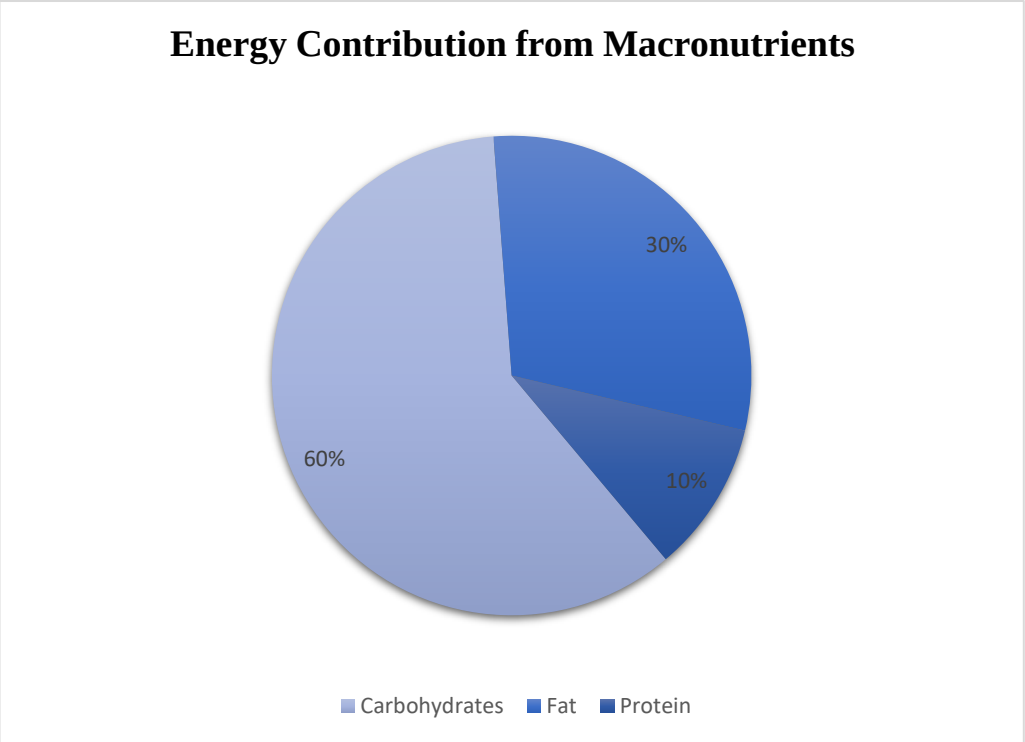


Table 4.4.14 Percentage Distribution of Types of Oil Used by the Participants (n=250)

Sr. No.	Oil Type	Percentage (%)	n (count)
1	Cottonseed oil	46.0	115

2	Groundnut oil	28.8	72
3	Mustard oil	9.6	24
4	Sunflower oil	8.0	20
5	Corn oil	3.2	8
6	Oil Blends (Saffola + Rice Bran & Mustard)	4.4	11

The data presented in Table 4.4.14 illustrated the types of cooking oil used by the participants and their respective usage frequencies. Among the total sample of 250 participants, cottonseed oil emerged as the most commonly used type, reported by 46% (n=115) of the respondents.

Groundnut oil was the second most prevalent, used by 28.8% (n=72) of participants, suggesting a relatively strong preference for traditional oils in the region. Mustard oil, though less commonly used, was still reported by 9.6% (n=24), reflecting its continued presence in some households.

Sunflower oil was used by 8.0% (n=20) of the participants, while corn oil was reported by 3.2% (n=8), indicating limited preference for these oil types. Additionally, a small proportion of participants (4.4%, n=11) used blended oils such as Saffola, rice bran oil, and mustard oil in combination, possibly reflecting an emerging awareness about oil blending for health benefits.

The combined use of cottonseed and groundnut oils accounted for nearly 75% of the sample (n=187), clearly establishing them as the dominant oil choices among the population. On the other hand, oils like corn oil, sunflower oil, and blends collectively accounted for only 15.6% (n=39), suggesting minimal variation in oil usage beyond the top two preferences.

Overall, the findings suggested a dominant reliance on cottonseed and groundnut oils, with limited diversity in the types of oils used.
The usage of oil blends and other vegetable oils appeared minimal, indicating either low awareness or limited accessibility of these options.
This pattern may have implications for the fatty acid profile of the participants' diets,

especially considering that cottonseed oil is relatively high in saturated fats compared to some other vegetable oils.

Figure 4.4.2: Type Of Oil Used by the Participants

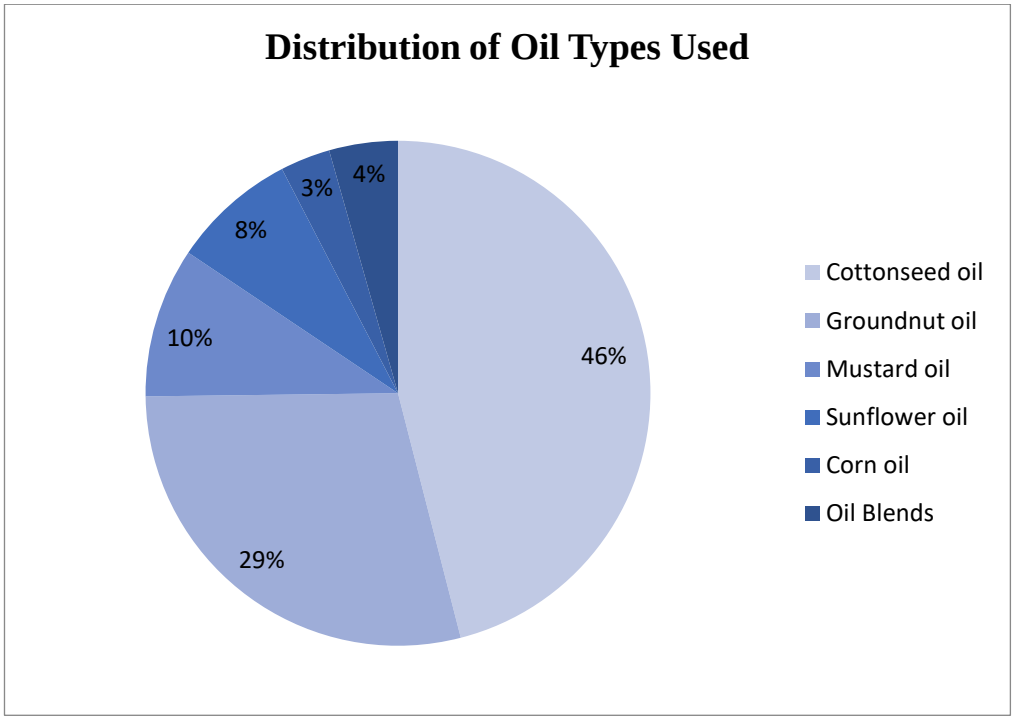


Table 4.4.15 Nutrient Intake Distribution by Category of The Participants (n=250)

Sr. no.	Category	Energy (n,%)	Protein (n,%)	Carbohydrates (n,%)	Fat (n%,)
1.	<25%	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
2.	26-50%	3 (1.2)	13 (5.2)	9 (3.6)	0 (0.0)
3.	51-75%	42 (16.8)	106 (42.4)	66 (26.4)	0 (0.0)
4.	76-100%	87 (34.8)	114 (45.6)	88 (35.2)	2 (0.8)
5.	>100%	118 (47.2)	17 (6.8)	87 (34.8)	248 (99.2)

Table 4.4.15 presents the distribution of nutrient intake across different percentage categories relative to the Recommended Dietary Allowance (RDA), highlighting

variations in intake levels among participants. Energy intake varied, with 47.2% of individuals exceeding 100% of the RDA, while 34.8% met their requirements within the 76-100 range. Additionally, 16.8 had an intake between 51-75, and a small proportion (1.2%) consumed only 26-50 of the recommended energy intakes.

Protein intake was distributed across different categories, with 45.6% of participants meeting 76-100 of the RDA, while 42.4 had an intake within the 51-75 range. A smaller proportion (6.8%) consumed protein beyond the recommended levels, whereas 5.2 had an intake between 26-50 of the requirements. Carbohydrate intake followed a similar pattern, with 35.2% of individuals meeting 76-100 of the RDA, while 34.8% exceeded the recommended intake. Meanwhile, 26.4% consumed between 51-75 of the requirements, and 3.6% had a significantly lower intake of 26-50.

Fat intake was notably high, with 99.2% of participants consuming beyond the recommended intake, and only 0.8% falling within the 76-100 category. No individuals had fat intake below 75% of the RDA, indicating a considerably high intake in comparison to other macronutrients.

Overall, while energy and carbohydrate intake were distributed across different levels, fat consumption was predominantly higher than the recommended values.

Table 4.4.16 Relationship Between SES and Dietary Intake (n=250)

Sr. no.	Variable	F-statistic	df1	df2	p-value	Remark
1.	Average Energy	0.1298	4	20.2	0.970	Not significant
2.	Protein Intake	1.2263	4	19.5	0.332	Not significant
3.	Average Carbs	0.9926	4	20.5	0.434	Not significant
4.	Average Fat	0.0359	4	19.9	0.997	Not significant

Table 4.4.16 presents the results of whether dietary intake variables, including average energy intake, protein intake, carbohydrate intake, and fat intake, differed significantly across different socioeconomic status (SES) groups. The results indicate that there were no statistically significant differences in dietary intake across SES groups for any of the variables analysed.

Highlights

Staple Foods & Protein Intake: Rice and whole wheat flour are commonly consumed, while millets, refined wheat, soybean, and other legumes have low intake.

Vegetable & Fruit Consumption: Limited intake of leafy vegetables (except coriander & curry leaves), with bananas and apples being the most frequently consumed fruits.

Dairy & Fats: Toned milk and curd are regular in the diet, while paneer, nuts, and seeds are rarely consumed; sunflower oil is the primary cooking fat.

Meal & Beverage Patterns: Regular meals (breakfast, lunch, dinner) with minimal snacking; tea is common, while fruit juices and other healthy drinks are rarely consumed.

Nutritional Gaps: Lack of dietary diversity, particularly in green vegetables, nuts, and micronutrient-rich foods, indicating potential nutrient deficiencies.

Section 4.5: MENQOL (Menopause-Specific Quality of Life Questionnaire)

The **Menopause-Specific Quality of Life Questionnaire (MENQOL)** is a comprehensive, validated tool designed to assess the impact of menopause on a woman's daily life and overall well-being. Developed to capture the multidimensional effects of menopause, it helps researchers and healthcare professionals evaluate symptom prevalence and severity across four key domains:

1. **Vasomotor Symptoms** – Includes common menopausal complaints such as hot flashes, night sweats, and excessive sweating, which significantly affect comfort and daily activities.

2. **Psychosocial Well-being** – Examines emotional and mental health aspects, including mood swings, anxiety, depression, irritability, and feelings of loss of control.

3. **Physical Symptoms** – Covers a wide range of bodily discomforts such as fatigue, sleep disturbances, body and joint pains, dizziness, headaches, and weight gain, which can interfere with routine activities.

4. **Sexual Function** – Assesses changes in sexual interest, vaginal dryness, and discomfort during intercourse, reflecting the hormonal shifts that occur during menopause.

The MENQOL consists of 29 questions, where respondents first indicate whether they have experienced a symptom in the past month and then rate its severity on a Likert-type scale.

Table 4.5.1 MENQOL SCORES

Sr. no.	Domain Score	n	Mean	SD
1	Vasomotor Domain Score	250	6.47	2.15
2	Physical Domain Score	250	4.71	1.76
3	Sexual Domain Score	250	5.27	2.47
4	Psychosocial Domain Score	250	4.49	2.55
5	Total Mean Score	250	5.23	1.85

Table 4.5.1 presents the mean scores of the four MENQOL domains—Vasomotor, Physical, Sexual, and Psychosocial—assessing the impact of menopausal symptoms on the quality of life among the participants. The total MENQOL mean score was 5.23 ± 1.85, indicating a moderate overall impact of menopause on quality of life.

Among the domains, the Vasomotor domain had the highest mean score (6.47 ± 2.15), suggesting that symptoms like hot flashes and night sweats were among the most frequently reported concerns. The Sexual domain score (5.27 ± 2.47) also indicates a considerable impact, reflecting challenges such as vaginal dryness and reduced libido.

The Physical domain had a mean score of 4.71 ± 1.76, highlighting the presence of symptoms like fatigue, joint pain, and sleep disturbances. The Psychosocial domain had the lowest mean score (4.49 ± 2.55), indicating the effect of menopause on mood, anxiety, and overall emotional well-being.

The results of the present study align with existing literature. An observational study conducted by Anandkumar and Kotnis (2020) in urban slums of Western Maharashtra reported a high prevalence of physical symptoms such as aching in muscles and joints (72.9), fatigue (65%), and sleep disturbances (54.3%), which are consistent with the findings of this study**.**

The observed impact on sexual and psychosocial domains further supports the evidence that menopause significantly affects overall well-being.

Table 4.5.2 Prevalence of Menopausal Symptoms Among Participants (n=250)

Sr. no.	Symptom	Count	Percentage (%)
Vasomotor domain			
1	Hot Flashes or Flashes	241	96.4
2	Night Sweats	239	95.6
3	Sweating	241	96.4
Psychosocial domain			
4	Dissatisfaction with Personal Life	134	53.6
5	Feeling Anxious or Nervous	148	59.2
6	Poor Memory	173	69.2
7	Accomplishing Less Than I Used To	165	66.0
8	Feeling Depressed Down or Blue	176	70.4
9	Being Impatient with Others	176	70.4
10	Feeling Wanting to Be Alone	138	55.2
Physical domain			

11	Flatulence (Wind) or Gas Pain	182	72.8
12	Aching in Muscles and Joints	231	92.4
13	Feeling Tired or Worn Out	200	80.0
14	Difficult Sleeping	145	58.0
15	Aches in Back of Neck or Head	237	94.8
16	Decrease in Physical Strength	217	86.8
17	Decrease in Stamina	202	80.8
18	Lack of Energy	213	85.2
19	Dry Skin	172	68.8
20	Weight Gain	216	86.4
21	Increased Facial Hair	133	53.2
22	Changes in Appearance, Texture, or Tone of Skin	140	56.0
23	Feeling Bloated	170	68.0
24	Low Backache	243	97.2
25	Frequent Urination	84	33.6
26	Involuntary Urination When Laughing or Coughing	72	28.8
Sexual domain			
27	Decreased Sexual Desire	213	85.2
28	Vaginal Dryness	218	87.2
29	Avoiding Intimacy	220	88.0

Table 4.5.2 reveals the prevalence of menopausal symptoms among participants. The most frequently reported symptoms were low backache (97.2%), hot flashes (96.4%),

sweating (96.4%), and aches in the back of the neck or head (94.8%). A high percentage of participants also experienced aching in muscles and joints (92.4%), avoiding intimacy (88.0%), and vaginal dryness (87.2%). Decreased stamina (80.8%), lack of energy (85.2%), and decreased physical strength (86.8%) were also commonly reported. Weight gain (86.4%) and decreased sexual desire (85.2%) were observed in a significant number of participants. Among psychological symptoms, feeling depressed, down, or blue (70.4%), being impatient with others (70.4%), and poor memory (69.2%) were frequently noted. Flatulence or gas pain (72.8%) was also a common concern. Frequent urination (33.6%) and involuntary urination when laughing or coughing (28.8%) were among the lesser-reported symptoms. Increased facial hair (53.2%) and dissatisfaction with personal life (53.6%) were present in about half of the participants. Overall, the data indicate that menopausal symptoms are widely prevalent among participants, affecting various aspects of their physical, emotional, and psychological well-being.

Figure 4.5.1 Prevalence of Menopausal Symptoms

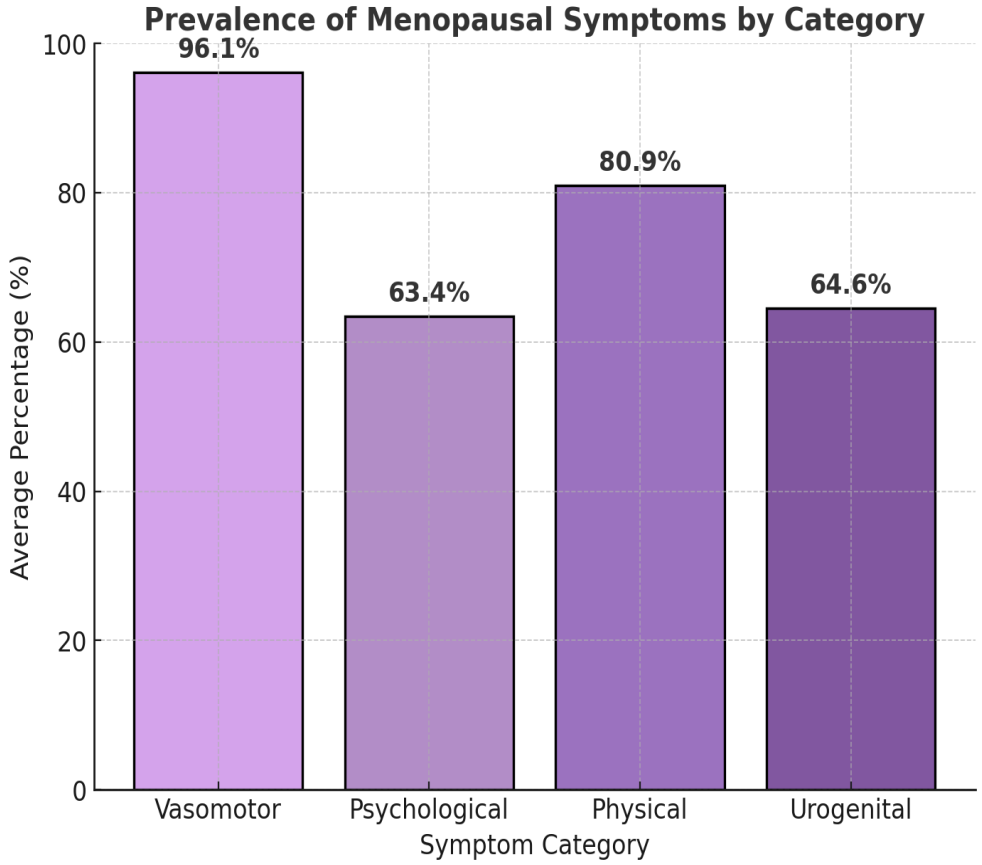


Table 4.5.3: MENQOL Domain Score Distribution by Severity Category (n %,)

Sr. no.	MENQOL Category	Vasomotor Domain	Physical Domain	Sexual Domain	Psychosocial Domain	Total Mean Score
1	No Effect	2 (0.8)	8 (3.2)	19 (7.6)	55 (22.0)	1 (0.4)
2	Mild	22 (8.8)	94 (37.6)	58 (23.2)	55 (22.0)	67 (26.8)
3	Moderate	84 (33.6)	99 (39.6)	81 (32.4)	73 (29.2)	103 (41.2)
4	Severe	142 (56.8)	49 (19.6)	92 (36.8)	67 (26.8)	79 (31.6)

Figures in the parenthesis denotes percentages

Table 4.5.3 illustrates the severity distribution of menopausal symptoms across different domains.

- **Vasomotor Domain**: A majority (56.8%) of women reported severe vasomotor symptoms like hot flashes and night sweats, while 33.6% experienced moderate symptoms. Only a small percentage (8.8%) had mild symptoms, and very few (0.8%) reported no effect.

- **Physical Domain:** Physical symptoms such as fatigue and joint pain were mostly moderate (39.6%) or mild (37.6%). Severe symptoms were reported by 19.6%, while 3.2% had no impact.

- **Sexual Domain**: Sexual issues, including reduced libido and vaginal dryness, were severe in 36.8% of participants and moderate in 32.4%. A smaller percentage (23.2%) had mild symptoms, while 7.6% reported no issues.

- **Psychosocial Domain:** Psychological symptoms like mood swings and anxiety were mostly moderate (29.2%) or severe (26.8%). Mild symptoms were seen in 22.0%, with an equal proportion (22.0%) reporting no impact.

- **Total Mean Score:** Overall, 41.2% of participants experienced moderate menopausal symptoms, while 31.6% had severe effects. Only 0.4% reported no impact.

Table 4.5.4 Differences in MENQOL Domain Scores Across BMI Categories

Sr. no.	Domain scores	χ^2	df	p	Remark
1	Total mean score	103.8	4	<.001	Significant
2	Sexual domain score	72.1	4	<.001	Significant
3	Physical domain score	101.1	4	<.001	Significant
4	Psychosocial domain score	32.1	4	<.001	Significant
5	Vasomotor domain score	86.1	4	<.001	Significant

The table 4.5.4 illustrates the significant differences in MENQOL domain scores across BMI categories, analysed using one-way ANOVA. The findings indicate that BMI plays a crucial role in determining the severity of menopausal symptoms, affecting all domains of menopausal quality of life. The results highlight that women with higher BMI tend to experience more pronounced physical symptoms, including fatigue, joint pain, and sleep disturbances, which may affect daily functioning. Similarly, vasomotor symptoms, such as hot flashes and night sweats, appear to be more intense in this group, potentially leading to increased discomfort.

Furthermore, BMI influences the psychosocial domain, with higher BMI categories showing a greater prevalence of mood disturbances, anxiety, and emotional distress. The sexual domain is also affected, as women with higher BMI report increased difficulties related to libido and overall sexual well-being.

Table 4.5.5 BMI as a Predictor of MENQOL Domain Scores (n=250)

Sr. no.	Outcome Variable	R	R^2	Intercept (Estimate)	Intercept (P)	BMI (Estimate)	BMI (P)

1	Vasomotor Domain Score	0.528	0.279	1.568	0.003	0.162	< .001
2	Physical Domain Score	0.486	0.236	0.996	0.023	0.122	< .001
3	Psychosocial Domain Score	0.248	0.061	1.760	0.012	0.090	< .001
4	Sexual Domain Score	0.434	0.188	0.637	0.311	0.153	< .001
5	Total Mean Score	0.501	0.251	1.219	0.007	0.132	< .001

the table 4.5.5 illustrates the significant impact of BMI on menopausal symptoms across all MENQOL domains. Higher BMI is associated with increased severity of vasomotor symptoms, including hot flashes and night sweats. Similarly, physical symptoms such as fatigue, joint pain, and sleep disturbances are more pronounced in individuals with higher BMI.

The table also highlights a significant relationship between BMI and psychosocial symptoms, including mood swings, anxiety, and irritability, though this association is less pronounced compared to other domains. Additionally, sexual health is affected, with higher BMI linked to increased difficulties such as reduced libido and vaginal discomfort.

Overall, the table emphasizes the role of BMI in influencing menopausal symptom burden, particularly in the vasomotor and physical domains.

These findings are consistent with previous research. For instance, a study by Kim et al. (2017) involving Korean women aged 44-56 years found that higher BMI was significantly associated with increased severity of menopausal symptoms, particularly vasomotor and physical symptoms. Specifically, obese perimenopausal women reported more pronounced physical symptoms such as fatigue, joint pain, and sleep disturbances, while obese postmenopausal women experienced heightened vasomotor symptoms, including hot flashes and night sweats.

Similarly, a study by Choi et al. (2020) reported that higher BMI was associated with increased climacteric symptoms among Korean menopausal women. These studies reinforce the observed associations between higher BMI and increased menopausal symptom severity across various domains.

Table 4.5.6 Association Between Socioeconomic Status and MENQOL Domain Scores

Sr. no.	MENQOL Domain	F-statistic	df1	df2	p-value	Remark
1	Vasomotor Score	0.646	4	19.0	0.636	Not significant
2	Psychosocial Score	2.532	4	19.3	0.074	Not significant
3	Physical Score	2.544	4	19.3	0.073	Not significant
4	Sexual Score	1.507	4	19.8	0.239	Not significant
5	Total Mean Score	2.168	4	19.3	0.111	Not significant

The table 4.5.6 illustrates the association between socioeconomic status (SES) and MENQOL domain scores. The results indicate that SES does not have a statistically significant impact on any of the MENQOL domains, including vasomotor, psychosocial, physical, and sexual symptoms, as well as the total mean score**.**

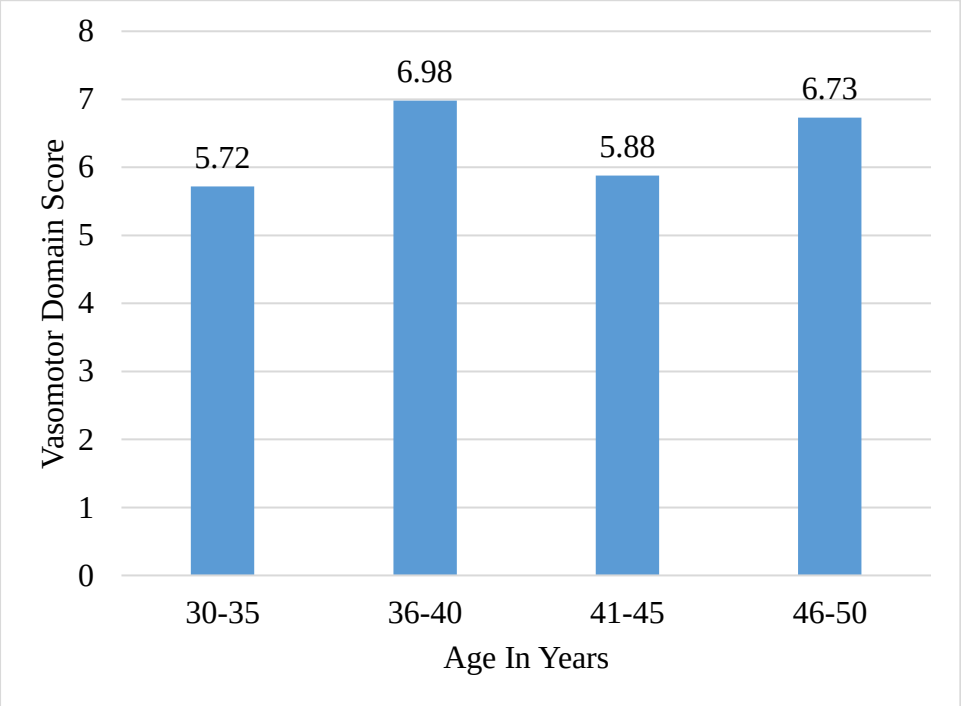
Table 4.5.7 Age Wise MENQOL Domain Scores of the Participants (n=250)

Sr. no.	Age Group	Vasomotor Score (Mean ± SD)	Psychosocial Score (Mean ± SD)	Sexual Score (Mean ± SD)	Physical Score (Mean ± SD)	Total Mean Score (Mean± SD)
1	30-35	5.72 ± 2.03	4.19 ± 2.63	4.88 ± 3.26	3.98 ± 1.96	4.69±1.90
2	36-40	6.98 ± 2.30	6.00 ± 2.28	5.95 ± 2.60	5.63 ± 1.90	6.13± 1.89

3	41-45	5.88 ± 1.77	3.54 ± 2.09	4.69±2.28	3.98 ± 1.13	4.52± 1.47
4	46-50	6.73 ± 2.21	4.48 ± 2.61	5.3± 2.32	4.88 ± 1.77	5.37± 1.86

The table 4.5.7 illustrates the association between age and MENQOL domain scores, providing insights into the variation in menopausal symptoms across different age groups. The findings indicate that vasomotor symptoms, in figure 4.5.2 including hot flashes and night sweats, are more pronounced in the 36-40 and 46-50 age groups, suggesting that these symptoms tend to peak during the transition to menopause. This aligns with previous research indicating that vasomotor disturbances are among the earliest and most persistent symptoms experienced during perimenopause.

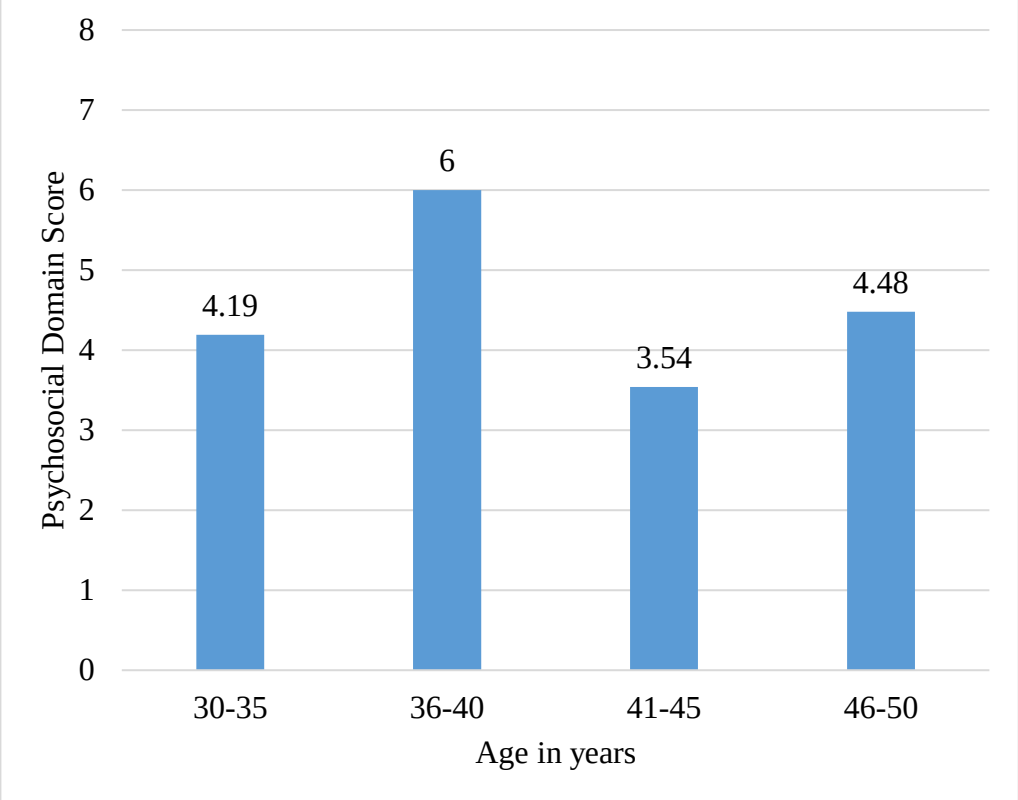
Figure 4.5.2 Vasomotor Domain Score Age Wise Distribution



Psychosocial symptoms, such as anxiety, mood changes, and irritability, exhibit the highest mean score in the 36-40 age group, followed by a decline in the 41-45 group. This suggests that psychological distress may be heightened in the early stages of menopausal transition, possibly due to hormonal fluctuations and increased life

stressors during midlife. The decline in symptom severity in later age groups may indicate adaptation to these changes over time.

Figure 4.5.3 Psychosocial Domain Score Age Wise Distribution



Sexual symptoms, including low libido, vaginal dryness, and discomfort, also vary across age groups, with relatively higher scores in the 36-40 and 46-50 groups. This suggests that menopause-related sexual health concerns are more prominent in midlife and persist with advancing age. The fluctuations in scores across different age groups highlight the complex interplay of hormonal, physiological, and psychosocial factors influencing sexual well-being during menopause.

Physical symptoms, including fatigue, joint pain, and sleep disturbances, are reported most frequently in the 36-40 and 46-50 age groups, whereas the 30-35 and 41-45 groups report relatively lower scores. This suggests that physical discomfort may progressively increase with age, particularly as the menopausal transition progresses. The rise in symptom burden among older participants aligns with research indicating that musculoskeletal pain, sleep disturbances, and fatigue become more prevalent as oestrogen levels decline.

Figure 4.5.4 Sexual Domain Score Age Wise Distribution

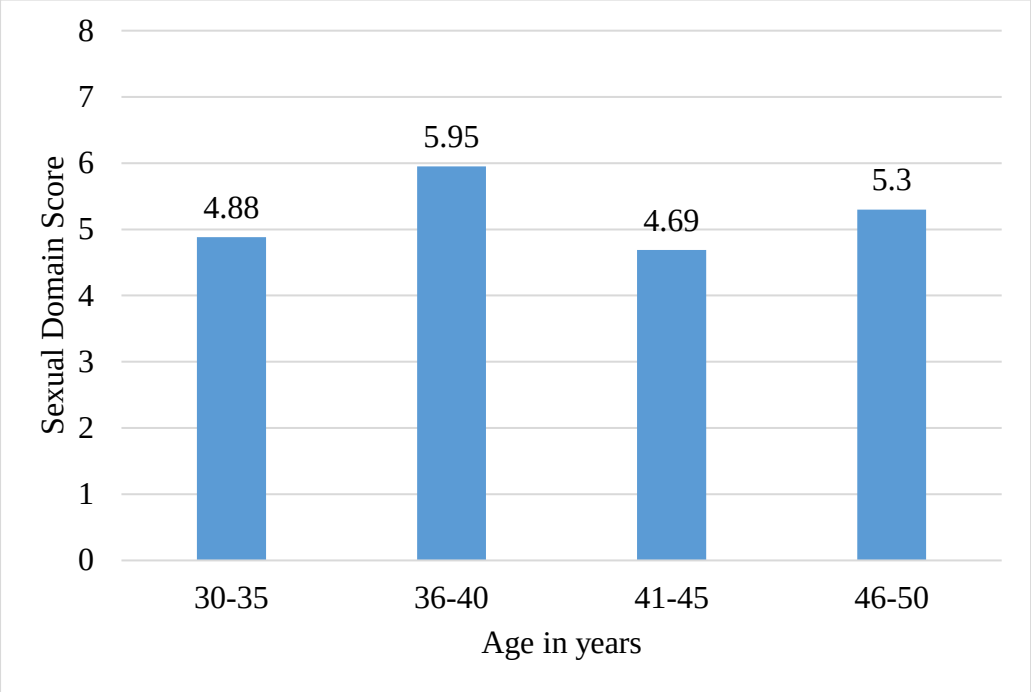
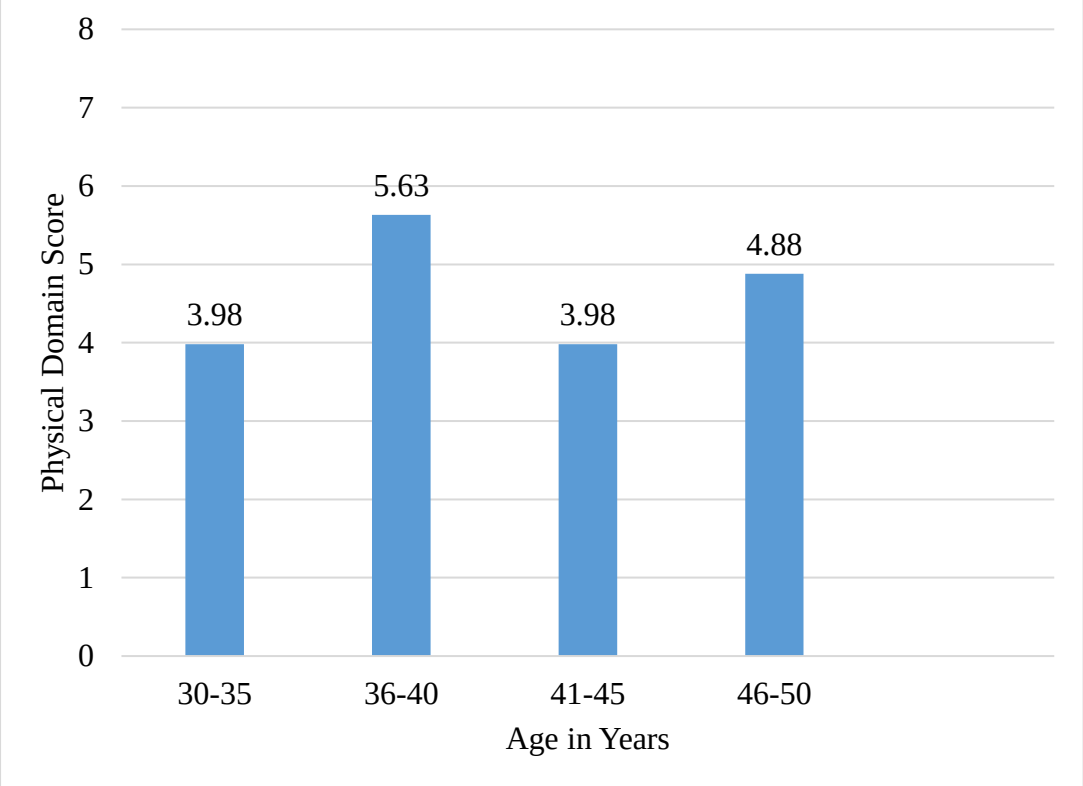


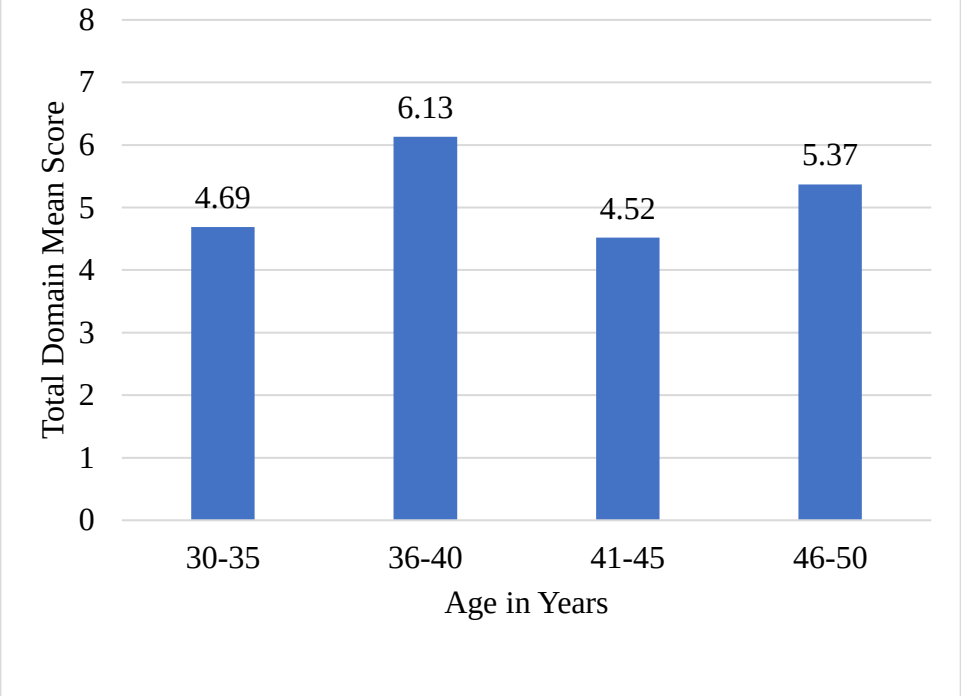
Figure 4.5.5 Physical Domain Score Age Wise Distribution



The total mean MENQOL score, representing the overall menopausal symptom burden, is highest in the 36-40 age group, followed by the 46-50 age group. This indicates that

perimenopausal symptoms are most severe during the early and late stages of transition, reflecting the fluctuating nature of hormonal changes during this period.

Figure 4.5.6 Total Mean Domain Score Age Wise Distribution



Highlights

Hot flashes (96.4%), joint pain (92.4%), and vaginal dryness (87.2%) were highly prevalent, with Vasomotor symptoms being the most severe (6.47 ± 2.15).

BMI Impact – Higher BMI worsened vasomotor, physical, psychosocial, and sexual symptoms, especially fatigue, joint pain, and mood issues.

Age Effect – Symptoms peaked in the 36-40 and 46-50 age groups, with vasomotor and physical issues being most pronounced.

Psychosocial Burden – Anxiety, depression, and mood swings were common, though psychosocial symptoms were less severe than physical and vasomotor issues.

No SES Influence – Socioeconomic status had no significant impact on

Section 6 Physical Activity Levels

The Global Physical Activity Questionnaire was developed by WHO for physical activity surveillance in countries. It collects information on physical activity participation in three domains. The domains are as follows:

- Activity at work
- Travel to and from places
- Recreational activities

Table 4.6.1 Physical Activity Levels of Participants (Based on GPAQ Classification) (n=250)

Sr. no.	Physical Activity Level	N	Percentage (%)
1	Low Activity (<600 MET-min/week)	237	94.8
2	Moderate Activity (600 - 2999 MET-min/week)	13	5.2
3	High Activity (≥3000 MET-min/week)	0	0

Table 4.6.1 presents the distribution of participants based on their physical activity levels, classified using the Global Physical Activity Questionnaire (GPAQ). The majority of participants (94.8, n=237) fall into the low activity category, indicating that they engage in less than 600 MET-minutes of physical activity per week. This suggests a predominantly sedentary lifestyle among the study population.

A small proportion (5.2%) of participants meet the criteria for moderate physical activity (600-2999 MET-minutes per week), signifying engagement in moderate-intensity activities. However, none of the participants reported high levels of physical activity (≥3000 MET-minutes per week), reflecting a lack of participation in vigorous-intensity activities

Table 4.6.2 Relation Between Physical Activity Levels of Participants (Based on GPAQ Classification) and MENQOL Domain Scores (n=250)

Sr. no.		**F**	**df1**	**df2**	**p**	**Remark**
1	VASOMOTOR DOMAIN SCORE	0.6777	1	13.2	0.425	**Not significant**
2	PSCHOSOCIAL DOMAIN SCORE	0.7162	1	13.1	0.413	**Not significant**
3	SEXUAL DOMAIN SCORE	0.3669	1	16.0	0.553	**Not significant**
4	PHYSICAL DOMAIN SCORE	1.2919	1	13.6	0.275	**Not significant**
5	TOTAL MEAN SCORE	0.0712	1	13.9	0.794	**Not significant**

Table 4.6.2 presents the relationship between the PAL across all MENQOL domains, there are no statistically significant differences in quality-of-life scores based on physical activity levels.

Table 4.6.3 Association Between Physical Activity Levels and BMI (N=250)

BMI Category	**Low Physical Activity**	**Moderate Physical Activity**	**Total**	**Chi-Square (χ^2)**	**df**	**p-value**	**Remark**
Normal weight	35	0	35	**5.00**	**4**	**0.287**	**Not significant**
Obese Class I	60	5	65				
Obese Class II	111	8	119				
Overweight	29	0	29				

Underweight	2	0	2				
Total	237	13	250				

Table 4.6.3 shows the association between physical activity levels and BMI among participants. The majority of respondents across all BMI categories reported low levels of physical activity, with only a small number (n=13) reporting moderate physical activity. While participants with normal weight, overweight, and underweight status had no individuals engaging in moderate physical activity, a few in the Obese Class I and II categories reported moderate activity levels. However, the chi-square test indicated that the association between BMI and physical activity was not statistically significant ($p = 0.287$).

Highlights

Low Physical Activity – The majority (94.8%) of participants had low activity levels, indicating a largely sedentary lifestyle.

Minimal Moderate Activity – Only 5.2% engaged in moderate-intensity physical activity, while none met high activity levels.

No Impact on MENQOL Scores – Physical activity levels did not significantly affect menopause-related quality of life across all domains (vasomotor, psychosocial, sexual, and physical).

Summary of Key Findings

The results of this study highlight several interrelated concerns affecting the health and well-being of perimenopausal women. A majority of participants exhibited poor nutritional status, closely linked to low socio-economic background and inadequate dietary practices. Physical activity levels were also low, with minimal engagement in structured exercise, contributing to increased BMI and more severe menopausal symptoms. A positive association was found between BMI and visceral fat, indicating that higher body weight is a key predictor of central obesity in this population. Irregular meal patterns were associated with increased frequency of junk food consumption, suggesting compensatory snacking behaviors. Interestingly, Waist-Hip Ratio did not show a significant correlation with visceral fat, emphasizing BMI as a more relevant indicator. Quality of life was moderately to severely affected, particularly in the physical and psychosocial domains, with poor nutrition and inactivity being major contributors. It was also observed that early onset of menopause was present among a considerable number of participants, with around 30–35 women reporting menopausal symptoms in the age group of 30–35 years. This finding indicates a rising concern of early menopause, which may be influenced by nutritional, lifestyle, and environmental factors.

CHAPTER 5

SUMMARY AND CONCLUSION

Marked by dynamic hormonal changes, perimenopause is a transformative period that can deeply affect a woman's health, dietary requirements, and overall sense of wellness Typically commencing several years before menopause, this phase involves a gradual decline in ovarian function, leading to irregular menstrual cycles and a spectrum of physiological and psychological changes. Common symptoms during this period include hot flashes, mood swings, fatigue, sleep disturbances, and metabolic alterations, which can significantly impact daily life. These changes are influenced by various factors, including genetics, lifestyle, and socio-economic conditions. Perimenopause is also associated with an increased risk of developing conditions such as osteoporosis, cardiovascular diseases, and obesity due to hormonal imbalances and metabolic shifts. Understanding the nutritional and lifestyle factors affecting women during this stage is crucial.

An analysis of the National Family Health Survey (NFHS) data from 1992-93 to 2005-06 revealed that the prevalence of menopause among Indian women remained relatively consistent over this period. The study found that factors such as engaging in farming, lack of education, belonging to scheduled castes or tribes, being underweight, having higher parity, and experiencing motherhood before the age of 16 were associated with a higher prevalence and earlier onset of menopause. These socio-economic determinants play a significant role in the menopausal experience of Indian women.

More recent data from the NFHS 2019-21 indicates that the prevalence of premature menopause (before age 40) is 2.2%, and early menopause (between ages 40-44) is 16.2%. Factors such as lower educational levels, poor economic conditions, smoking, fried food consumption, and early age at menarche are significantly associated with these conditions.

Henes the current study was planned to comprehensively assessed the nutritional status, physical activity levels, dietary habits, and quality of life of perimenopausal women residing in urban Vadodara. The findings provide a detailed understanding of the socio-demographic profile, body composition, dietary patterns, and menopausal symptoms experienced by the participants. The study was based on the following objectives:

Broad objective:

- To Assess the Nutritional Status, Physical Activity Pattern, Dietary Habits and Quality of life of the Perimenopausal Women residing in Urban Vadodara.

Specific objective:

➢ To assess the relationship between socio-economic status and dietary intake among peri menopausal women.

➢ To assess the dietary habits of perimenopausal women and identify common nutritional deficiencies

➢ To assess the current nutritional status and its effect on health outcomes and perimenopausal symptoms, such as hot flashes and mood swings.

➢ To assess the frequency of consumption of key food groups and nutrients using food frequency questionnaires.

Methodology

This study was conducted to explore the nutritional status, lifestyle, and quality of life of perimenopausal women in urban Vadodara.

Study Design & Sampling

- Design: Cross-sectional study
- Sample Size: 250 participants
- Sampling Technique: Snowball sampling
- Study Area: Four zones of Vadodara (North, East, West, South)

Inclusion & Exclusion Criteria

- Inclusion: Women aged 30-50 years who consented to participate
- Exclusion: Women with PCOS, PCOD, thyroid disorders, those undergoing HRT, chemotherapy, hysterectomy, or lactation

Data Collection Tools & Parameters

1. Socio-Demographic Data: Information on age, education, occupation, marital status, family type, and income was collected using the Kuppuswami Scale (2024).
2. Anthropometry & Body Composition: Height, weight, BMI (Asia-Pacific WHO classification), waist/hip ratio, body fat, visceral fat, and skeletal muscle mass were assessed using standard methods and the Karada Scan.
3. **Dietary Assessment**:
    - Food Frequency Questionnaire (FFQ) was used to analyze dietary patterns.
    - 24-Hour Recall (3 Days) recorded detailed nutrient intake.
    - Meal patterns, junk food consumption, and supplement intake were also documented.
4. **Quality of Life:** The MENQOL questionnaire was used to assess vasomotor, psychosocial, physical, and sexual symptoms.
5. **Physical Activity:** The WHO Global Physical Activity Questionnaire (GPAQ) evaluated work, travel, and leisure activities, along with sedentary behavior.

The Salient Observations of The Study as Follows:

Background Information

- The study encompassed 250 perimenopausal women residing in urban Vadodara, Gujarat.
- A predominant segment (61%) belonged to the upper middle-income group, while 32% were categorized within the lower middle-income bracket, indicating an overall financially stable population; additionally, the sample was largely religiously homogenous, with 95% identifying as Hindu, while Muslims (4%) and Christians (0.8%) comprised minor proportions.
- The age distribution revealed that 48% of participants were in the 46-50 years age group, signifying a majority in the advanced stage of perimenopause, while 26% were aged 41-45 years, followed by 18% in the 36-40 years range, and 8% between 30-35 years.

- The educational profile showed a relatively high literacy level, with 40% holding undergraduate degrees, 29% completing secondary education, 15.6% having primary-level schooling, and 14.8% attaining postgraduate qualifications.
- Marital status data revealed that a substantial majority (90%) were married, while the remaining 10% were divorced, with no respondent's identifying as single.
- The majority (79%) were engaged as homemakers, reflecting a prevalence of domestic roles among participants, whereas 11.6% were in formal employment and 9.2% were self-employed, indicating limited participation in the formal workforce.
- Nuclear family structures (64%) were more commonly observed compared to joint family setups (36%), reflecting a shift toward modern urban household patterns; concurrently, 53% of respondents reported having two children, while others reported either single-child families or larger family sizes, illustrating typical urban reproductive trends.

Anthropometric Profile:

- The anthropometric analysis revealed that 71.2 kg was the average weight, accompanied by a mean BMI of 30.35 kg/m², categorizing the majority of participants within the obese range and highlighting a significant burden of excess body mass.
- A marked association between age progression and obesity was observed, with women aged 46-50 years disproportionately represented in the higher obesity grades, illustrating a clear pattern of age-related adiposity.
- Central obesity was conspicuous, with a mean waist circumference of 88.45 cm and a waist-hip ratio of 0.86, signifying an elevated predisposition to abdominal fat accumulation and associated metabolic disturbances**.**
- Alarmingly, 73.6% of the women were categorized as obese (spanning Grades 1 to 3), while only 14% maintained a normal BMI, underscoring a critical public health concern in this demographic.
- Body composition metrics underscored excessive total fat percentage (38.03%) and heightened visceral fat (13.47%), both of which are well-established

precursors to insulin resistance, hypertension, and other non-communicable diseases.

- The data also revealed suboptimal skeletal muscle mass, particularly concentrated in the trunk region (mean 20.59%), indicative of muscle depletion amidst rising fat mass—a trend often referred to as sarcopenic obesity.
- Notably, the average body age of 54.85 years surpassed the participants' biological age range, reflecting an underlying decline in metabolic vitality and suggesting premature biological aging.
- Overall, the anthropometric findings paint a concerning picture of adiposity-driven health risks among perimenopausal women, necessitating early lifestyle interventions to address weight management, muscle preservation, and cardiometabolic health optimization.

Food Patterns

- The dietary assessment revealed a predominant adherence to vegetarian diets, with 84% of participants identifying as vegetarians, and a minority consuming eggs (11.2%) or non-vegetarian foods (4.8%).
- Junk food consumption was highly prevalent, with 78% of participants consuming it at least once or multiple times per week; notably, 44% reported weekly intake, while 34% indulged 2-3 times per week.
- Fast food items such as pizza and burgers emerged as the most frequently consumed junk food category, followed by fried snacks (615 responses) and sweets or desserts (498 responses), reflecting a pronounced inclination toward energy-dense, nutrient-poor foods.
- The consumption pattern appeared heavily influenced by social contexts, as social gatherings were the leading reason for junk food intake (226 mentions), followed by habitual consumption (180 mentions) and convenience (167 mentions), suggesting a combination of behavioural and environmental drivers behind unhealthy eating habits.
- Additionally, evening hours were identified as the most common time for junk food intake, reported by 92.8% of participants, indicative of evening snacking behaviours possibly linked to irregular meal patterns and cravings.

- The findings also revealed that irregular meal timing, particularly skipping lunch and evening meals, was associated with a higher frequency of junk food intake, suggesting that disrupted eating patterns contribute to suboptimal food choices.
- These findings point to a growing dependency on quick, low-nutrient options, reinforcing the importance of targeted nutritional guidance and lifestyle modifications aimed at reducing unhealthy snacking habits and promoting balanced eating patterns, especially among perimenopausal women vulnerable to diet-related health risks.

Dietary habits

- The dietary assessment, as captured through the Food Frequency Questionnaire (FFQ), revealed a limited dietary diversity, with participants displaying a pronounced reliance on staple cereals, predominantly whole wheat flour (93.2% daily consumption) and raw milled rice (78%). This points to a cereal-centric dietary model.
- Millet consumption, including nutrient-dense varieties such as jowar, bajra, and maize, was notably infrequent, with over half of the participants reporting occasional or absent intake, thereby contributing to the erosion of traditional dietary patterns and a narrowing of micronutrient profiles
- The intake of pulses and legumes, while relatively adequate in the case of green gram dal (73.2% reporting regular consumption), revealed significant gaps in the inclusion of other protein-rich legumes such as soybeans, rajma, and horse gram, with more than 50% of women rarely or never consuming these foods. This dietary pattern offers a plausible explanation for the marginal protein inadequacy observed in the nutrient intake analysis.
- The incorporation of green leafy vegetables demonstrated uneven distribution. While culinary herbs such as coriander (48% daily users) and curry leaves (38%) were frequently utilized, nutritionally superior options such as drumstick leaves and bathua were rarely consumed, restricting the intake of key micronutrients such as iron, calcium, and folate.
- Other vegetables and root crops, such as bottle gourd and potato, featured regularly, but consumption of cruciferous vegetables (e.g., cabbage,

cauliflower) and fibre-rich tubers (e.g., yam, sweet potato) remained limited, pointing to low phytonutrient diversity.

- The consumption of dairy products, including curd (75% reporting weekly or more frequent intake) and various types of milk, appeared relatively adequate. However, the infrequent consumption of paneer and other animal-based proteins contributed to a dietary profile deficient in high-biological-value proteins, as reflected in the 24-hour dietary recall data, where mean protein intake (41.2 g/day) accounted for only 89.6% of the RDA.
- Conversely, an over-reliance on refined cereals and processed grain-based foods translated into a carbohydrate intake of 241.8 g/day, exceeding 185% of the RDA, as well as a disproportionate allocation of calories to carbohydrates (approximately 60%), predisposing this population to glycaemic imbalances and adiposity.
- Elevated fat intake (53.7 g/day) was congruent with frequent junk food consumption patterns identified in the FFQ, further compounding the energy-dense yet nutrient-poor nature of the overall dietary composition.
- Collectively, the data depict a dietary landscape characterized by grain dominance, limited pulse variety, underutilization of traditional greens, and elevated consumption of refined foods, resulting in both macronutrient imbalance and micronutrient insufficiencies.

MENQOL (Menopause-Specific Quality of Life)

- The MENQOL assessment indicated a notable decline in quality of life across all four domains: vasomotor, physical, sexual, and psychosocial, with the vasomotor domain being the most affected (mean score: 6.47). A high prevalence of symptoms such as hot flashes (96.4%), night sweats (95.6%), and excessive sweating (96.4%) was observed, contributing to considerable discomfort and interference with daily life.
- Within the physical domain (mean score 4.71), symptoms including low backache (97.2%), joint and muscle pain (92.4%), and persistent fatigue (80%) were frequently reported, suggesting a significant impact on participants' functional capacity and physical well-being.

- The sexual domain (mean score 5.27) highlighted disturbances in sexual health, with issues such as vaginal dryness (87.2%), diminished sexual desire (85.2%), and avoidance of intimacy (88%) being widely experienced.
- In the psychosocial domain (mean score 4.49), emotional and cognitive challenges were prevalent, including depression (70.4%), irritability (70.4%), and memory lapses (69.2%), indicating that psychological well-being was notably affected.
- When symptoms were analysed by age group, it was observed that women aged 36-40 years experienced moderate symptom severity, followed by a slight reduction in severity in the 41-45-year group, which may suggest a temporary adjustment or coping response. However, symptoms escalated significantly in the 46-50-year group, where the highest mean scores were noted across all domains, especially in the vasomotor and physical domains, aligning with the expected physiological changes during late perimenopause.
- Additionally, an association between BMI and symptom severity was evident. Women classified as Obese Grade III presented with the highest mean scores, notably in the vasomotor domain (mean: 7.24) and physical domain (mean: 5.66), suggesting that excess body weight may intensify menopausal symptoms.
- It was also observed that women with central obesity (waist-hip ratio ≥ 0.85) reported higher psychosocial and sexual domain scores, which may indicate that abdominal adiposity is linked to a heightened emotional burden and disruptions in sexual health.
- The findings suggest that advancing age and obesity contribute to the worsening of menopausal symptoms, affecting multiple aspects of health and well-being. This underscores the need for comprehensive and individualized interventions, including lifestyle changes, psychological support, and targeted management of menopausal symptoms to enhance the quality of life for women in this transitional period.

Physical activity levels

- An evaluation of physical activity patterns using the Global Physical Activity Questionnaire (GPAQ) revealed that a predominant share of participants

(94.8%) engaged in low levels of physical activity, with only a small proportion (5.2%) falling into the moderate activity category. Notably, there were no participants classified under high activity, reflecting a lack of vigorous exercise or structured physical activity routines among the study population.

- A low level of physical activity can contribute to various health risks, including weight gain, metabolic disorders, and reduced quality of life, especially during perimenopause.
- The comparison of menopause-related quality of life among different physical activity levels showed no noticeable differences across vasomotor symptoms, psychosocial well-being, physical health, sexual function, and overall quality of life.

Major Conclusions

- The study provided valuable insights into the health and lifestyle patterns of perimenopausal women in urban Vadodara, highlighting key areas of concern. The findings revealed a high prevalence of obesity, particularly central obesity, which was strongly associated with age progression and metabolic health risks. Dietary habits indicated excessive reliance on refined carbohydrates and junk food, contributing to nutritional imbalances, while protein and micronutrient intake remained suboptimal due to limited dietary diversity.
- The assessment of menopause-related quality of life (MENQOL) demonstrated a significant burden of vasomotor, physical, sexual, and psychosocial symptoms, with hot flashes, joint pain, fatigue, and emotional distress being particularly common. Obesity and higher BMI categories were linked to more severe menopausal symptoms, further reinforcing the impact of excess weight on overall well-being.
- Physical activity levels were alarmingly low, with no participants engaging in high-intensity exercise, potentially exacerbating health risks. However, differences in physical activity levels did not show a significant impact on menopause-related quality of life, suggesting that multiple factors, including hormonal changes, stress, and lifestyle habits, may have contributed to symptom severity.

Key Dietary Recommendations

- Maintain a Well-Balanced and Nutrient-Rich Diet: A diverse and wholesome diet comprising unprocessed foods ensures the optimal intake of essential macronutrients—carbohydrates, proteins, and fats—along with vital micronutrients required to meet the increased nutritional needs of perimenopause.

- Strengthen Bone Health with Calcium and Vitamin D: To reduce the risk of osteoporosis, incorporate calcium-rich foods such as milk, curd, ragi, and sesame seeds, while ensuring adequate vitamin D intake through fortified dairy, mushrooms, egg yolks, and sufficient sunlight exposure.

- Prevent and Manage Iron Deficiency: Combat anemia by consuming iron-dense foods like spinach, beetroot, lentils, and jaggery, while pairing them with vitamin C sources such as citrus fruits, guava, and bell peppers to enhance absorption.

- Optimize Protein Intake for Muscle and Hormonal Stability: Support muscle mass and hormonal function by including high-quality protein sources such as eggs, fish, soybeans, paneer, lentils, and lean poultry.

- Choose Complex Carbohydrates for Sustained Energy: Prioritize whole grains such as bajra, brown rice, and whole wheat over refined carbohydrates to maintain stable blood sugar levels, support metabolic health, and sustain energy throughout the day.

- Incorporate Healthy Fats for Cognitive and Cardiovascular Support: Utilize unsaturated fats from sources like groundnut or mustard oil while including omega-3-rich foods such as flaxseeds, walnuts, and fatty fish to reduce inflammation and improve heart health.

- Harness the Benefits of Phytoestrogens: Alleviate menopausal symptoms such as hot flashes and hormonal imbalances by incorporating soy products, sesame seeds, flaxseeds, and chickpeas, which provide plant-based estrogen-like compounds.

- Stay Hydrated for Overall Metabolic and Skin Health: Ensure adequate hydration by consuming at least 8–10 glasses of water daily, and include herbal teas like tulsi and chamomile to aid relaxation and stress reduction.
- Minimize Processed Foods and Excess Sugar Intake: Reduce the consumption of high-sodium snacks, refined sugars, and caffeinated beverages to prevent bloating, mood swings, and metabolic imbalances. Instead, opt for fresh fruits, roasted makhanas, and homemade nutritious snacks.
- Improve Quality of Life Through Personalized Nutrition: Tailor dietary interventions to individual health conditions, physical activity levels, and socio-economic factors to ensure long-term adherence, promoting overall well-being and sustained improvements in quality of life.
- Engage in Regular Exercise: Aim for at least 150 minutes of moderate activity per week (walking, cycling, swimming) to maintain overall health.
- Incorporate Strength and Flexibility Training: Include resistance exercises (twice a week) and stretching/yoga to support muscle mass, bone density, and mobility.
- Manage Stress and Sleep Well: Practice meditation, yoga, and deep breathing for stress relief and aim for 7–9 hours of sleep per night.
- Limit Alcohol and Caffeine Intake: Reduce consumption to prevent sleep disturbances, anxiety, and hormonal imbalances.

Limitations

A key limitation was the difficulty in obtaining accurate data for specific MENQOL domains, particularly sexual and psychosocial aspects, due to cultural sensitivities, participant shyness, and societal beliefs. This may have led to underreporting or incomplete responses in these areas.

Future Recommendations

- **Promote awareness and education** on healthy dietary habits, physical activity, and lifestyle modifications to help perimenopausal women manage symptoms and improve overall well-being.
- **Develop community-based nutritional and healthcare interventions** that provide personalized dietary guidance and physical activity programs to reduce obesity-related health risks.

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Annexure I

CONSENT FORM

Study Title: EXPLORING NUTRITIONAL STATUS, LIFESTYLE AND QUALITY OF LIFE PATTERNS IN PERIMENOPAUSAL WOMEN OF URBAN VADODARA

Researcher:
Poonam Pohani, Sr. MSc Dietetics Student, Faculty of Family and Community Sciences, The Maharaja Sayajirao University of Baroda
Guide: **Dr. Komal Chauhan**, Faculty of Family and Community Sciences, The Maharaja Sayajirao University of Baroda

Introduction:

I, **Poonam Pohani**, a Sr. MSc Dietetics student at The Maharaja Sayajirao University of Baroda, am conducting a research study titled **"EXPLORING NUTRITIONAL STATUS, LIFESTYLE, AND QUALITY OF LIFE PATTERNS IN PERIMENOPAUSAL WOMEN OF URBAN VADODARA"** under the guidance of **Prof. (Dr) Komal Chauhan**. The purpose of this study is to understand the nutritional, physical activity, and quality of life patterns in perimenopausal women and to assess how these factors impact health outcomes during this transition phase.

Purpose of the Study:

This study aims to assess the nutritional status, physical activity, dietary habits, and quality of life of perimenopausal women aged 30-50 years residing in Urban Vadodara. The study will explore relationships between socio-economic status and dietary intake, as well as investigate the impact of nutrition on common perimenopausal symptoms, such as hot flashes, mood swings, and bone health.

Participation Procedures:

If you agree to participate in this study:

- You will be asked to provide personal details such as age, dietary habits, lifestyle behaviors, and health history.
- You will undergo assessments including anthropometric measurements (height, weight, BMI), dietary recall, and physical activity patterns.
- Information related to your nutritional status and quality of life will be collected through questionnaires.

Confidentiality:

Your privacy is of utmost importance. Your personal information will be kept confidential, and a participant code will be assigned to maintain anonymity. The collected data will be used for research purposes only, and your name or identity will not be disclosed in any publications or presentations.

Risks and Benefits:

There are no anticipated risks associated with participation in this study. The study does not involve any invasive procedures.
Benefits: You will receive valuable insights into your nutritional and health status, and the findings may contribute to better health management for perimenopausal women.

Voluntary Participation:

Participation in this study is completely voluntary. You are free to withdraw from the study at any time without any consequences. Refusal to participate or withdrawal will not affect your relationship with The Maharaja Sayajirao University of Baroda.

Contact Information:

For any questions or concerns regarding the study, you can contact:
Poonam Pohani
Phone: [63774 86442]
Email: [pohanipoonam1999@gmail.com]

Dr. Komal Chauhan
Phone: [9898790340]
Email: [komal.chauhan-fn@msubaroda.ac.in]

Consent Statement:

By signing this consent form, I confirm that I have read and understood the information provided about the study. I voluntarily agree to participate in the study and provide the required information for research purposes. I understand that I may withdraw from the study at any time.

Participant's Name: _____
Signature: _____
Date: _____

Researcher’s Signature: _____
Date: _____

અભ્યાસ શીર્ષક:
શહેરી વડોદરાની પરિરસવિતિ સ્ત્રીઓમાં પોષણની સ્થિતિ, જીવનશૈલી અને જીવનની ગુણવત્તાના નમૂનાઓનું અન્વેષણ

શોધકર્તા:
પૂનમ પોહાણી, સિનિયર MSc ડાયટેટિક્સ વિદ્યાર્થી, ફેકલ્ટી ઓફ ફેમિલી એન્ડ કોમ્યુનિટી સાયન્સિસ, મહારાજા સયાજીરાવ યુનિવર્સિટી ઓફ વડોદરા
માર્ગદર્શક: ડૉ. કોમલ ચૌહાણ, ફેકલ્ટી ઓફ ફેમિલી એન્ડ કોમ્યુનિટી સાયન્સિસ, મહારાજા સયાજીરાવ યુનિવર્સિટી ઓફ વડોદરા

પરિચય:
હું, પૂનમ પોહાણી, મહારાજા સયાજીરાવ યુનિવર્સિટી ઓફ વડોદરાની સિનિયર MSc ડાયટેટિક્સની વિદ્યાર્થીની, *"શહેરી વડોદરાની પરિરસવિતિ સ્ત્રીઓમાં પોષણની સ્થિતિ, જીવનશૈલી અને જીવનની ગુણવત્તાના નમૂનાઓનું અન્વેષણ"* શીર્ષક હેઠળ સંશોધન કરી રહી છું. આ અભ્યાસ ડૉ. કોમલ ચૌહાણના માર્ગદર્શન હેઠળ કરવામાં આવી રહ્યો છે. આ અભ્યાસનો હેતુ પરિરસવિતિ (Perimenopausal) સ્ત્રીઓમાં પોષણની સ્થિતિ, શારીરિક પ્રવૃત્તિ અને જીવનની ગુણવત્તા નમૂનાઓને સમજવાનો છે અને આ પરિબળો સ્વાસ્થ્ય પર કેવી અસર કરે છે તેનું મૂલ્યાંકન કરવાનું છે.

અભ્યાસનો હેતુ:
આ અભ્યાસ 30-50 વર્ષની ઉંમરના શહેરી વડોદરામાં વસતી પરિરસવિતિ સ્ત્રીઓની પોષણની સ્થિતિ, શારીરિક પ્રવૃત્તિ, આહારની આદતો અને જીવનની ગુણવત્તાનું મૂલ્યાંકન કરવાનો હેતુ ધરાવે છે. આ અભ્યાસ આહાર અને પરિરસવિતિ સાથે સંબંધિત સામાન્ય લક્ષણો જેમ કે હોટ ફ્લેશ, મૂડ સ્વિંગ્સ, અને હાડકાંના આરોગ્ય પર પોષણની અસરને જાણવા માટે છે.

ભાગીદારી પ્રક્રિયા:
જો તમે આ અભ્યાસમાં ભાગ લેવા માટે સંમત થાઓ છો:

- તમને તમારી વય, આહાર આદતો, જીવનશૈલી વ્યવહાર અને આરોગ્ય ઇતિહાસ જેવી વ્યક્તિગત વિગતો આપવા માટે કહેવામાં આવશે.

- તમારા ઉંચાઈ, વજન, બીએમઆઈ જેવા માપન, આહારના રીકૉલ અને શારીરિક પ્રવૃત્તિના નમૂનાઓના મૂલ્યાંકન માટે કહેવામાં આવશે.
- તમારું પોષણસ્તર અને જીવનની ગુણવત્તા સંબંધિત માહિતી પ્રશ્નાવલીઓ દ્વારા એકત્રિત કરવામાં આવશે.

ગોપનીયતા:
તમારી ખાનગી માહિતી બહુ મહત્વપૂર્ણ છે. તમારો વ્યક્તિગત માહિતી ગોપનીય રાખવામાં આવશે અને એક ભાગીદાર કોડ આલોકિત કરવામાં આવશે જેથી તમારું નામ અથવા ઓળખ પ્રકાશિત ન થાય. સંશોધનના હેતુઓ માટે એકત્રિત માહિતીનો ઉપયોગ કરવામાં આવશે અને તમારું નામ અથવા ઓળખ કોઈ પ્રકાશનો અથવા પ્રસ્તુતિઓમાં શેર કરવામાં નહીં આવે.

જોખમો અને ફાયદા:
આ અભ્યાસમાં ભાગ લેતી વખતે કોઈ જોખમની અપેક્ષા નથી. અભ્યાસમાં કોઈ આકસ્મિક અથવા આઘાતજનક પ્રક્રિયા શામેલ નથી.
ફાયદા: તમે તમારા પોષણ અને સ્વાસ્થ્ય સ્થિતિ વિશે મહત્વપૂર્ણ માહિતી મેળવી શકશો, અને આ અભ્યાસ પરિરસવિતિ સ્ત્રીઓના આરોગ્યના સારસંભાળ માટે યોગદાન આપી શકે છે.

સ્વૈચ્છિક ભાગીદારી:
આ અભ્યાસમાં ભાગીદારી સંપૂર્ણપણે સ્વૈચ્છિક છે. તમે જ્યારે ઇચ્છો ત્યારે અભ્યાસમાંથી પાછા ફરી શકો છો અને આ માટે કોઈ નકારાત્મક પરિણામો ન આવશે. અભ્યાસમાં ભાગ લેવું કે તેમાંથી પાછું ફરવું, તે તમારો મહારાજા સયાજીરાવ યુનિવર્સિટી ઓફ વડોદરાની સાથેના સંબંધ પર કોઈ અસર નહીં કરે.

સંપર્ક માહિતી:
જો તમને અભ્યાસ સંબંધિત કોઈ પ્રશ્નો કે ચિંતાઓ હોય, તો કૃપા કરીને સંપર્ક કરો:
પૂનમ પોહાણી
ફોન: [63774 86442]
ઈમેલ: [pohanipoonam1999@gmail.com]

ડૉ. કોમલ ચૌહાણ
ફોન: [9898790340]
ઈમેલ: [komal.chauhan-fn@msubaroda.ac.in]

સહમતિની જાહેરાત:

હું આ સહમતિ પત્રક પર સહી કરીને પુષ્ટિ કરું છું કે મેં અભ્યાસ વિશે આપેલી માહિતી વાંચી અને સમજી છે. હું સ્વૈચ્છિક રીતે અભ્યાસમાં ભાગ લેવાનું સ્વીકારું છું અને સંશોધન હેતુઓ માટે જરૂરી માહિતી આપવા માટે સંમત છું. હું આને સમજું છું કે હું જ્યારે ઇચ્છું ત્યારે અભ્યાસમાંથી પરત ફરી શકું છું.

ભાગીદારનું નામ: _____

સહી: _____

તારીખ: _____

શોધકર્તાની સહી: _____

તારીખ: _____

Annexure II

TITLE: EXPLORING NUTRITIONAL STATUS, LIFE STYLE AND QUALITY OF LIFE PATTERNS IN PERIMENOPAUSAL WOMEN OF URBAN VADODARA"

QUESTIONNAIRE

Section1: Socio Demographic Information

1.Name:

2.Age

- 30-40
- 41-50

3. Education level

- No formal education
- Primary school
- Secondary school
- Graduation
- Post graduation

4. Occupation

- Homemaker
- Self employed
- Employed

5. Religion

- Hindu
- Muslim
- Sikh
- Jain
- Chirstian
- Other

6. Marital status

- Single
- Married
- Divorced
- Widowed

7. Number of children

- None
- One
- Two
- More than two

8. Type of family

- Nuclear
- Joint
- Extended

9. Number of family members

10. Education of the head

- Profession or honours
- Graduate
- Intermediate or diploma
- High school certificate
- Middle school certificate
- Primary school certificate
- Illiterate

11. Occupation of the head Score

- Legislators, senior officials and managers
- Professionals
- Technicians and associate professionals
- Clerks
- Skilled workers and shop and market sales workers
- Skilled agricultural and fishery workers
- Craft and related trade workers
- Plant and machine operators and assemblers
- Elementary occupation
- Unemployed

12. monthly family income in rupees

- 2,13,814 and above
- 1,06,850-2,13,813
- 80,110-1,06,849
- 53,361-80,109
- 31,978-53,360
- 10,703-31,977

- <10,702

Section 2: Anthropometric assessment

13. Weight

14. Height

15. BMI

16.Waist circumference

17. Hip circumference

18. Waist/Hip ratio

Section 3: Food Pattern

19. Are you a

- Vegetarian
- Non-vegetarian
- Eggetarian

20. General meal pattern

Meal pattern	Regular	Irregular
Bed tea		
Break fast		
Mid-morning		
Lunch		
Evening snacks		
Dinner		
Bed time		

21. How often do you consume junk food (e.g., fried snacks, fast food, sugary snacks)?

- Daily
- 2-3 times a week
- Once a week
- Less than once a week
- Never

22.What type of junk food do you consume most often? (Select all that apply)

- Chips, fries, or other fried snacks
- Sweets or desserts (cakes, pastries, chocolates)
- Fast food (pizza, burgers, etc.)
- Sugary drinks (soda, packaged fruit juices)
- Packaged snacks (instant noodles, biscuits, etc.)

23.Why do you consume junk food? (Select all that apply)

- Cravings
- Convenience
- Stress relief
- Habit
- Social gatherings
- Other (Specify): _____

24.Do you feel that your junk food consumption has increased during perimenopause?

- Yes
- No
- Not sure

25.At what time of day do you usually consume junk food?

- Morning
- Afternoon
- Evening
- Late night
- Anytime throughout the day

26. Do you take any nutritional supplements

- Yes (please specify)
- No

Name of the supplement	Dosage	Frequency

Section4: dietary habits (food frequency questionnaire)

Food item	Daily	4-5 times a week	2-3 times a week	Once a week	Once a month	Occasionally	Never
Cereals and millets							

Rice (puffed)							
Rice (flakes)							
Rice (parboiled)							
Rice (raw milled)							
Wheat flour (whole)							
Wheat flour(refined)							
White bread							
Brown bread							
Semolina							
Jowar							
Maize							
Bajra							
Others (specify)							
Pulses and legumes							
Bengal gram (dal)							
Bengal gram(whole)							
Black gram(dal)							
Black gram(whole)							
Cowpea							
Green gram (dal)							
Peas dry							
Horse gram							
Lentil dal							
Red gram (whole)							
Rajmah							
Soyabeen							
Others(specify)							
Leafy vegetables							
Amaranth							
Cabbage							
Colocasia							
Fenugreek leaves							
Mustard leaves							
Spinach							
Mint							
Others(specify)							
Other vegetables							
Bitter gourd							
Cauliflower							
Brinjal							
Ladies finger							

Capsicum							
Bottle gourd							
Kankoda							
Kovai							
Peas green							
Cucumber							
Drumstick							
French beans							
Others							
Roots and tubers							
Potato							
Carrot							
Onion							
Radish							
Beet root							
Yam							
Sweet potato							
Tapioca							
Others							
Milk and milk products							
Toned milk							
Whole milk							
Low fat milk							
Curd							
Panner							
Koya							
Other							
Nuts and oil seed							
Ground nut							
Sesame seeds							
Coconut							
Cashew							
Almonds							
Pistachio							
Walnut							
Others							
Fruits							
Apple							
Banana							
Orange							
Mango							
Papaya							
Grapes							
Musk melon							
Custard apple							
Jamun							
Sapota							
Amla							
Dried fruits (raisins)							
Flesh food							
Egg							
Chicken							

Fish							
Fats and oils							
Oil-single							
Oil-blend							
Ghee							
Others							
Sugar and jaggery							
Sugar							
Jaggery							
Honey							
Other(specify)							
RTE							
Biscuits (specify)							
Jam/bread							
Pickle							
Sweets							
Instant noodles							
Chivda,							
Gathiya							
Ice-cream(specify)							
Soft drinks							
Cornflakes							
Muesli							
Others							

24-hour dietary recall (3 days)

Day	Meal time	Name of the food stuff	Ingredients	Raw weight(g)	Cooked weight
Day 1	Breakfast				
	Mid-morning				
	Lunch				
	Evening tea				

	Dinner				
Day 2	Breakfast				
	Mid-morning				
	Lunch				
	Evening tea				
	Dinner				
Day 3	Breakfast				
	Mid-morning				
	Lunch				
	Evening tea				
	Dinner				

Study Specifics:

Subject ID #:_____ **Date:_____ /_____ /_____**
mm dd yy

THE MENOPAUSE-SPECIFIC

QUALITY OF LIFE QUESTIONNAIRE

MENQOL™

Primary Care Research Unit
Department of Family and Community Medicine
Sunnybrook Health Sciences Centre
University of Toronto

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The authors request citation of the 1996 and 2005 development papers whenever MENQOL or MENQOL-I is used or otherwise acknowledged.

For information or permission to use the questionnaire, please submit a request through ePROVIDE™, Mapi Research Trust, online platform.

INSTRUCTIONS

Each of the items in the questionnaire is in the form of the examples below:

		Not at all bothered → Extremely bothered 0 1 2 3 4 5 6
NIGHT SWEATS	☐ No ☐ Yes →	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6

Indicate whether or not you have experienced this problem in the **PAST MONTH**.

IF YOU ***HAVE NOT*** EXPERIENCED THE PROBLEM:

Mark "No"

NIGHT SWEATS	☑ No ☐ Yes →	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6

→ Go to the next item.

IF YOU ***HAVE*** EXPERIENCED THE PROBLEM:

Mark "Yes," then check off how bothered you were by the problem.

NIGHT SWEATS	☐ No ☑ Yes →	☐ 0 ☐ 1 ☑ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6

→ Go to the next item.

This questionnaire is completely confidential. Your name will not be associated with your responses. However, if for any reason you do not wish to complete an item, please leave it and go on to the next one.

MENQOL One month - United States/English - Version of 04 Jun 2021 - ICON.
ID2535-TR-0335 / MENQOL_AU2.2_1month-recall_eng-US.doc

Date: _____/ _____/ _____
mm dd yy

Subject ID #: _____

For each of the following items, indicate whether you have experienced the problem in the **PAST MONTH**. If you have, rate how much you have been ***bothered*** by the problem.

			Not at all bothered → Extremely bothered						
			0	1	2	3	4	5	6
1. HOT FLUSHES OR FLASHES	☐ No	☐ Yes →	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
2. NIGHT SWEATS	☐ No	☐ Yes →	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
3. SWEATING	☐ No	☐ Yes →	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
4. DISSATISFACTION WITH MY PERSONAL LIFE	☐ No	☐ Yes →	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
5. FEELING ANXIOUS OR NERVOUS	☐ No	☐ Yes →	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
6. POOR MEMORY	☐ No	☐ Yes →	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
7. ACCOMPLISHING LESS THAN I USED TO	☐ No	☐ Yes →	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
8. FEELING DEPRESSED, DOWN OR BLUE	☐ No	☐ Yes →	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
9. BEING IMPATIENT WITH OTHER PEOPLE	☐ No	☐ Yes →	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
10. FEELINGS OF WANTING TO BE ALONE	☐ No	☐ Yes →	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
11. FLATULENCE (WIND) OR GAS PAINS	☐ No	☐ Yes →	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
12. ACHING IN MUSCLES AND JOINTS	☐ No	☐ Yes →	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
13. FEELING TIRED OR WORN OUT	☐ No	☐ Yes →	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
14. DIFFICULTY SLEEPING	☐ No	☐ Yes →	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
15. ACHES IN BACK OF NECK OR HEAD	☐ No	☐ Yes →	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
16. DECREASE IN PHYSICAL STRENGTH	☐ No	☐ Yes →	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6

MENQOL One month - United States/English - Version of 04 Jun 2021 - ICON.
ID2535-TR-0335 / MENQOL_AU2.2_1month-recall_eng-US.doc

Date: _____/ _____/ _____
mm dd yy

Subject ID #: _____

				Not at all bothered → Extremely bothered						
				0	1	2	3	4	5	6
17. DECREASE IN STAMINA	☐ No	☐ Yes	→	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
18. LACK OF ENERGY	☐ No	☐ Yes	→	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
19. DRY SKIN	☐ No	☐ Yes	→	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
20. WEIGHT GAIN	☐ No	☐ Yes	→	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
21. INCREASED FACIAL HAIR	☐ No	☐ Yes	→	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
22. CHANGES IN APPEARANCE, TEXTURE OR TONE OF MY SKIN	☐ No	☐ Yes	→	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
23. FEELING BLOATED	☐ No	☐ Yes	→	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
24. LOW BACKACHE	☐ No	☐ Yes	→	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
25. FREQUENT URINATION	☐ No	☐ Yes	→	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
26. INVOLUNTARY URINATION WHEN LAUGHING OR COUGHING	☐ No	☐ Yes	→	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
27. DECREASE IN MY SEXUAL DESIRE	☐ No	☐ Yes	→	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
28. VAGINAL DRYNESS	☐ No	☐ Yes	→	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
29. AVOIDING INTIMACY	☐ No	☐ Yes	→	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6

Section 6 Physical Activity Levels

Physical Activity

Next 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.

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.

	Questions	Response	Code
Activity at work			
1	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? *[INSERT EXAMPLES] (USE SHOWCARD)*	Yes 1 No 2 *If No, go to P 4*	P1
2	In a typical week, on how many days do you do vigorous-intensity activities as part of your work?	Number of days ⌊__⌋	P2
3	How much time do you spend doing vigorous-intensity activities at work on a typical day?	Hours : minutes ⌊__⌋⌊__⌋ : ⌊__⌋⌊__⌋ hrs mins	P3 (a-b)
4	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? *[INSERT EXAMPLES] (USE SHOWCARD)*	Yes 1 No 2 *If No, go to P 7*	P4
5	In a typical week, on how many days do you do moderate-intensity activities as part of your work?	Number of days ⌊__⌋	P5
6	How much time do you spend doing moderate-intensity activities at work on a typical day?	Hours : minutes ⌊__⌋⌊__⌋ : ⌊__⌋⌊__⌋ hrs mins	P6 (a-b)
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]			
7	Do you walk or use a bicycle (*pedal cycle*) for at least 10 minutes continuously to get to and from places?	Yes 1 No 2 *If No, go to P 10*	P7
8	In a typical week, on how many days do you walk or bicycle for at least 10 minutes continuously to get to and from places?	Number of days ⌊__⌋	P8
9	How much time do you spend walking or bicycling for travel on a typical day?	Hours : minutes ⌊__⌋⌊__⌋ : ⌊__⌋⌊__⌋ hrs mins	P9 (a-b)
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), [insert relevant terms].			
10	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,]* for at least 10 minutes continuously? *[INSERT EXAMPLES] (USE SHOWCARD)*	Yes 1 No 2 *If No, go to P 13*	P10
11	In a typical week, on how many days do you do vigorous-intensity sports, fitness or recreational (*leisure*) activities?	Number of days ⌊__⌋	P11
12	How much time do you spend doing vigorous-intensity sports, fitness or recreational activities on a typical day?	Hours : minutes ⌊__⌋⌊__⌋ : ⌊__⌋⌊__⌋ hrs mins	P12 (a-b)

Continued on next page

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Physical Activity (recreational activities) contd.			
Questions		**Response**	**Code**
13	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? *[INSERT EXAMPLES] (USE SHOWCARD)*	Yes 1 No 2 *If No, go to P16*	P13
14	In a typical week, on how many days do you do moderate-intensity sports, fitness or recreational (*leisure*) activities?	Number of days ⌊__⌋	P14
15	How much time do you spend doing moderate-intensity sports, fitness or recreational (*leisure*) activities on a typical day?	Hours : minutes ⌊__⌋⌊__⌋ : ⌊__⌋⌊__⌋ hrs mins	P15 (a-b)
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. *[INSERT EXAMPLES] (USE SHOWCARD)*			
16	How much time do you usually spend sitting or reclining on a typical day?	Hours : minutes ⌊__⌋⌊__⌋ : ⌊__⌋⌊__⌋ hrs min s	P16 (a-b)

Institutional Ethics
Committee for Human
Research
(IECHR)

FACULTY OF FAMILY AND COMMUNITY SCIENCES
THE MAHARAJA SAYAJIRAO UNIVERSITY OF BARODA

Ethical Compliance Certificate 2024-2025

This is to certify Ms. Poonam Pohani study titled; "EXPLORING NUTRITIONAL STATUS, LIFE STYLE AND QUALITY OF LIFE PATTERNS IN PERIMENOPAUSAL WOMEN OF URBAN VADODARA." from Department of Foods and Nutrition has been approved by the Institutional Ethics Committee for Human Research (IECHR), Faculty of Family and Community Sciences, The Maharaja Sayajirao University of Baroda. The study has been allotted the ethical approval number IECHR/FCSc/M.Sc./10/2024/46.

Komal

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