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Gender analysis of climate change and natural hazard related vulnerability perception

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Summary

The purpose of this thesis is to understand how socio-cultural dynamics make women feel more vulnerable to climate change and natural hazards. The impacts and magnitude of climate change are not known. It is well recognized that climate change is not gender neutral. This thesis focuses on disadvantages and challenges that women face in terms of socio-cultural dynamics that may not give them equal access to resources and services that are necessary to respond to the negative effects of climate change and natural hazards. In order to come up with sustainable solutions to climate change and natural hazards, it is important to address gender dimensions, recognizing the fact than women and men have different needs and priorities. It is important that processes address the needs of both men and women. In many societies, women considered one of the most vulnerable and economically disadvantaged group, deal with several social constraints in their everyday lives that restrict their access to and control over vital resources. This research therefore, aims to understand how socio-cultural dynamics make women feel more vulnerable to climate change and natural hazards. The study also assumes that socio-cultural dynamics may also have indirect effect on vulnerability perception via influencing individual's socio-economic status, which is conceptualised as a combination of education, employment and income.

Socio-cultural dynamics, socio-economic status and vulnerability perception are the key concepts in this research. To measure these concepts in quantifiable units, they were operationalised into variables and then indicators based on various definitions. The study was conducted in 28 slums of Indore city in India where an equal number of male and female respondents were selected on the basis of a stratified random sampling. The study used a survey strategy to conduct the research because of large number of research units. Primary data was collected thorough questionnaires which included questions about the respondents socio-cultural context, socio-economic status and vulnerability perceptions. The data obtained was translated into SPSS and several statistical tests which included t-tests and regression, in order to compare the differences between men and women and to see the influence of socio-cultural dynamics and socio-economic status on vulnerability perception, were conducted. While socio-cultural dynamics, conceptualised as a combination of freedom on mobility, decision making power in the household, burden of household responsibilities and age of marriage, was found to be significantly influencing vulnerability perception, making women feel more vulnerable to men with burden of household responsibilities as the variable influencing vulnerability perception the most, socio-economic status when included in this model was not found to be a significant predictor of variations in vulnerability perception. However, this could be also because of the measurement approaches used for the variables of socio-economic status.

The research concludes that socio-cultural dynamics significantly differentiates vulnerability perceptions of men and women. And in order to create unbiased and sustainable responses to climate change and natural hazards, it is important to include local people in vulnerability assessments to understand their differing needs. While socio-cultural dynamics is critical domain where more research is required, the need for gender segregated data is strongly apparent.

Keywords

Socio-cultural dynamics, socio-economic status, vulnerability perception, gender, gender equality

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Abbreviations

IHS	Institute for Housing and Urban Development
MP	Madhya Pradesh
INR	Indian Rupee

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Chapter 1 : Introduction

1.1 Background

"Climate change impacts are not gender neutral" (Organisation for Economic Co-operation and Development, 2010). Studies on gender and climate change highlight that climate change consequences affect men and women differently. Nelson (2011) states that the world will experience climate change impacts in unknown ways, where social, economic and geographical attributes will be crucial in defining people's vulnerability. Owing to gender related social constructs, women with poor economic backgrounds will be more susceptible to the impacts of climate change (Nelson, 2011). The problem of this study is to explore certain aspects that may have a crucial role in making women feel more vulnerable to the risks of changing climate with a focus on informal settlements in India.

The Organisation for Economic Co-operation and Development report (2010) mentions the prime gender elements in climate discourse as women's greater vulnerability to climate change especially in developing countries and gender diverse roles in response to climate change where women are the chief catalysts towards transformation. The prime discussions as regards women and climate change feature that women should be given particular consideration because they are the poorest groups, with a high mortality percentage during natural hazards and they are the ones more vigilant and aware towards the environment (Arora-Jonsson, 2011). A study of 141 countries illustrates the link between natural disasters and gender revealing that natural disasters killed more women than men and women with higher socio-economic status were less impacted by natural disasters (Neumayer and Plumper, 2007). In traditional societies, especially, these differences may stem from socio-cultural factors including social norms, rules, customs and ideologies. For instance, in SriLanka, mainly boys are taught how to swim or climb trees and hence during Tsunami, survival was easier for men (United Nations Development Programme, 2009). Arora-Jonsson (2011, p. 745) also mentions "women's vulnerability as stemming from traditions, customs and practices as highlighted in many literatures". “It has been documented that women in Bangladesh did not leave their houses during floods due to cultural constraints on female mobility and those who did were unable to swim in the flood waters" (Arora-Jonsson, 2011). Understanding factors that hinder equal access of resources and services to women is essential for an inclusive and sustainable climate change development. "Men and women play different roles in society, with their gender differences shaped by ideological, historical, religious, ethnic, economic and cultural determinants" (Jabes, 2005). And therefore, it is important to study these determinants that shape differences between men and women in terms of opportunities and challenges. The focus of this study is on informal settlements because these are often territories lacking access to basic services, more vulnerable to climate risks and natural hazards and where inhabitants live in hazardous conditions. Additionally, these are also neighbourhoods where social customs, rules, norms etc. are deeply rooted.

1.2 Problem Statement

This study has three main dimensions:

- Poor women as more vulnerable to the consequences of climate change and natural hazards
- Vulnerability Perception of the ones at risk
- The role of socio-cultural dynamics in influencing vulnerability perception

1.2.1 Vulnerability Perception

Vulnerability is an important concept that is used in understanding climate change and disaster related issues and developing responsive strategies. Vulnerability is a broad concept. Heijmans (2001, p. 2) talks about three main views of addressing vulnerability. The first which says vulnerability depends on the "intensity, magnitude and duration of external shocks" thereby attributing nature as the main cause of people's vulnerability. The second advocating for economic and financial instruments as the solution for reducing people's vulnerability. And the third that talks about socio-economic and political process hindering people's ability to deal with disaster events and hence generating vulnerability. According to this view, "a safer environment can only be achieved if disaster response changes the processes that put people at risk. The long-term solution lies in transforming the social and political structures that breed poverty and the social dynamics and attitudes that serve to perpetuate it" (Heijmans and Victoris, 2001). The third view is often overlooked in disaster responses by international agencies or governments, when local people's needs are assumed without involving them to understand how they perceive vulnerability.

Two individuals living in the same household can perceive vulnerabilities differently, depending upon their gender, age, etc. Therefore, climate change adaptation may not be effective if it is generalised based on assumption. For instance, an awareness or training programme becomes irrelevant if the women have mobility restrictions that do not allow them to take part in these programmes. Hence, climate change response requires to understand how local people/ recipients of such programmes or assistance perceive vulnerability and identify their differing needs to formulate relevant development strategies.

1.2.2 Socio-cultural dynamics

Many studies highlight that poor women are the most vulnerable to climate change. This vulnerability is heightened when societal dynamics and processes limit their access to resources and services. In India people are divided by religion, caste, class and diverse cultural practices. The way society in India looks at women, indicates of gender differences that are rooted in social systems. The normal operations of the dominant social systems reveal structural causes of gender inequality. These causes are striking at societal, cultural, institutional and policy levels.

In traditional societies, social and cultural norms differ for men and women. Where men have considerably more freedom and power to take decisions for themselves, women often must endure what the society deems appropriate for them. For instance, girl's education, especially in traditional households in India, is not a priority, even when the family can afford it financially. (Pathania, 2014) mentions about the tradition of preference for son over a girl in India due to reasons such as "family linkage, type of insurance for the future, prestige and power, financial support, salvation, dowry, low status of women, gender discrimination and family name". Women exist within structures that limit them to reach their capabilities and access resources. These resources and services may include but are not limited to access to education, right to be employed and earn money, legal ownership of land/ property, technology. Many of these resources and services play a crucial role in building on individual's adaptive capacities, and reducing their vulnerability perceptions. For instance, an educated individual will be in a better position to understand weather forecasts or government released information on possible threats of natural disasters.

1.3 Research Objectives

This research will try to measure vulnerability perception of men and women in the slum areas of Indore city in India. The study will then try to understand the differences in the opportunities and rights for men and women to see how these factors influence vulnerability perception.

1.4 Research Question

How do socio-cultural factors make women feel more vulnerable to climate change or natural hazards? Study of informal settlements in Indore, India.

- Do women have a lower socio-economic status than men?
- Do women have lower opportunities and rights than men?
- Does this translate into a higher perceived vulnerability to climate change?

1.5 Significance of the study

There is little research done on the issues of gender and climate change and majority of it is in the rural context (Aguilar, Granat, et al., 2015). Considering rapid urbanization and related issues of growing informal settlements, urban inequality, GHG emissions, etc., urban areas deal with different set of problems and hence there is a need to understand issues of gender and climate change in the urban context. This research will add to the understanding in field of gender and climate change while focussing on socio-cultural aspects.

As urban areas are likely to bear the most brunt of climate change, it is essential that policies are inclusive and embrace also the most vulnerable groups to facilitate resilience (Aguilar, Granat, et al., 2015). Moreover, women considered one of the most vulnerable group are often a missing element in climate change policies. While the issues are being talked about at international forums, most local and national government policies disregard gender aspects and thus are ineffective and may also aggravate disparities (Aguilar, Granat, et al., 2015). "One of the major problems is also linked to the lack of gender segregated data which makes it difficult to know and explore the relationship between gender and climate issues" (Aguilar, Granat, et al., 2015). Looking at the context of India, "women, as the particularly vulnerable subjects of climate change, is the only mention made to gender in the Indian Government's National Action Plan on Climate Change (NAPCC)" (Arora-Jhonson, 2011, p. 744).

Developing countries may have more opportunities compared to developed countries to facilitate development in a more inclusive, dynamic and sustainable ways because they are still in the process of making major decisions as regards infrastructure, services, resources, etc. "Employing gender as a category in the study of climate change and its impacts can help address this unfairness" (Aguilar, Granat, et al., 2015, pp. 304). However, this seems to be a long process considering diverse country contexts and that different nations are at different stages of development and have different priorities and challenges.

Involving local people in understanding how they perceive vulnerabilities to climate change and natural hazards, will help not only in formulating more appropriate responses but also in facilitating more suitable allocation of resources.

1.6 Scope of the study

The scope of this research is limited to understanding how socio-cultural barriers make women feel more vulnerable to natural hazards. In answering this research question, the study will dwell into concepts of socio-cultural dynamics, socio-economic status and vulnerability perception. While the three concepts are complex and widespread concepts with several intricacies involved, the study will focus on specific elements within these concepts. The research will be limited in terms of how each concept will be measured. Although there are various approaches to assess these concepts, the study is restricted with the measurement choices because of limitations of data availability. This may affect the reliability of the study.

Moreover, since the residents of the study area, do not speak the same language as the researcher, specific information and data, including but not limited to, respondent’s history,

background, household and community dynamics was difficult to access, which may further affect the reliability of the study.

Chapter 2 : Literature Review / Theory

2.1 Gender and related issues

Scott in her famous article, 'Gender: a useful category of historical analysis', explains the history of gender. Around the year 1876, people associated "grammatical terms to evoke traits of character or sexuality" and by the year 1986, in a more thoughtful manner, "gender was used as a way of referring to social organisation of the relationship between the sexes" (Scott, 1986). Subsequently "men and women were defined in terms of one another and no understanding of either could be achieved by entirely separate study" (Scott, 1986). The growing usage of word "gender" by 'American feminists' who advocated for understanding society on gender differentiations, meant that discussions would refer to men and women in relation to each and (Scott, 1986). Many authors including (Meyerowitz, 2008) and (Charlene L., Muehlenhard, Z. D. P., 2011) have discussed the history of gender and related terminologies, while reviewing different theories. However, going through the entire history is beyond the scope of this research and the focus here is limited to understanding the basics of gender and related concepts, as a background to the research.

2.1.1 Gender terminologies

As we discuss about gender related issues, it is important to note the generally consistent terminologies of the associated concepts.

- *Gender equality*, generally speaking, is defined as "the recognition that women and men have different needs and priorities, and that women and men should experience equal conditions for realising their full human rights, and have the opportunity to contribute to and benefit from national, political, economic, social and cultural development" (Moser and Moser, 2010)
- "*Mainstreaming a gender perspective* is the process of assessing the implications of women and men of any planned action, including legislation, policies or programmes, in all areas and at all levels. It is a strategy for making women's as well as men's concerns and experiences an integral dimension of the design, implementation, monitoring and evaluation of policies and programmes in all political, economic and societal spheres so that women and men benefit equally and inequality is not perpetuated. The ultimate goal is to achieve gender equality" (Moser and Moser, 2010).
- *Gender empowerment*, an element of gender mainstreaming, is defined as "promoting women's participation in decision-making processes, as well as having their voices heard and the power to put issues on the agenda" (Moser and Moser, 2010). (Shettar, 2015) defines Women Empowerment as “increasing the spiritual, political, social, educational, gender or economic strength of individuals and communities of women”. While different authorities have different definition of gender empowerment, this study incorporates gender empowerment as “the process of upliftment of economic, social and political status of women, the traditionally underprivileged ones, in the society. It is the process of guarding them against all forms of violence. Women empowerment involves the building up of a society, a political environment, wherein women can breathe without the fear of oppression, exploitation, apprehension, discrimination and the general feeling of persecution which goes with being a woman in a traditionally male dominated structure” (Shettar, 2015).

Moser & Moser (2010) in their article 'Gender mainstreaming since Beijing' discuss the progress on gender mainstreaming since member states across the globe endorsed the Beijing Platform for Action in 1995. When member states pledged to achieve gender Equality and

women empowerment, gender mainstreaming was pointed put as the essential tool towards their achievement.(Preet, Nilsson, et al., 2010)explains that gender mainstreaming is an ongoing process which relates to incorporating gender aspect in all kinds of research, legislation, policies and implementation activities.When it comes to sustainable development and when we talk about climate change, (Stott, 2010)notes that strategies addressing climate change must embrace gender equality, facilitating "transfer of, and control over, resources to the disadvantaged".

2.1.2 Gender Planning

For urban development to be sustainable, it is important that it involves and benefits all members of the society including the most vulnerable and exposed population. It has been recognized that women are one of the most vulnerable groups and are often excluded from planning and policies. Moser (1993, p.6) highlights that "women are not recognized as important in planning processes and simply not included at the level of policy formulation" and that "development policy, even when aware of the important role women play in development processes, because of certain assumptions, often 'misses' women".

To understand gender and related concepts in detail, this study will use the discipline of gender planning. Moser (1993, p.1) states that "the goal of gender planning is the emancipation of women from their subordination, and their achievement of equality, equity and empowerment". Talking about the development of gender and related concepts, two important approaches have been the most prominent in this field of study namely "women in development" (WID) and "gender and development" (GAD). "The term 'women in development' was coined in the early 1970s by the Women's Committee, a network of female development professionals who were influenced by the work on Third World development" (Moser, 1993, p.2). This was followed by United States Agency for International Development (USAID) endorsing the phrase in their Women in Development approach that recognized women as having untapped capabilities to support in economic development (Moser, 1993, p.2). As proponents of the approach, USAID, its office of Women in Development and Harvard Institute of International Development, also put together a study on women's exclusion from development (Moser, 1993, p.2). The WID discussions during the period between 1970s and mid-1980s, among many other aspects, also focussed on 'social justice and equity for women' and on "demands for the allocation of development resources to women hinge on economic efficiency arguments about what women can contribute to the development process"(Razavi and Miller, 1995)Subsequently, with drawbacks identified for studying women in isolation, there were modifications in the approach with a deviation towards what is known as 'Gender in Development' (GAD) (Moser, 1993, p.2). Although WID approach discussed about women's lower status, but it excluded the relativity aspect i.e. women's subordination in comparison to men (Razavi and Miller, 1995). "WID identified women's lack of access to resources as the key to their subordination without raising questions about the role of gender relations in restricting women's access in the first place (and in subverting policy interventions, were they to direct resources to women" (Razavi and Miller, 1995).

The idea of taking into account 'gender' in lieu of 'women', inveigled by writers such as Oakley (1972) and Rubin(1975), was to focus on "the manner in which the problems of women were perceived in terms of their sex-namely, their biological differences from men-rather than in terms of their gender-that is, the social relationship between men and women, in which women have been systematically subordinated" (Moser, 1993, p.3). This alteration facilitated examining women in regard to men and not just women exclusively and focusing on how gender alliances are socially constructed (Moser, 1993, p.3).

The discipline of gender planning focuses on empowerment to achieve equality. The goal of gender planning is to "ensure that women, through empowering themselves, achieve equality and equity with men in developing societies" (Moser, 1993, p.i). "Gender Planning and Development focuses on the interrelationship between gender and development, the formulation of gender policy and the implementation of gender planning practice" (Moser, 1993, p.i). The significance of the concept is rooted in the permanence that development policies are often biased against women or exclude them (Moser, 1993, p.i). Gender planning principles relate to "gender roles and needs, to control over resources and decision-making within the household, and to Third World policy approaches to women in development" (Moser, 1993, p.i). Gender planning as opposed to Women in Development is about "subordination and inequality" and "achieving equality and equity with men through empowerment" (Moser, 1993, p.3).

2.1.3 Lack of gender planning methodology

In spite of the fact that women's role in Third World development processes is being increasingly acknowledged, it is also accepted that understanding of WID and GAD have not been rewritten in policy actions (Moser, 1993, p.4). An insufficient gender planning methodology has been an impediment for professionals in the field of development planning (Moser, 1993, p.4). Gender planning still remains an 'add-on' rather than an integral element of development practice (Moser, 1993, p.4). Moser (1993, p.5) points out issues inducing failure in developing a gender planning framework.

- Authority's indisposition to acknowledge gender as a planning concern
- Policy-makers and professionals making decisions in issues concerning WID/GAD often are not professionally qualified in the field of planning and the governing authority is mostly male-dominated and gender insensitive
- Lack of focus on developing methodological tools to render gender awareness into action
- difficulty in incorporating gender into existing planning fields owing to the latter's inflexibility

These arguments besides explaining the dearth of gender planning framework also explain the resulting exclusion of women and gender from planning theory and practice. (Shettar, 2015) reiterates that even though policies focusing on women’s empowerment prevail at different levels and sectors, there still exists a substantial gap between these policies and their actual implementation. (Preet, Nilsson, et al., 2010) in their study on "how gender perspective is integrated into research and policy making concerning climate change and global health", based on the review of selected policy documents, found insufficient evidence of integration of gender perspective in scientific as well as policy documents related to climate change.

2.1.4 Ambiguous assumptions of current policies and practices

Men and women have distinct functions to perform in the society, diverse needs owing to their position within the household and differing rights over resources which is the underlying premise for gender planning aiming for liberation of women (Moser 1993). Moser (1993, p. 15) highlights the ambiguous assumptions of current policy and practice as following:

- "that the household consists of a nuclear family of husband, wife and two or three children"

- "that the household functions as a socio-economic unit within which there is equal control over resources and power of decision-making between all adult members in matters influencing the household's livelihood"
- "that within the household there is a clear division of labour based on gender. The man of the family, as the 'breadwinner', is primarily involved in productive work outside the home, while the woman as the housewife and 'homemaker' takes overall responsibility for the productive and domestic work involved in the organization of the household".

These unsubstantial conventions, augmented by the hands of the "legal and education systems, the media and family-planning programmes", render planning unsuitable (Moser, 1993, p.16). The assumption about households comprising of a nuclear family disregards the heterogeneity of low-income households (Moser, 1993, p.16). This concept also relates to the frail idea of households largely having a male headship. "The idea that a 'head', normally assumed to be a man, represents and manages the household, is a figment of the statistician's imagination" (Roger, 1980, cited in Moser, 1993, p.16).

The second assumption holds that the household is one socio-economic unit, resting on kinship, marriage relationships and parenthood, "sharing both work and proceeds of their labour" (Moser, 1993, p.19). However, Moser (1993) notes, that households vary drastically and are continually reorganized, revolving around the socio-economic context that they exist in. The assumption holds that every household is an individual unit with clearly defined boundaries that separates it from other households. However, it neglects resource and labour transfers, both informal and those arising due to kinship alliances, between households. There are also questions raised on the validity of the premise that decision making powers and control over resources are equal for all adult members of the household. "The idea that the household functions as a single socio-economic unity, organized as an independent entity with clearly defined boundaries that separate it from other households in the socio-economic structure in which it is locates, is not borne out in reality" (Evans, 1989, cited in Moser, 1993, p.19). "Gender, age and status are all critical determinants in differentiating the mobilization and allocation of family labour to different activities" (Moser, 1993, p.22)."Because individual choices are motivated by the desire to maximize total family welfare, household members subordinate individual tastes and preferences in pursuit of common goals" (Becker, 1965, cited in Moser, 1993, p.22). The assumption has been criticized as it expects that the male head of the family makes fair decisions for all dependent members of the household including women and children, ensuring equality (Moser, 1993, p.23). "The male household head may not have any real understanding of the day-to-day problems associated with household welfare, since provisioning is a reproductive task of women. Men frequently know little of their wives coping strategies" (Moser, 1993, p.23). Moser (1993, p.23) argues that to ascertain that one benevolent member of the family would ensure equal sharing of resources, enough to meet each member's needs, is a misjudgement. The assumption dismisses the probability of differing access to and control over resources between members of the household (Moser, 1993, p.23). It is a common practice to assume that owing to the social institution of marriage, the two persons share similar rights, responsibilities, however social and cultural aspects play a critical role in influencing these arrangements. "Ideological and cultural as well as economic reasons underlie the symmetries and asymmetries in intra-household resource allocation" (Moser, 1993, p.23). "Intra-household decision-making, management and distribution arrangements vary depending on the household form and the nature of conjugal contract" (Dawyer and Bruce, 1988, cited in, Moser, 1993, p.24). Moser (1993, p.24) notes that "since the 'benevolent dictator' does not represent household needs, his welfare cannot be taken as proxy for the welfare of all household members". Women regularly eat last and are less likely to get new clothes and luxuries (Chen et al., 1981, cited in Moser, 1993, p.24). The concept of 'maternal altruism' has also been used

to explain women's differing obligations to the family (Whitehead, 1984 cited in Moser,1993, p.24). In Africa, Asia and Latin America, women customarily obtain land because of their gendered roles as wives or mothers, whereas, men obtain land in their own right by virtue of their lineage membership or other systems of inheritance (Moser, 1993, p.24). These socio-cultural aspects highlight the importance to segregate analysis between men and women. Moser (1993, p.37) also highlights the necessity to distinguish between women's needs and men's needs in development.

2.2 Socio-cultural dynamics

Social norms exist about different aspects, however in this research we focus on those related to gender aspects. Since existing socio-cultural contexts greatly influence people's lives, gender analysis has continuously been integrated with the concepts of culture, ethnicity and social class by scientists and scholars (Peplau, Veniegas, et al., 1999) Culture has been defined in different ways by different authors. (Hofstede, 2011) defines culture as "the collective programming of the mind that distinguishes the members of one group or category of people from others". (Peplau, Veniegas, et al., 1999) refers to culture as "the shared beliefs, values, and traditions, and behaviour patterns of a particular group...culture is transmitted from one generation to the next by parents, teachers, religious leaders, and other respected members of the culture. In technological societies, the mass media also convey cultural messages. This process of transmitting culture across generations is known as socialization". Culture often refers to "intellectual and creative products, including literature, music, drama and painting" and at the same time it is also used "to describe the beliefs and practices of another society, particularly where these are seen as closely lined with tradition or religion" (Schalkwyk, 2000). (Hofstede, 2011) explains that culture is a "collective phenomenon" and is mainly used for "tribes, ethnic groups, nations, organizations, genders, generations and social classes". (Hofstede, 2011) notes that "societal cultures reside in (often unconscious) values". Socio-culture dynamics in itself is a broad and complex concept with several dimensions to it. This section highlights a few elements of concept that influence people's day to day lives.

- *Social norms:*"Rules and expectations about how group members should behave are known technically as social norms" (Peplau, Veniegas, et al., 1999). For example gender norms such as appropriate names for females versus males (Peplau, Veniegas, et al., 1999).
- *Social roles:*"The set of social norms about how a person in a particular social position such as a mother or warrior is expected to act. Social roles defines the rights and responsibilities of group members and prescribe which qualities and behaviours are appropriate or ideal and which are unacceptable" (Peplau, Veniegas, et al., 1999). Usually it is considered appropriate for men and women to perform different kind of tasks. Culture, along these lines, usually demarcates boundaries for roles of men and women in the society(Peplau, Veniegas, et al., 1999).
- *Status and power:*"Social status refers to a person's rank, privileges, or power in a group. Traditionally, age and gender have been important determinants of status, with greater power being accorded to elders and men" (Peplau, Veniegas, et al., 1999). For instance, in many societies, men take decisions for the entire family, in many countries women still lack legal ownership of properties."When relationships are perceived as unequal, male dominance is the most common pattern" (Peplau, Veniegas, et al., 1999).
- *Ideology:*"Individual's beliefs about proper or appropriate roles for women and men constitute their gender-role ideology. Traditionals endorse a division of labour by gender and a pattern of male dominance" (Peplau, Veniegas, et al., 1999).

- *Stereotypes:*"Beliefs about the typical attributes of women and men are known as gender stereotypes" (Peplau, Veniegas, et al., 1999). For instance, generally speaking, men are often seen stronger than women.
- *Values:*"Beliefs about which behaviours and personal qualities are important and which are inconsequential-values-are another important component of culture" (Peplau, Veniegas, et al., 1999).

2.2.1 Concepts adding to social evil &facts about women in India

(Shettar, 2015) highlights that women in India, on an everyday basis, deal with numerous'social evils', and consequently assigned a lower status than men in the society.Shettar (2015, p.13) while studying on issues and challenges of women empowerment in India, found that "acceptance of unequal gender norms by women are still prevailing in the society" and emphasises that "Women Empowerment is the vital instrument to expand women's ability to have resources and to make strategic life choices".Shettar (2015, p.13), draws attention to a critical idea that Women's Empowerment in India is connected to "geographical location (urban/rural), educational status, social status (caste and class) and age". As a result, without taking into consideration these factors, efforts targeted for Women Empowerment may not generate results as expected. In this research, we talk about gender equality to emphasise that in many communities in India, women do not enjoy equal rights and opportunities as their male counterparts. Along these lines (Preet, Nilsson, et al., 2010) emphasises that "sex-disaggregated data and gender-sensitive policies are tools needed to tackle the different impacts of climate change on people's lives".

Women in many traditional societies in India are deprived of the rights to take decisions concerning themselves, their children or the household. The root cause of all these issues originates from concepts like dowry, son preference, to name a few. Shettar (2015, p.15) while describing the present situation of women in the capital city, New Delhi, highlights that "being equal to their male counterparts is still a far cry for Indian women. Not only are they marginal as public figures an average woman can hardly call the shots at home or outside".According to the (United Nations Development Programme (UNDP), 2015)on human development indicators, India ranked 130 out of 148 countries, in the Gender Inequality Index (GII) which is "a composite measure reflecting inequality in achievements between women and men in three dimensions: reproductive health, empowerment and labour market". Moreover, the percentage of females with secondary education was 27% compared to 50.4% males, 29% of female participation was recorded in labour force in comparison to 80.7% male participation (United Nations Development Programme (UNDP), 2013). About 66% of female population in rural India is idle and unutilized(Shilpa, 2014). Just 52% of women in India make decisions about their own health, one woman dies every minute from a pregnancy related cause; regardless of caste, class or age, most Indian women are solely responsible & accountable for invisible & unpaid work with in their homes/households; women spend ten times more time on household work than men do; men spend less than one hours per week on cooking, while women spend 15 hours per week; men have over 2 hours of leisure in a day while women have only 5 minutes; 80% of women are employed in agriculture & informal sectors of the Indian economy but are paid less as compared to their male counterparts; women on an average require 2200 calories per day & yet receive about 1400; women are more likely to fall ill than men, yet less likely to receive preventive or curative care(Mishra, 2015).

Shettar (2015, p.15) mentions some of the main issues women in India deal with as gender discrimination, lack of education, female infanticide, financial constraints, family responsibilities, low mobility, social status, dowry, child marriage and are often deprived of decision making authority, freedom of movement, access to education and access to

employment. Shettar (2015, p.16) further emphasises the importance of taking into consideration a multidimensional approach that accounts for different aspects of 'women's life and status' for analysing the status of women. According to the World Economic Forum report (2015), India ranks 108 in the Gender Gap Index out of 145 countries.

Gender Gap Sub-indices	Rank	Score
Economic participation & opportunity	139	0.383
Educational attainment	125	0.896
Health & survival	143	0.942
Political Empowerment	9	0.433

Source: (World Economic Forum, 2015)

Table 2.1Gender Gap Index

"Social norms and family structure in developing countries like India, manifests and perpetuates the subordinate status of women" (Shettar 2015, p.17). In India, several social issues, contributes to the lower status of women. The age-old practice of 'son preference over girl' as boys are looked upon as an investment who will be financial support and caretaker of the family and an embodiment of their repute in comparison to a girl child who will be burden on the family (Pathania, 2014, p.519). This favouritism gives rise to early marriages of girl child, 'so that the girl's family does not have to support the girl and to the husband's family the girl can be a low cost labour and a child bearer' (Pathania, 2014, p.521).

Socio-cultural factors, consequently, may influence women's access to services and resources, some of which are crucial in building on their adaptive capacities and reducing their vulnerability perceptions. These resources and services may also be reflected in people's socioeconomic status which the American Psychological Association defines as "a combination of education, income and occupation" and "commonly conceptualized as the social standing or class of an individual or group. When viewed through a social class lens, privilege, power, and control are emphasized. Furthermore, an examination of SES as a gradient or continuous variable reveals inequities in access to and distribution of resources" (American Psychological Association, 2016). Education, occupation and income have been widely used as indicators of socio-economic status by many scholars including (Roos, Lahelma, et al., 1998) and (Duncan, 2022).

2.3.1 Poverty

Because the focus of this study is specifically on informal settlements, it is important to understand the concepts of poverty. Research on urban poverty highlights that understanding it is not a straightforward affair. Mitlin and Satterthwaite (2013, p.1) note that urban poverty is misinterpreted and understated owing to the restricted ways in which it is measured and analysed, excluding meaningful considerations. Mitlin and Satterthwaite (2013, p.1) believe that the Millennium Development Goals, that were targeted to be achieved by 2015 were intended to focus on poverty reduction, however "the main measure used for these goals (the dollar-a-day poverty line) is completely inappropriate for so many urban contexts". Poverty is not static but changing and does not just concern physical and financial assets but also takes into account issues of rights and freedoms (Friend and Moench, 2013, p.104). Friend and Moench (2013, p.104) mention that "social capital and the influence of markets, states and community - and issues of power, voice, citizenship and rights - all contribute to livelihood outcomes, wellbeing and poverty". (Adger, 2006) note that poverty and vulnerability are

influenced and structured by psychical, socio-cultural and political aspects. This has important significance in the context of this study. Friend and Moench (2013, p.105) note the difference between welfare approaches aimed at poverty reduction with a focus on service provision and resource transfer to the poor and approaches concentrating more on 'social transformation' where besides supporting people attention is paid on understanding why people are poor. This inclination from welfare to transformation may be the first step towards preparing institutions to capacitate stronger and flexible systems in order to eliminate poverty (Friend and Moench, 2013).

2.3.2 Vulnerability

Through the course of time, vulnerability has been defined differently by different scholars and authorities. Most of the development work on climate change in cities involves taking care of climate vulnerabilities while improving adaptive capacity and resilience (Friend and Moench, 2013). Adger (2006) mentions that with the general notion of poor considered most vulnerable, having inadequate adaptive capacities, poverty has been a focal point in vulnerability assessments. Friend and Moench, (2013, p.99) argue that "poverty and vulnerability while linked are not the same thing". Many literatures recognize that poverty and vulnerability are intertwined concepts but not selfsame and that "vulnerability to a range of various shocks and crisis is a defining characteristic of being poor" (Friend and Moench, 2013, p.106). Friend and Moench (2013, p.106) argue that vulnerability means different thing to different people and "that "vulnerability is relative". Friend and Moench (2013, p.106) also suggest that vulnerability is dependent on several factors mentioning that "vulnerability is complex and differentiated in ways that may not always reflect the current distribution of health and wellbeing". There are approaches that go into a deeper analysis of sub-categories differentiating poverty on the basis of gender, age and ethnicity (Friend and Moench, 2013, p.106). To understand the association between poverty and vulnerability, it is important to take into account the resources people have access to and control over, power dynamics and other elements that influence decision making Adger (2006). Friend and Moench, (2013, p.99) highlight the importance of taking into account social values in developing equitable responses to climate change and that the concept of resilience is incomplete as it does not "address the social "values" implicit in the way systems are organised and respond to disruption". They emphasize the need for "additional theoretical framework beyond resilience" to include elements of social justice and equity Friend and Moench (2013, p.99). Despite drawbacks, resilience concepts can be helpful in bettering knowledge on poverty and vulnerability (Friend and Moench, 2013, p.99). "Although resilience concepts say little about values, they provide insights into the causes and characteristics of poverty and vulnerability in complex urbanising environments" (Friend and Moench, 2013, p.99).

(Wood, 2003) state that individual's goals and desires are influenced by social relationships. Friend and Moench (2013, p.106) explain that resilience is "socially constructed" as "many choices are made at societal levels above the individual, questions of power and voice determine how we shape resilience and whose objectives and values they reflect". Individuals deprived of power and voice in decision-making processes are also the ones with little influence over outcomes (Friend and Moench, 2013, p.107). Communities are often presupposed to have "shared interests and values" which undermines the heterogeneity element existing in communities (Friend and Moench, 2013, p.110).

Adger (2006) explain that vulnerability is also contextual as it depends on "the nature of the specific shock or crisis in question". For instance, a wealthy individual with land in flood prone areas may be more vulnerable than to a not so wealthy individual with more mobile asset base (Friend and Moench, 2013, p.107). Therefore, vulnerability analysis requires to include

understanding of the specific context. Because of all these complexities concerning vulnerability and related concepts, an important question is who and how should policies and development programs target.

The concept of vulnerability has increasingly been used by most institutions working on issues related to climate change and disaster relief. Most of these institutions also identify poor as the most vulnerable requiring particular consideration (Heijmans, 2001). However, the understanding of the concept is different across different actors. Heijmans (2001) talks about three main views of addressing vulnerability.

- The first which says vulnerability depends on the "intensity, magnitude and duration of external shocks" thereby attributing nature as the main cause of people's vulnerability. This view advocates for "systems for predicting hazards and technologies to enable human structures to withstand negative impacts" as solutions to reduce vulnerability Heijmans, 2001, p.2)
- The second says that "in spite of increasing technological and scientific capacity, people continue to suffer, because prediction and mitigation technologies are so costly" (Heijmans, 2001, p.2). This view, hence, advocates for economic and financial instruments as the solution for reducing people's vulnerability.
- The third view says that "it is not only the exposure to hazards that puts people at risk, but also socio-economic and political processes in society that generate vulnerability" Heijmans, 2001, p.2). This view puts the blame on socio-economic and political process that hinder people's ability to deal with disaster events thereby generating vulnerability. According to this view, "a safer environment can only be achieved if disaster response changes the processes that put people at risk. The long-term solution lies in transforming the social and political structures that breed poverty and the social dynamics and attitudes that serve to perpetuate it" (Heijmans, 2001, p.2).

The third view is often overlooked in disaster responses by international agencies or governments, when local people's needs are assumed without involving them to understand how they perceive vulnerability.

2.3.3 Local people's perception v\s outsider's perception

Heijmans (2001) points out that "the degree of perceived risk varies greatly among households and depends on class, gender, location, and other particular conditions shaped by economic, social and political processes" (Heijmans, 2001, p.1). Two individuals living in the same household can perceive vulnerability differently, depending upon their gender, age, etc. Therefore, climate change adaptation may not be effective if it is generalised based on assumption. For instance, an awareness or training programme becomes irrelevant if women have mobility restrictions that do not allow them to take part. However, Heijmans (2001, p.4) highlights, "vulnerability reduction and the selection of appropriate measures is often a competition between different actors, who seek to realize their needs and interests". Consequently, vulnerability reduction measure may serve national and global interests but ignore local people's perceptions and needs. Hence, climate change response requires to understand how different people perceive vulnerability and to identify their differing needsin order to formulate relevant development strategies.

Heijmans (2011) discusses that there are often inconsistencies between an outsider's analysis of vulnerability and local people's vulnerability perceptions. "Outsiders label the poorest people as the most vulnerable, while in reality people who face greater everyday threats of disease and food shortages, consider disaster risk not as their priority. Since poor people seldom get the

chance to participate in vulnerability assessments, outsiders tend to interpret and assume risk behaviour of affected populations as universal, which leads to identification of wrong or irrelevant risk reduction measures. Large amount of money spent on risk reduction by governments and international donors might be a waste of resources, while the risks prioritized by poor people are ignored" (Heijmans, 2001, p.10). (Young, 1998) argues that “risk should not be defined solely by pre-determined, supposedly objective criteria that enable its various levels to be gauged through quantification. It is also a social construct, interpreted differently by all of us”.

2.3.4 Involving the ones at risk

While it is widely recognized that poor people and especially women are most vulnerable to climate change and should be in priority concerns, not many vulnerability assessments involve local people themselves, to understand how they perceive risks and vulnerabilities (Heijmans, 2001). For strategies to benefit communities, households and individuals, it is important to understand the differences in their perceived vulnerabilities. "Most of the aid agencies just make assumptions regarding local people's needs and priorities, and treat them as recipients or beneficiaries of their programs, not as creative actors in disaster risk reduction" (Heijmans, 2001, p.3. If there exists gaps or inconsistencies between local people's needs and development approaches, then the entire planning becomes irrelevant. Local people do not have an understanding of the concept of vulnerability, neither do they use this concept literally to assess their risk or to make decisions. However, as Heijmans (2001, p.6) notes, local people "feel the stress, face difficulties, talk about 'risks', and make risk-taking or risk-avoiding decisions. They do not only take into account the possible exposure to hazards and future damages) i.e. what outsiders generally refer to as 'vulnerability', but also their capacities, options and alternatives, and the implications of their decisions. It is important that outsiders understand both sides that make up local people's perception of risk, rather than analyzing and measuring their vulnerability with outside criteria".

Individuals perceive vulnerability differently and this results in differing needs and priorities. Heijmans (2001, p.8) notes that "besides differences in risk perception between local communities and disaster agencies, risks are viewed differently among people from the same community", emphasising that risk perception may differ for every individual. Poor people's vulnerability concerns are deep-seated in the "poor living conditions" and hence it essential to link "disaster risk reduction with development efforts, because reducing the vulnerability of the poor is a development question" (Heijmans, 2001, p.10).

Heijman (2001, p.12) recommends that assessment tools require "identification and analysis of the dynamic pressures that deprive the people of their resources to cope with adverse events and to increase awareness of people about root causes of vulnerability and future risks". (Preet, Nilsson, et al., 2010) notes that "the physical constraints due to reproductive demands and the socioeconomic inequalities affecting women limit their choices and enhance vulnerabilities". Issues like these are likely to get overlooked if local women's perceptions of vulnerability towards climate change and natural hazards are not taken into account.

2.4 Evolving urban context

With the world's population becoming increasingly urban, development process is becoming more complex and challenging with new urban issues emerging. "Competing social and economic influences, interests and values shape urban systems. But equally such complex systems are shaping, constraining and opening opportunities for action, yet doing so with unforeseen consequences" (Friend and Moench, 2013, p.100). "Cities are emergent mosaics or networks that reflect social values and relations coupled with the co-evolving environmental

and infrastructure systems that characterize the built environment" (Friend and Moench, 2013, p.100). (Parnell, Simon, et al., 2007) highlight that urban areas also show differing access to resources and sharing of risks and opportunities within its confines. "Moreover the purpose, meaning and value of urban systems - what their functions are and for whose benefit, and what cities represent - is vigorously contested and shaped by dynamic urban populations with differential rights and influence" (Friend and Moench, 2013, p.100). Additionally, climate change and the uncertainty associated with its impacts, complicates the study of urbanisation. The process of urbanisation is challenged by "economic and political benefits accruing to some, while risks are distributed on others" (Friend and Moench, 2013, p.100). Friend and Moench (2013, p.103) argue that "the concept of resilience shifts thinking of climate change away from shocks and crises with specific impacts, to a context of on-going change, characterized by greater uncertainty and risk". "Urban areas are increasingly dependent on complex infrastructure, energy, food, water, transport, communications and accompanying socio-cultural systems that are vulnerable to climate change" (Friend and Moench, 2013, p.103). Lately, "resilience has been applied to urbanisation processes with urban areas being framed as complex social ecological systems" (Friend and Moench 2013, p.103). This attention at the system's level may facilitate altering system's characteristics (including agents, institutions and interactions between the two) to endure shocks and crisis (Friend and Moench, 2013, p.103). And this is important because a city's structure, function, values cannot be pre-determined, they are shaped by values that construct the choices that people make (Friend and Moench, 2013, p.103).

2.5 Adaptive Capacity

"Adaptive capacity is the ability of systems, institutions, humans, and other organisms to adjust to potential damage, to take advantage of opportunities, or respond to consequences" (Intergovernmental Panel on Climate Change, 2013). In order to respond to natural or climate related disasters, it is important to know how vulnerable individuals, communities and systems are. IPCC’s risk vulnerability framework highlights the role of adaptive capacity in risk assessment and vulnerability as a function of sensitivity, exposure and adaptive capacity (Cardona, O.D., M.K. van Aalst., Birkmann, et al., 2012). Research on adaptive capacity examines specific components of systems, guiding their capacity to adapt and the anatomy of alterations, which are termed as determinants of adaptive capacity" (Intergovernmental Panel on Climate Change,). This section reviews discussions on objective and subjective adaptive capacities climate related issues.

Various frameworks are used to understand adaptive capacities of people and systems, outlining different determinants that drive the ability of people to adapt to changing climate. The LAC framework by Africa Climate Change Resilience Alliance is a good tool for understanding objective capacities as it puts together asset based elements and non-material elements as drivers of local adaptive capacity focusing on community and household levels (Africa Climate Change Resilience Alliance, 2011). It measures adaptive capacity through characteristics that are mutually dependent and assist in the ability toadapt, suggesting that improvements in these characteristics shall conjointly add to the adaptive capacities (Jones, Ludi, et al., 2010).

The section below discusses specific elements of the LAC framework that may be relevant for this study. Components of the Local Adaptive Capacity Framework:

*Asset Base:*Originating from DFID's Sustainable Livelihood theory, asset base classifies resources into human (labor resources available to households e.g. number of people employable, education level, skills, health conditions), natural (land, water, soil, etc), financial (capital base including cash, credit, savings, remittances, pensions), physical (transport, shelter,

water, energy, communications, production equipments, etc) and social (networks, social relations, affiliations, association with groups, relationships of trust and cooperation) dimensions (DFID, 1999). These resources assist individuals to pursue their livelihood strategies (DFID, 1999). The Sustainable Livelihood approach believes that the ability of individuals to respond to threats depends on the resources they own or have control over and that they own these assets in different combinations (DFID, 1999). The underprivileged lacking sufficient resources or access to resources are the most susceptible to the consequences of climate change (Jones, Ludi, et al., 2010). Asset base influences people's adaptive capacity and hence is an important element in this field of study. Assets vary in space and time and are also influenced by government policies, institutions and processes (DFID, 1999).

Institutions and Entitlements: They may be criterion that control and manage access to resources. Institutions that provide for fair and non-discriminatory opportunities to its members irrespective of their age, gender, ethnicity, religion, etc. are considered to improve people's adaptive capacity (Africa Climate Change Resilience Alliance, 2011). How these institutions enable or deny people from accessing resources, scope of participation for communities and the degree to which their voices are heard and the institution's own adaptability are important in defining how and in what ways communities are able to adapt (Jones, Ludi, et al., 2010). Systems with robust institutions which may be informal organizations, networks, associations, social relationships and rules at the community level, are better equipped to adapt to the changing climate (Jones, Ludi, et al., 2010).

*Knowledge and Information:*Awareness about forthcoming and expected climate related challenges and the knowhow of how to adapt to these changes enhances people's ability to adapt (Jones, Ludi, et al., 2010). The manner in which climate change information is gathered, interpreted and dissipated says a lot about adaptive capacities of systems (Jones, Ludi, et al., 2010). There have also been discussions about the presence and use of indigenous and local knowledge of communities in responding to the changing climate. Systems need to capitalize on local informal knowledge combined with formal knowledge and practices from authorities and professionals (Jones, Ludi, et al., 2010). Accessibility of information, understanding of where to look for information are equally important concerns (Jones, Ludi, et al., 2010).

Romero-Lankao, P.et al. (2014) postulates informality as another important determinant affecting asset base and financial conditions thereby shaping exposure to hazards and adaptive responses (Romero-Lankao, Huges, et al., 2014). For instance, people without legal ownership may be less motivated for investment in house improvement for flood protection. Informality may also reduce access to resources e.g. physical capital (services like water, electricity), adversely affecting their adaptive capacity.

Romero-Lankao, P.et.al. (2014) show that studying these determinants at household, neighbourhood, city and regional levels can be helpful to explore relationships between different scales for a robust adaptive system. For e.g. good risk integration into territorial planning may reduce level of hazard damages or good community based disaster response and innovations may reduce the need for city government's investment. It is also important to look at relationships between determinants and determinants and adaptive capacity. Romero-Lankao, P.et.al. (2014) in their study show that people in low income neighbourhoods relied more on their social networks due to unawareness of how and where to look up for information or if it even existed compared to people in middle income neighbourhoods who relied more on official information in their responses to emergency events.

Although discussions on adaptive capacity focuses more on objective elements, owing to non-quantifiable characteristics of subjective elements, research highlights the importance of subjective elements in determining people's ability to adapt where the focus has been on risk

perceptions and impacts related to climate change and individual perception of adaptive capacity (Fresque-Baxter and Armitage, 2012).

Culture is a meaningful facet for insights into people's response to climate change as an influence nested in production and consumption arrangements, and society's way of living, inducing GHG emissions (Adger, Barnett, et al., 2013b). "Culture is the symbols that express meaning, including beliefs, rituals, art and stories that create collective outlooks and behaviours, and form which strategies to respond to problems are devised and implemented including both material and non-material aspects" (Adger, Barnett, et al., 2013a). It is a fundamental component in understanding people's response to climate threats depending on their perception and interpretation of risk (Adger, Barnett, et al., 2013a). It is also considered strongly connected to territory (Adger, Barnett, et al., 2013a). It is debated that climate change may distort cultures and communities in multifaceted ways especially when people are uprooted from places that they value, for instance "reduction in pastoralism as a cultural part of communities due to draught affecting more and more areas" (Adger, Barnett, et al., 2013a). Another e.g. is Brazil's indigenous tribe of Kamayura (who live by fishing), struggling with reduced fish stocks in river due to reduced rain and warm water (McCarney, Blanco, et al., 2011). Owing to the intricacies of climate change and interconnectedness of subjective and objective elements, it is necessary that research in adaptive capacity and vulnerability assessments connect both elements for a better understanding of climate change adaptation issues and related opportunities and challenges (Fresque-Baxter and Armitage, 2012).

2.6 Limits and barriers to adaptation

Since years climate change discussions and efforts have focused more on mitigation strategies, however with the rapidly changing climate, the uncertainties associated with it and the increased frequency of climate related disasters, adaptation has become a necessity globally. "Although much of the earlier international climate policy debate in the 1990s and early 2000s was pre-occupied with mitigation, the past decade has seen a growing attention given to adaptation-both its practice and its politics" (Parry et.al., 1993; Pielke et al., 2007, cited in Adger, Dessai, et al. (2008, p.336). Hence there has been an increasing focus on adaptation efforts at national, regional, municipal, community and household level.

In climate change discussions, adaptation is frequently defined as "adjustment in natural or human systems in response to actual or expected climate stimuli or their effects which moderates harm or exploits beneficial opportunities" (McCarthy el al., 2001, cited in Adger, Dessai, et al., 2008, p. 337). To understand vulnerability and adaptive capacity, it is important to consider critical elements impeding successful adaptation, concepts referred to as barriers and limits to adaptation. "Limits are traditionally analyzed as set of immutable thresholds in biological, economic or technological parameters" (Adger, Dessai, et al., 2008)(Adger, Dessai, et al., 2008, p.335). Unlike studies that define limits as derived externally, Adger, Dessai, et al.(2008) recognize limits as originating from within. This approach takes into consideration "the ways in which societies are organised, the values that they hold, the knowledge that they construct and the relationships that exist between individuals, institutions and the state" (Adger, Dessai, et al., 2008, p.338). Values implying individual and communal perceptions of meaningful facets in life are usually constantly evolving and vary inside and amidst societies and (Adger, Dessai, et al., 2008, p.338). These perceptions shape rules and systems that administer resource allocation, risk and social change (Adger, Dessai, et al., 2008, p.338). Adger, Dessai, et al. (2008, p.338) formulate limits into four sub spheres namely ethics, knowledge, risk and culture, while zooming in into their fabrication inside the society. According to (Adger, Dessai, et al., 2008, p.338). "these limits to adaptation are mutable, subjective and socially constructed".

Adger, Dessai, et al. (2008) further explains the concept under the aegis of four propositions on the four sub spheres. In the context of this research, two propositions based on ethics and risk may be relevant. The first proposition states that "any limits to adaptation depend on the ultimate goals of adaptation, which are themselves dependent upon diverse values" (Adger, Dessai, et al., 2008, p.338). The fact that adaptation efforts engage numerous actors in decision making and hence abounding and often differing ideologies, values and judgments, even more in large-scales and multiple agents, may induce conflicting results or emerge as limits to adaptation (Adger, Dessai, et al., 2008, p.338). "Values of society are not held in isolation and are different for different stakeholders with levels of influence and power over their own destinies" (Adger, Dessai, et al., 2008, p.338). Adger, Dessai, et al. (2008) also talk about scale and agency of adaptation decision making stating that understanding of adaptation calls for knowledge of the specific situation. "This requires an appreciation of the nature of the operational, managerial or strategic decision that is at stake. This in turn requires the scale and agency of decision-making to be defined" (Adger, Dessai, et al., 2008, p.340). This implies that decision making is easier at a scaled-down level as compared to a larger level involving several actors (Adger, Dessai, et al., 2008, p.340). Adger, Dessai, et al. (2008, p.340) states that "the dependency of adaptation decisions on scale and agency point to hidden limits to adaptation in an increasingly complex and inter-connected society".

Here, Adger, Dessai, et al. (2008, p.341) also talk about the differing goals of adaptation which are seldom established precisely and vary "within a sector, a society, between nation states and, most intractably, between different generations". Adger, Dessai, et al. (2008, p.341) states for instance "for those on margins of society, the immediate priority may be to secure livelihoods or protect assets from climate and other risks versus wealthier individuals who may seek to maintain their current state or standard of living. Adger, Dessai, et al. (2008, p.341) quotes (Camfield and McGregor 2005) saying "while there are different perspectives on the goals and objectives of adaptation there is, however, little discussion in the adaptation literature on the role of social and cultural values in defining these goals and objectives".

The second proposition on risk states that "social and individual factors limit adaptation action" (Adger, Dessai, et al., 2008, p.339). According to Adger, Dessai, et al.(2008), aspects like age, habit, social status, risk perception are individual but also limit concerted response for instance if a perceived or familiar consequence is considered as a risk to be responded to. This premise is relevant in the context of this research in understanding whether men and women perceive risks differently and if yes, does this difference depend on their differing access to resources which may be influenced by social rules and norms.

"For individual, and the societies they are members of, actions are shaped in part by deeply-embedded (but not static) cultural and societal norms and values" (Adger, Dessai, et al., 2008, p.344). This premise is critical to understand how social and individual characteristics including social norms, rules, beliefs, etc. shape women's capacities to adapt and creates difference between men's and women's adaptive capacities. Adger, Dessai, et al. (2008, p.344) states that "some characteristics operate at the individual level and include beliefs, preferences, perceptions of self-efficacy and controllability. These, together with perception of risk, knowledge, experience, and habitual behaviour, norms and values determine what is perceived to be a limit to adaptation-at both individual and social levels in particular society-and what is not". Adger, Dessai, et al. (2008, p.345) recognize these limits as socially formulated, individual and embedded in sociology and psychology of risk and propose that they can be subdued and they are rooted in individual beliefs. Adger, Dessai, et al. (2008, p.345) argue that "an insightful appreciation of individual and social actions-and conversely the limits to such actions-needs to be discussed and understood in terms of the characteristics of individuals and

the societies that they compose, and how these affect perceptions of risk and related behaviours".

This attribute is important in this research to understand for instance, how individuals, women in this case, with low self-efficacy, which may be an outcome of socially constructed norms and gender roles, do not consider themselves as able to act to a perceived risk. Perception of risk, knowledge and awareness are important aspects that shape how adaptation occurs (Adger, Dessai, et al., 2008, p.346). "Choices are shaped by whether local impacts are known and are anticipated, and by the cognitive-behavioural gap that exists in individuals between knowledge of impacts, values, beliefs, norms and action" (Adger, Dessai, et al., 2008, p.346). Adger, Dessai, et al. (2008, .346) also mentions that it is difficult to state how these limits can be subdued owing to the convoluted interplays of social and individual traits. "Adaptation can be viewed as providing broader benefits, not just specifically to cope with climate impacts but as part of the development process" (Apuuli et al. 2009, cited in Adger, Dessai, et al. 2008, p.341).

Eisenack et al. (2014) differentiates between limits and barriers. Barriers defined as "challenges, obstacles, constraints or hurdles that impede adaptation" differ from limits as they can be subdued and altered as opposed to limits which are 'unsurpassable'. "Barriers are understood as a reason for adaptive capacity not being translated into action or as one reason for low adaptive capacity" (Eisenack et al. 2014, p.867). Eisenack et al. (2014, p.867) mentions that barriers "can be overcome, avoided or reduced by individual or collective action with concerted effort, creative management, changed ways of thinking, political will, and reprioritization of resources, land uses and institutions". "Barriers can arise from three sources: the actor(s) making adaptation decisions, the context in which adaptation takes place or the system that is at risk of being affected by climate change" (Eisenack et al. 2014, p.867). Many studies like Eisenack and Stecker and Moser and Ekstrom talk about the role of norms and values in understanding barriers (Eisenack et al. 2014, p.868).

2.7 Conceptual Framework

The conceptual framework depicts the relationship between the core concepts of the research, which are, socio-cultural dynamics and vulnerability perception. The research assumes that socio-cultural dynamics including social norms, social rules, social status, ideologies, stereotypes and values influence the vulnerability perception of individuals. The study deals with the concepts of socio-cultural dynamics and socio-economic status, which are broad and complex concepts in themselves and have several dimensions. Owing to the time available, this research will focus on specific dimensions as highlighted in chapter 3. Apart from the direct effect of socio-cultural dynamics on individual's vulnerability perceptions, the study also assumes that there is also an indirect effect of socio-cultural dynamics on individual's vulnerability perceptions via socio-economic status. This implies that the socio-cultural dynamics by influencing individual's access to and control over resources will influence their socio-economic status thereby influencing individual's vulnerability perceptions. Hence, in this research, socio-cultural dynamics is the independent variable, vulnerability perception is the dependent variable and socio-economic status is the mediating variable. The core concepts and the mediating concept is conceptualized in chapter 3 based on the theories and definitions highlighted in the theoretical review

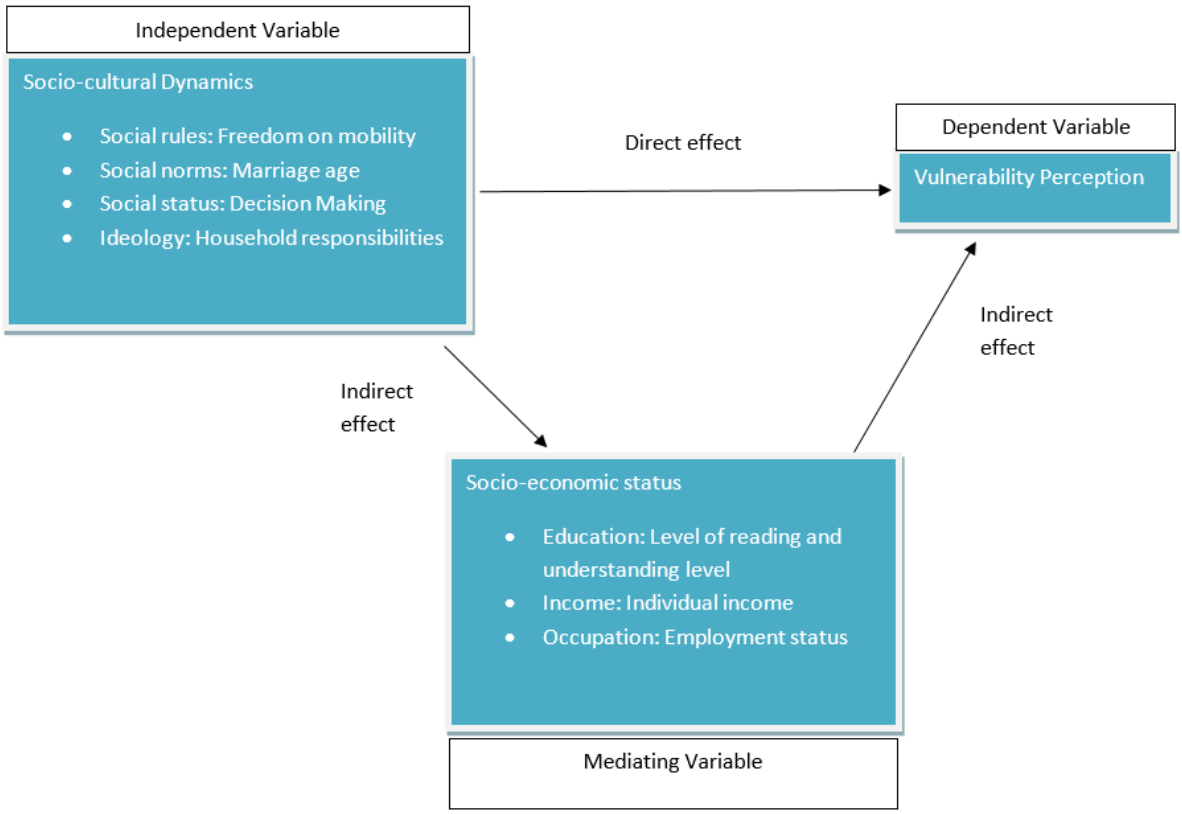


Figure 2.1 Conceptual Framework

Chapter 3 : Research Design and Methods

3.1 Research Objectives

This research will try to measure vulnerability perception of men and women in the slum areas of Indore city in India. The study will then try to understand the differences in opportunities and rights for men and women and their socio-economic status also reflecting socio-cultural dynamics and then try to see how these factors influence vulnerability perception.

3.2 How do socio-cultural factors make women feel more vulnerable to climate change? Study of informal settlements in Indore, India.

- Do women have a lower socio-economic status than men?
- Do women have lower opportunities and rights than men?
- Does this translate into a higher perceived vulnerability to climate change?

Concept	**Definition**
Vulnerability	"vulnerability of a given system or society is a function of its physical exposure to effects and its ability to adapt to these conditions" (IPCC, 2013) "Vulnerability to climate change is the degree to which geophysical, biological and socio-economic systems are susceptible to, and unable to cope with, adverse impacts of climate change" (Intergovernmental Panel on Climate Change, 2007) "Vulnerability is not only the exposure to hazards that puts people at risk, but also socio-economic and political processes in society that generate vulnerability" (Heijmans, 2001, p.2)
Vulnerability perception	How much people perceive themselves as vulnerable to the threats of climate change and natural hazards

Socio-cultural dynamics	"Cultural refers to the shared beliefs, values, traditions, and behaviour patterns of a particular group. Culture is transmitted from one generation to the next by parents, teachers, religious leaders, and other respected members of the culture. This process of transmitting culture across generations is known as socialization" (Peplau, Veniegas, et al., 1999, Adger, Dessai, et al., 2008) The key elements of culture include: • Social Norms: "Rules and expectations about how group members should behave are known technically as social norms" (Peplau, Veniegas, et al., 1999) • Social Rules: "This term refers to the set of social norms about how a person in a particular social position such as a mother or warrior is expected to act. Social roles define the rights and responsibilities of group members and prescribe which qualities and behaviours are appropriate or ideal and which are unacceptable" (Peplau, Veniegas, et al., 1999) • Status and Power: "Social status refers to a person's rank, privileges, or power in a group" (Peplau, Veniegas, et al., 1999) • Values: "Beliefs about which behaviours and personal qualities are important and which are inconsequential" (Peplau, Veniegas, et al., 1999). Values implying individual and communal perceptions of meaningful facets in life are usually constantly evolving and vary inside and amidst societies Adger et. al (2008) • Ideology:"Individual's beliefs about proper or appropriate roles for women and men constitute their gender-role ideology. Traditionals endorse a division of labour by gender and a pattern of male dominance" (Peplau, Veniegas, et al., 1999) For the purpose of this research, socio-cultural dynamics are conceptualized as comprising of social norms, social rules and social status and ideologies that guide resource allocation and define rights and opportunities that facilitate access to resources.
Socio-economic status	"Socioeconomic status is often measured as a combination of education, income and occupation. It is commonly conceptualized as the social standing or class of an individual or group. When viewed thorough a social class lens, privilege, power, and control are emphasized. Furthermore, an examination of socioeconomic status as a gradient or continues variable reveals inequities in access to and distribution of resources" (American Psychological Association, 2016)

Concept	**Variable**	**Indicator**
Vulnerability Perception	Perception of vulnerability	How vulnerable do respondents feel of a possible future climatic threat or natural hazard
Socioeconomic status	Education	Highest level of education Level of reading and writing

	Occupation	Occupational status
	Income	Individual income of respondents
Socio-cultural Dynamics	Ideology	Household responsibilities
	Social norms	Marriage age
	Social rules	Freedom of mobility
	Social status	Status within the household Health status

3.3 Research Strategy

The literature review includes definitions from various sources of the concepts used in this study. The operationalisation puts together some of these definitions and constructs a definition that fitsthe context of this study.

In order to answer the research questions, a survey approach was used as the research strategy. (Verschuren and Doorewaard, 2010) describes survey as "a type of research in the course of which the researcher tries to gain an overall picture of a comprehensive phenomenon spread out over a stretch of time and/ or space". Keeping in mind the purpose of this research, the study required to cover a large number of research units which implied large amount of data generation. The choice of a survey research therefore allowed for the use of smart data generating tools for a quantitative analysis of the data generated. Moreover, the survey strategy allowed for an empirical research, as it was unlikely to find the relevant data in existing literature. The subject in focus comprises of a large number of units, i.e. men and women from informal settlements in the city of Indore. Since the research engages a large number of research units, it was not feasible to do an in-depth analysis in the time available, the focus of the study was on breadth rather than depth.

The first step towards implementation was determining respondent's vulnerability perception by asking them how much they feel vulnerable to a possible climatic threat or natural hazard including floods, droughts, and natural hazards. This indicator was be used to measure vulnerability perception.

On the other hand, socio-cultural norms were measured through the following indicators:

- Ideology: Household Responsibilities
- Social norms: Marriage age
- Social rules: Freedom of mobility
- Social status: Status within the household

The study also hypothesises that socio-cultural norms may influence individual’s vulnerability perception by influencing their socio-economic status. Therefore, to test the mediation effect, socio-economic status was measured as through respondent’s income, occupation and education.

3.4 Data Collection method and instrument

Due to the context of this study, where it is unlikely to find relevant data in existing literature, the focus was on primary data collection. Primary data is defined as "data that are collected for

the specific research problem at hand, using procedures that fit the research problem best"(Hox and Boeije, 2005). Moreover, the study is dealing with evolving concepts like socio-economic status, socio-cultural dynamics and vulnerability perception, therefore they must be studied in the current context, in order to make accurate interpretations.

In order to work with large number of research units, questionnaires which included close ended questions were used as the data collection instrument. This helped the study to know each respondent's vulnerability perception to climate change and natural hazards, the socio-cultural context for every individual respondent and ask them questions about their socio-economic characteristics. Due to the fact that the respondents were from poor economic backgrounds, where only a few have access to computers, and many have low levels of education with difficulties in reading and writing, and due to distance issues, three coordinators were hired to support data collection. These coordinators were from civil society organization called Cecoedecon, who works with slum inhabitants in the city on issues related to environment and climate change, women & child development, health & malnutrition and natural resource management.

In view of the large number of research units resulting in large data that was expected to originate, quantitative processing was carried out to allow for quantitative analysis of the data.

3.5 Sample size and Selection

3.5.1 Sampling

(Neumayer and Plumper, 2007) defines population as "the abstract idea of a large group of many cases from which a researcher draws a sample and to which results from a sample are generalized". Target population is defined as "the specific pool of cases that he or she wants to study" (Neumayer and Plumper, 2007, p.224). The population in this case is the inhabitants of the slums in the city of Indore. According to Neumayer and Plumper (2007, p.225), the concept of population is abstract as it is "impossible to pinpoint it concretely", and hence it needs an operational definition which includes all the elements in the population as closely as possible". For this reason, the sampling frame, which is defined as a "specific list that closely approximates all the elements in the population" was created (Neumayer and Plumper, 2007, p.225). The size of the slum population in Indore is 590,257. However, due to time constraints and financial constraints, it was not feasible to cover the entire population in this research. Therefore, for the ease of data collection in was decided to take into consideration all the slums that the organisation Cecoedecon, works in. This helped in getting access to data like no. of males, no. of females besides the actual data collection.

In order to select the sample, stratified random sampling was used first. Stratified sampling is defined as "a random sample in which the researcher first identifies a set of mutually exclusive and exhaustive categories, divides the sampling frame by the categories, and then uses random selection to select cases from each category" (Neumayer and Plumper, 2007, p.231). The following steps were undertaken to create a stratified random sample:

First the population for this research was defined as the slum population in the city of Indore. Section-3 of the Slum area improvement and clearance act, 1956, defines slums as mainly "those residential areas where dwellings are in respect unfit for human habitation by reasons of dilapidation, overcrowding, faulty arrangements and designs of such buildings, narrowness or faulty arrangement of streets, lack of ventilation, light, sanitation facilities or any combination of these factors which are detrimental to safety, health and morals" (Government of India, 2011). In the Census of India 2011, three types of slums have been defined, namely notified, recognized and identified slums (Government of India, 2011). From the selected slums, only individuals 18 years old and above were included to be able to fairly compare

aspects like education level, employment status and because adult people may be better able to understand and answer the questions accurately. The table below notes the demographics of the slums included in this research.

S. No.	Name of the Slum	Households	No. of Males (18 years and above)	No. of Females (18 years and above)	Total	BPL Families (Below poverty level)	% of BPL Families	Literacy Rate
1	Ma Bhagwati Nagar	104	243	261	503	8	7.69%	40%
2	Somnath Ki Chal	426	1130	1000	2130	67	41.36%	38%
3	Pawan Puri palda	588	1719	1486	3205	318	54.08%	30%
4	Aman Nagar	722	1940	1672	3612	58	29.15%	30%
5	Shri Ram Nagar	148	288	274	562	21	14.19%	40%
6	Durga Nagar	329	763	743	1486	101	30.70%	25%
7	Sunder Bagh	54	135	131	266	10	18.52%	25%
8	Mayapuri	145	342	262	604	49	33.79%	35%
9	Balda Colony	547	1388	1349	2737	147	31.28%	42%
10	Samaj Vad Nagar	480	1276	1197	2473	146	30.42%	45%
11	Biyabani Dhar Road	106	282	232	514	12	11.32%	45%
12	Khajrana Gaon	803	2316	2307	4623	136	16.94%	35%
13	Rahul Gandhi Nagar	468	1384	1129	2513	249	53.21%	22%
14	Niranjanpura Nai Basti	570	1761	1565	3326	163	28.60%	20%
15	Narval	467	1542	1271	2813	104	22.27%	25%
16	Bara Bhai ,	249	534	541	1075	79	53.02%	30%
17	Choti Khajarani	698	2224	1946	4170	292	41.83%	30%

18	Roop Nagar	291	662	568	1230	183	62.89%	25%
19	Bhawna Nagar	573	1161	1097	2258	119	20.77%	20%
20	Sanjay Gandhi	366	904	850	1704	183	50.00%	15%
21	Shanti Nagar	996	2433	2383	4816	669	67.17%	20%
22	Kumedi Kankad	208	553	468	1021	41	19.71%	22%
23	Mahu Naka Chhatripura	285	802	721	1523	4 9	46.67%	30%
24	Dhiraj Nagar	505	1420	1105	2525	504	71.49%	25%
25	Bapu Gandhi Nagar	243	643	552	1195	83	34.16%	25%
26	Prakash Chandra Shethi Nagar AB Road	448	929	904	1833	175	39.06%	30%
27	Lahiya Colony	330	1013	837	1850	65	21.45%	20%
28	Kanjar Mohalla	140	411	395	806	93	66.43%	30%

Table 3.1Demographics

Source: Community organisation (Cecoedecon) data base, 2015

After this listing of the stratifications, sample size was determined using the following formula.

3.5.2 Sample Size

The sample size for this study was calculated using Yamane's formula (Kasiulevičius, Šapoka, et al., 2006).

$$n = \frac{N}{1 + Ne^2}$$

Where N is the size of the population and n is the size of the sample, e is the level of precision. In this case, size of the slum population in Indore is 590,257. However, for this specific study, only 28 slums were included where the total male and female population (18 years or above) was found to be 57373. In this research a standard confidence interval of 95% was used and margin of error of 8% to allow for a smaller sample size because of limited time and financial constraints.

$$\frac{57373}{[1 + 57373(0.08 * 0.08)]} = 155.825$$

Therefore, the resulting sample size was 156 men and 156 women, i.e. 312. In the effort to cover as many respondents as possible, this number was increased to 320 initially. To ensure

that the sample represents the population in consideration, it was first calculated what proportion of the total population is represented by each slum by dividing individual total population (males and females) of each slum to the total population of males and females. Then this proportion was multiplied by 320 (156+156) to know what proportion of sample is required from each slum (column G), these figures were then rounded off to whole numbers (column H). Now since the study aimed to cover equal number of male and female respondents from each slum, all the odd number values in column H were made even by adding 1 (column I). This resulted in a total sample size of 332 (i.e. 166 males and 166 females).

The research units were hence selected based on the relative size on the sub-populations.

A	B	C	D	E	F	G	H	I
Name of the Slum	No. of Households	No. of Males (18 years and above)	No. of Females (18 years and above)	Total	Proportion of the total male and female population of the selected slums	Percentage of the required sample size (320)	Rounded figures	Sample size from each slum
Ma Bhagwati Nagar	104	243	261	503	0.0087671 9	2.8055008 45	3	4
Somnath Ki Chal	426	1130	1000	2130	0.0371254 77	11.880152 69	12	12
Pawan Puri palda	588	1719	1486	3205	0.0558625 14	17.876004 39	18	18
Aman Nagar	722	1940	1672	3612	0.0629564 43	20.146061 74	20	20
Shri Ram Nagar	148	288	274	562	0.0097955 48	3.1345754 97	3	4
Durga Nagar	329	763	743	1486	0.0259006 85	8.2882191 97	8	8
Sunder Bagh	54	135	131	266	0.0046363 27	1.4836247 02	1	2
Mayapuri	145	342	262	604	0.0105276	3.3688320 29	3	4
Balda Colony	547	1388	1349	2737	0.0477053 67	15.265717 32	15	16
Samaj Vad Nagar	480	1276	1197	2473	0.0431038 99	13.793247 69	14	14

Biyabani Dhar Road	106	282	232	514	0.008958918	2.866853747	3	4
Khajrana Gaon	803	2316	2307	4623	0.080577972	25.78495111	26	26
Rahul Gandhi Nagar	468	1384	1129	2513	0.043801091	14.01634915	14	14
Niranjanpura Nai Basti	570	1761	1565	3326	0.0579715 2	18.55088631	19	20
Narval	467	1542	1271	2813	0.049030032	15.689610 1	16	16
Bara Bhai ,	249	534	541	1075	0.018737037	5.995851707	6	6
Choti Khajarani	698	2224	1946	4170	0.072682272	23.25832709	23	24
Roop Nagar	291	662	568	1230	0.021438656	6.8603698 6	7	8
Bhawna Nagar	573	1161	1097	2258	0.039356492	12.59407735	13	14
Sanjay Gandhi	366	904	850	1704	0.029700382	9.504122148	10	10
Shanti Nagar	996	2433	2383	4816	0.083941924	26.86141565	27	28
Kumedi Kankad	208	553	468	1021	0.017795827	5.694664738	6	6
Mahu Naka Chhatripura	285	802	721	1523	0.026545588	8.494588047	8	8
Dhiraj Nagar	505	1420	1105	2525	0.044010249	14.08327959	14	14
Bapu Gandhi Nagar	243	643	552	1195	0.020828613	6.665156084	7	8

Prakash Chandra Shethi Nagar AB Road	448	929	904	1833	0.031948826	10.22362435	10	10
Lahiya Colony	330	1013	837	1850	0.032245133	10.31844247	10	10
Kanjar Mohalla	140	411	395	806	0.01404842	4.495494396	4	4
Total	11289	30198	27246	57373	1	320	320	332

Table 3.2 Relative size on the sub-populations

Sampling ratio which is defined as "the ratio of the size of the sample to the size of the target population", in this case is 0.57 percent (332/57373).

3.5.3 Sample Size

The sample size for this study was calculated using Yamane's formula (Kasiulevičius, Šapoka, et al., 2006).

$$n = \frac{N}{1 + Ne^2}$$

Where N is the size of the population and n is the size of the sample, e is the level of precision.

In this case, size of the slum population in Indore is 590,257. In this research a standard confidence interval of 95% was used and margin of error of 8% to allow for a smaller sample size because of limited time and financial constraints.

$$\frac{590257}{[1 + 590257(0.08 * 0.08)]} = 156.20$$

In order for the study to be valid and reliable, efforts will be made to study as many respondents as possible in the time available. To start with, the study aims to survey 320 respondents (i.e. 160 men and 160 women).

3.6 Limitations of the study and validity and reliability

There are several challenges associated with the kind of research design that the study engages in. This section highlights the most critical challenges that might have had the greatest impact on research findings. One of the limitations of this research was with regards to the concepts that it deals with including socio-cultural dynamics and socio-economic status. These concepts are complex and broad concepts and have several dimensions within themselves. With the time available for this research, it was not possible to take into consideration all these dimensions. Another limitation of the study was language barrier between the researcher and the respondents. Although 3 local coordinators were hired for data collection, concepts like vulnerability perception maybe difficult to be incorporated without understanding the detailed background of the respondents. And since the data collection was done through close ended questions in questionnaires, this was not feasible. This made it difficult to do an in-depth analysis. However, considering the survey research strategy, the focus of this research was on

breadth rather than depth. Further, since the study is based only on slums for which data was available and where data collection was possible, generalization of the results to a broader context is challenging. Another challengewas the difficulty to do an in-depth analysis of the respondents, their background and history, which may be important in understanding specific dimensions of socio-cultural dynamics. However, with the limited data availability, time and financial constraints, this was not feasible. Moreover, issues of reliability were also addressed in this research by developing suitable and focused measures for each concept. The measures used for each concept were extracted from other literatures and hence were based on theories, thereby emphasizing their scientific relevance.

3.7 Data Analysis

The data collected was then analysed using statistical software SPSS (Statistical package for social sciences). First a number of t-test were performed in SPSS, for every indicator, to facilitate comparison between males and females. Additionally, regression was performed to understand the influence of:

1. socio-cultural dynamics on vulnerability perception
2. socio-cultural dynamics on socio-economic status
3. socio-economic status on vulnerability perception
4. socio-cultural dynamics and socio-economic status on vulnerability perception

Chapter 4 : Research Findings

This chapter presents the findings from the data collected through questionnaires. The beginning of this chapter gives a brief overview of the background explaining the context in which the study is conducted. Apart from the basic characteristics of the area studied and the respondents, the chapter also includes statistics, pictures and maps for a better understanding of the research area. To answer the research questions, statistical tests were conducted using SPSS, results for which are also presented in this chapter.

4.1 Background information of the study area (Madhya Pradesh)

The study is focused in Indore city in the state of Madhya Pradesh (MP), the second largest state, located in central India, with an area of 3.08 lakh square kilometre (PRIA, 2014). The state, rich in natural resources with abundant forest cover, has 51 districts which are divided into 362 tehsils, 313 community development blocks, 54903 villages and 476 towns. 14 urban towns are governed through municipal corporations, 100 through municipalities and rest through nagarparishad (PRIA, 2014).

Source: Maps of India (2015)

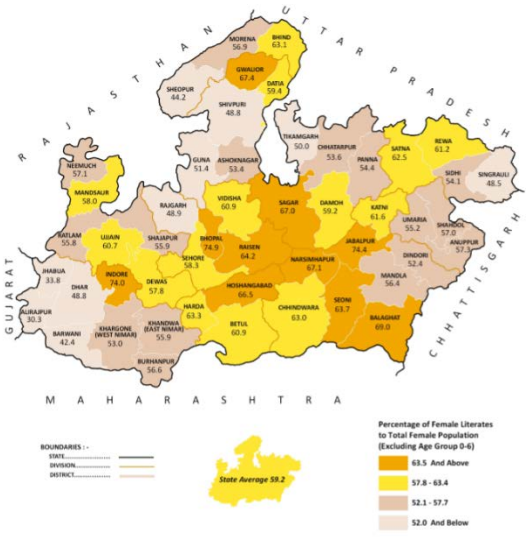
Figure 4.1 India: States and Union Territories

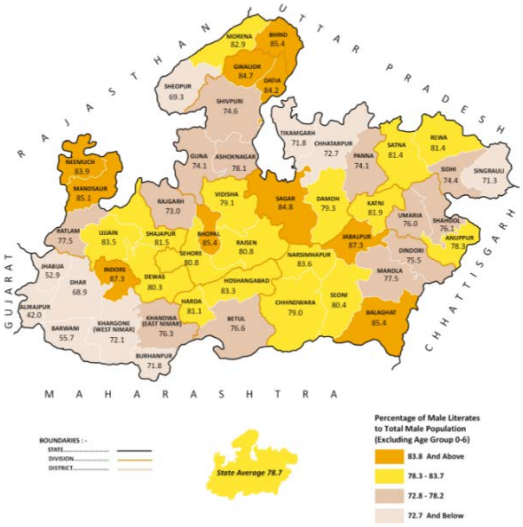
	Population of India					Population of Madhya Pradesh				
	2001 (in million)	2011 (in million)	Difference	Percentage		2001 (in million)	2011 (in million)	Difference	Percentage	
				2001	2011				2001	2011
Total	1,028.70	1,220.20	181.5	100	100	60.3	72.6	12.3	100	100
Urban	286.1	377.1	91	27.81	31.16	16	20.1	4.1	26.53	27.69

Source: Government of India (2011)

Table 4.1 Population of India and Madhya Pradesh

As per Census 2011, MP had a population of 7.27 Crores (72,626,809, 72.7 million) with 37,612,306 males and 35,014,503 females. The population in 2001 was 6.03 crore (60,348,023, 60.3 million) and has experienced a 20.35% growth in the decade against the national growth rate of 17.7% (Ministry of Home Affairs, 2011b). The population density of the state is 236 per sq km in comparison to 382 per sq km of India (Ministry of Home Affairs, 2011b). Out of the total state population of 72.6 million, 52.6 million population lives in rural areas and 20.1 million (29.69% of the total population) live in urban areas (Ministry of Home Affairs, 2011b). Out of the total increase of 12.3 million population of the state, in the last decade, 8.2 million is from rural areas and 4.1 million is from urban areas (Ministry of Home Affairs, 2011b).





Source: Ministry of Home Affairs, (2011c)

Figure 4.2 Male literacy of MP **Figure 4.3** Female literacy of MP

The state has a literacy rate of 74% for females as compared to 87% for males. And the state average is 69.32%(Ministry of Home Affairs, 2011c). In year 2011-12, the state of Madhya Pradesh had 31.65% of population below poverty line out of which 21% is in urban Madhya Pradesh (Reserve Bank of India, 2013).

4.2 Indore District and city

Indore is the largest city in Madhya Pradesh. According to Census 2011, Indore recorded the highest total population of 12,543,372 in the state with an urban population of 4,012,635 (Ministry of Home Affairs, 2011b). It is important in this study to note that India is a country with people from diverse religions, classes and castes and consequently people exist in different socio-cultural contexts. The city is home to people from diverse religions with 80.18% Hindu followers, 14.09% Muslim followers, 3.25 % Jainism followers, 1.09 % Sikhism followers, 1.09% Buddhism followers, 0.65% Christianity followers and 0.03% population following other religions and 0.21% population following no particular religion (Ministry of Home Affairs, 2011a). “The city, located on the southern edge of fertile Malwa plateau (22°.43 ‘N, 76°.42 ‘E), has an average altitude of 550 m above Mean Seal Level. The total planning area of Indore is 504.87 sqkm including the Indore Municipal Corporation (IMC) area” (TARU, 2009). The city is the largest and most crucial commercial/ industrial hub of the state of Madhya Pradesh. Engineering and textile units, food processing (Soya, sunflower and pulses), pharmaceutical, iron & steel foundries, leather, automobile components, industrial chemicals, mini cement plants, mini steel plants, solvent extraction, soap and detergents, are few of the main industries (TARU, 2009). Known as the business capital of the state and owing to its cultural history, the city has experienced an enormous influx of migrants. Migration along with the general population increase and extension of city boundaries, has resulted in an increase in the city’s population of 32.9% (i.e. 485,663 in absolute numbers) over the course of a decade (Agarwal, 2016).

Source: (Maps of India, 2011)

Figure 4.4 Indore Map

The core city is administered by Indore Municipal corporation (IMC), which is entrusted mostly with the maintenance of the roads, water, drainage, sewerage, transport, street lighting, solid waste management along with the slum development and other city administration functions. IMC has tried to incorporate many urban sector reforms. The metropolitan area has a population of 32.77 lakhs with population density of about 3727 per sqkm (PRIA, 2014). The Indore Development Authority (IDA) is responsible for most of the development works including colonies, shopping centres, roads and over-bridges with the whole development area (TARU, 2009). The urban poverty ratio in the city is 2.80% of the urban population. Unemployment rate in the city is 2.07% (Ministry of Urban Development, 2015). The city relies on two small dams that are close by, the Narmada river based pumping systems and ground water apart from other water sources. A large section of population is deprived of sufficient water supply due to the mismatch of water supply and growing demand as a result of the growing urban population. According to 2009 data, the city was able to manage 180 million litres per day (mld) compared to a total requirement of almost 270 mld(TARU, 2009). According to Census 2011, “there were 4,62,075, urban households in Indore district out of which 74% is good, 23% is livable and 3% is dilapidated. 59% have water sources in their homes, 29% have water source in nearby area and rest 12 % of the household have to travel far off for water source. 98% of households have electricity and 1.3 % use kerosene as source of lighting. 67% of households use banking services” (PRIA, 2014).

According to the study done by PRIA in 2009, 63% out of 4041 towns in India reported slums. 37072 slum blocks have been notified, 30846 have been recognized and 40,309 have been identified. 17.4% of 789 lakh households in the country are slum households (PRIA, 2014). Indore has the highest percentage of population in slums, in the state of Madhya Pradesh., i.e., 5.90 lakh population (590,257) in 1.14 lakh slum households. 30 % of the population of Indore lives in slums (Agarwal, 2016). The Indore municipal corporation deals with the biggest slum population of 5,90,257 slum dwellers in Madhya Pradesh (Times of India, 2013).

4.3 Women and gender Indore

Although recent data on gender statistics in Indore was not accessible, the data on 'Gender Equality and Women's Empowerment' from 'National family health survey', that was published in 2009, as presented below, indicates of the low status of women in Indore slums (Government of India, 2009).

Percentage of women (age 15-49 years) married before exact age 18 and men (age 15-49 years) married before exact age 21 in Indore slums	
Percentage of women married by exact age 18	Percentage of men married by exact age 21
48	22.4

Percentage of women age 15-49 who are allowed to go alone to three places (market, health facility, and outside the community) and percentage with a bank or savings account that they themselves use	
Percentage allowed to go alone to all three places	Percentage with a bank or savings account they themselves use

50.6	**18.6**

Percentage of women and men age 15-49 who agree with at least one reason for wife beating in Indore slums	
Percentage of women who agree that a husband is justified in hitting or beating his wife for at least one specified reason	Percentage of men who agree that a husband is justified in hitting or beating his wife for at least one specified reason
25.4	39.6

Percentage of married women who usually make decisions about own health care	
Alone	Jointly
29.3	43.9

Percentage of married women who usually make decisions about making large household purchases:	
Alone	Jointly
7.6	61.9

Percentage of married women who usually make decisions about making purchases for daily needs:	
Alone	Jointly
34.5	38.4

Percentage of married women who usually make decisions about visits to her family or relatives	
Alone	Jointly
10.3	59.5

4.4 Climate Change Vulnerability Indore

The city's water supply system faces potential threat due to the changing climate. "Downscaled climate information suggests an increase in surface temperature of 2 to 4 °C, and a range of rainfall amounts of -4% to +8% by 2046-2065" (National Oceanic and Atmospheric

Administration (NOAA), 2011). The climate change vulnerability assessment report of 2014 highlights that "Indore has high vulnerability with respect to water resource index. It also highlights that the city has moderate Environmental vulnerability (GIZ, 2014).

"In the ACCRN's vulnerability assessment of the city, the Education Capacity Index (ECI) indicates that the literacy rate is comparatively high, however the level of education hardly provides any benefit in terms of earning capacity. The Income Stability Index (ISI) indicates that nearly one third of city's households (predominantly slum, lower income and middle income categories) have less income stability. The Loan and Insurance Vulnerability Index (LVI) indicates the penetration of insurance is poor (less than 25%) as well as incidence of loans is higher in case of lower and slum SECs. This causes higher financial vulnerability to these households." (TARU, 2009).

4.5 Sample characteristics

The study covers respondents from 28 slums in Indore as mentioned in the table below. The table also shows the number of households, number of male and female population, number of families living below poverty line and literacy percentage of these slum areas.

S. No.	Name of the Slum	Households	Male	Female	Total	BPL Families	% of BPL Families	Literacy Rate
1	Ma Bhagwati Nagar	104	243	261	503	8	7.69%	40%
2	Somnath Ki Chal	426	1130	1000	2130	67	41.36%	38%
3	PawanPuripalda	588	1719	1486	3205	318	54.08%	30%
4	Aman Nagar	722	1940	1672	3612	58	29.15%	30%
5	Shri Ram Nagar	148	288	274	562	21	14.19%	40%
6	Durga Nagar	329	763	743	1486	101	30.70%	25%
7	Sunder Bagh	54	135	131	266	10	18.52%	25%
8	Mayapuri	145	342	262	604	49	33.79%	35%
9	Balda Colony	547	1388	1349	2737	147	31.28%	42%
10	SamajVad Nagar	480	1276	1197	2473	146	30.42%	45%
11	Biyabani Dhar Road	106	282	232	514	12	11.32%	45%
12	KhajranaGaon	803	2316	2307	4623	136	16.94%	35%
13	Rahul Gandhi Nagar	468	1384	1129	2513	249	53.21%	22%
14	NiranjanpuraNaiBasti	570	1761	1565	3326	163	28.60%	20%
15	Narval	467	1542	1271	2813	104	22.27%	25%
16	Bara Bhai ,	249	534	541	1075	79	53.02%	30%
17	ChotiKhajarani	698	2224	1946	4170	292	41.83%	30%
18	Roop Nagar	291	662	568	1230	183	62.89%	25%
19	Bhawna Nagar	573	1161	1097	2258	119	20.77%	20%
20	Sanjay Gandhi	366	904	850	1704	183	50.00%	15%

21	Shanti Nagar	996	2433	2383	4816	669	67.17%	20%
22	KumediKankad	208	553	468	1021	41	19.71%	22%
23	Mahu Naka Chhatripura	285	802	721	1523	4 9	46.67%	30%
24	Dhiraj Nagar	505	1420	1105	2525	504	71.49%	25%
25	Bapu Gandhi Nagar	243	643	552	1195	83	34.16%	25%
26	Prakash Chandra Shethi Nagar AB Road	448	929	904	1833	175	39.06%	30%
27	Lahiya Colony	330	1013	837	1850	65	21.45%	20%
28	KanjarMohalla	140	411	395	806	93	66.43%	30%

Table 4.2 Slum characteristics

Main occupations in these slums include shoemaking, vegetable selling, trash collection for men. They find irregular work as labourers in factories and construction sites also. Women who work, are involved in jobs such cooking and cleaning in nearby houses (maid servants), dressmaking, selling kitchen utensils and making wooden baskets.

Gender	Frequency	Percent
Female	166	50
Male	166	50
Total	332	100

Table 4.3 Gender distribution of respondents

360 questionnaires were distributed in 28 slums out of which 332 questionnaires were filled completely, incomplete and unfilled questionnaires were excluded. The data collected was entered into an excel file and then the file was imported into SPSS. Before starting any statistical analysis, the data was first checked and corrected for errors. 166 female respondents and 166 male respondents were surveyed who aged between 19 to 80 years.

Gender			Age	Marriage age	Income
Females	Mean		38.05	18.1	1930.78
	Median		37	18	1000
	Mode		30	18	0
	Std. Deviation		10.929	3.135	2396.4
	Range		47	17	12000
	Minimum		19	9	0
	Maximum		66	26	12000
	N	Valid	166	147	166
		Missing	0	19	0
Males	Mean		39.08	22.72	6933.73

	Median	40	23	7000
	Mode	40	23	7000
	Std. Deviation	11.617	3.279	3420.129
	Range	60	20	20000
	Minimum	20	16	0
	Maximum	80	36	20000

Table 4.4 Frequency distribution of age, marriage age and income of respondents

The average age of female respondents was 38 and that of male respondents was 39. However the sample as a whole, covered respondents from all ages which is reflected in the high standard deviation (Female SD = 11, Male SD = 12).

Marital Status	**Female**		**Male**	
	Frequency	**Percent**	**Frequency**	**Percent**
single	10	6	19	11.4
married	138	83.1	141	84.9
divorced	4	2.4	1	0.6
widowed	14	8.4	5	3
Total	166	100	166	100

Table 4.5 Respondents Marital Status

83% of female respondents were married in comparison to 85% male respondents. Education level of the respondents was generally low with striking difference between male and female respondents. Where 13% of female respondents had no formal education, only 11% completed education up to senior school in comparison of .6% male respondents with no formal education and 24% who completed education up to senior school.

Gender	**Education level**	**Frequency**	**Percent**
Female	illiterate	21	12.7
	below primary	55	33.1
	primary	44	26.5
	secondary	27	16.3
	senior	18	10.8
	bachelors	1	.6
	Total	166	100.0
Male	illiterate	1	.6
	below primary	19	11.4
	primary	43	25.9
	secondary	51	30.7
	senior	40	24.1

	bachelors	10	6.0
	masters	2	1.2
	Total	166	100.0

Table 4.6 Education level of respondents

4.6 Testing differences

The section below presents t-test results comparing results for male and female respondents for each variable as noted in the operationalisation. The section is divided into parts presenting findings for each concept (i.e. socio-economic status, socio-cultural dynamics and vulnerability perception).

4.6.1 Socio-economic status

4.6.1.1 Education level (Level of reading and understanding texts)

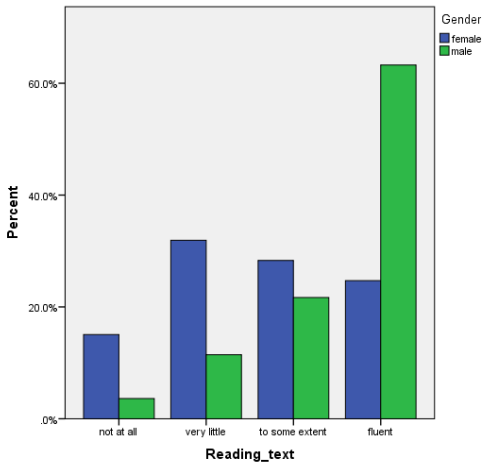


Figure 4.5 Level of reading text

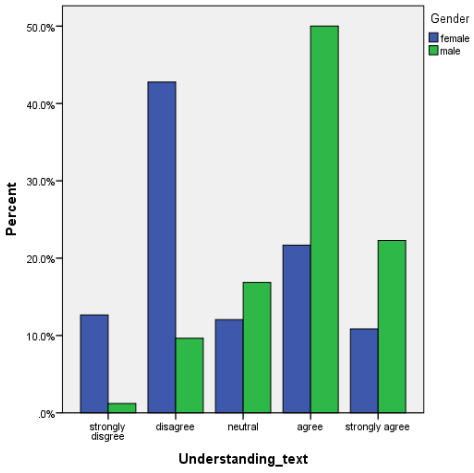


Figure 4.6 Level of understanding text

As regards the level of reading text, the respondents were specifically asked as "to what extent are they able to read information in the local language (Hindi). Figure 1 shows that while 15% of female respondents said they cannot read text at all in comparison to just 3.6% male respondents, just 24% of female respondents said they can fluently read text in comparison to 63% of male respondents.

Whereas, when respondents were asked "how much they agree to the statement 'you understand the main idea of the text'", in order to know their level of understanding texts in the local language (Hindi), figure 2 shows that 43% of female respondents disagreed to the statement, whereas a cumulative percentage of 17% was recorded for male respondents who strongly disagreed, agreed or were neutral to the statement. 50% of the male respondents agreed to the statement saying that they can understand texts in Hindi.

An independent t-test was conducted to compare mean scores of reading and understanding text for female and male respondents. The results showed that there was significant difference in the mean scores for female (M=2.77, SD=1.54) and male respondents (M=3.63, SD=.82) on conditions, (t(252) = -6.33, p = .00, d = .85). Men are on average .85 times more likely to read and understand text.

4.6.1.2 Income

Gender	N	Minimum Income	Maximum Income	Mean Income	Standard Deviation
Female	166	0	12000	1930.78	2396.400
Male	166	0	20000	6933.73	3420.129

Table 4.7 Income of respondents

The findings also showed a considerable difference in average incomes for female respondents (M = 1930.78, SD = 2396) and male respondents (M = 6933.73, SD =3420. 129) with maximum scores of 12,000 and 20,000 respectively.

An independent t-test was conducted to compare mean scores of income for female and male respondents. The results showed that there was significant difference in the mean scores for female (M=1930.78, SD=2396) and male respondents (M=6933.73, SD=3420) on conditions, (t(295.547) = 15.435, p = .00, d = 5002.952). Men on an average have 5003 (INR) higher income than women.

4.6.1.3 Occupation

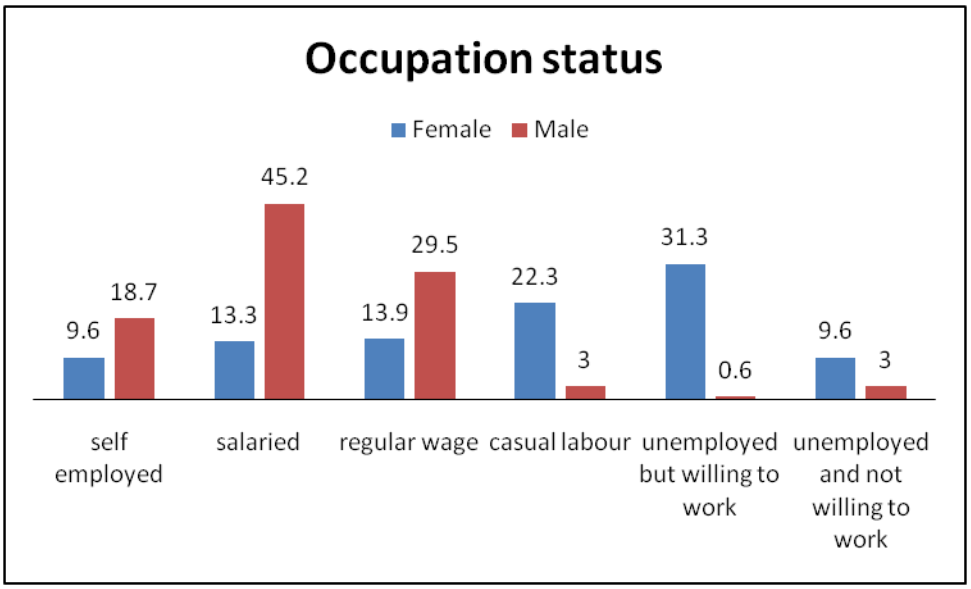


Figure 4.7 Occupation status of the respondents

The findings show that 31% of female respondents were unemployed but willing to work in comparison to just 3% male respondents. It also appears that relatively, a large percentage of female respondents (22%) were engaged in casual labour and very few in salaried employment (13%) in comparison to just 3% male respondents engaged in casual labour and 45% in salaried employment. Casual labour mainly involves sewing, stitching, making wooden baskets, and other occupations many of which are undertaken irregularly and do not require going out of the house.

A t-test was not possible in this case because, occupational status here is a categorical variable.

4.6.2 Socio-cultural dynamics

4.6.2.1 Social Rules (Freedom on mobility)

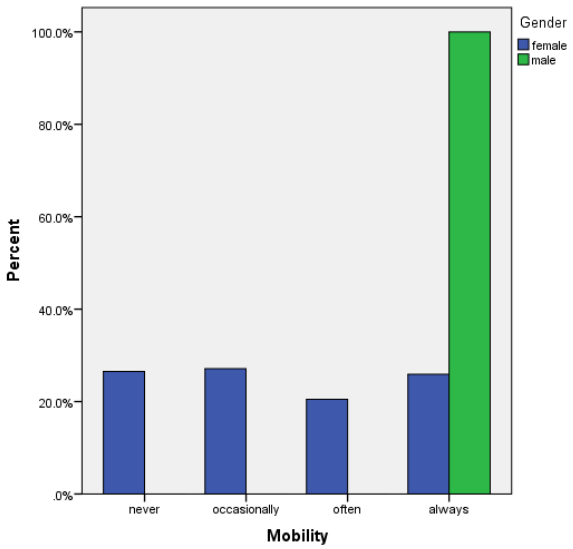


Figure 4.8 Freedom of mobility of female and male respondents

In terms of *freedom on mobility*, research findings indicate that 26.5% of female respondents said that they are never allowed to go out of the house without being accompanied by another family member, relative or a friend while 100% of the male respondents answered that they have no restrictions on mobility. Additionally, to understand the *limit on freedom of mobility*, the respondents were asked 'until what time of the day, are they allowed to move out of their houses, for work, without being accompanied by any other family member, relative or friend'. Table.. shows that 27% of female respondents are not allowed to go out of the house by themselves, while 13% have no restrictions on mobility. These responses were mainly from female respondents aged 50 and above. Whereas 100% of the male respondents have no limit on mobility.

Gender	Freedom of mobility	Frequency	Percent
Female	never	44	26.5
	occasionally	45	27.1
	often	34	20.5
	always	43	25.9
	Total	166	100.0
Male	always	166	100.0

Table 4.8 Freedom of mobility of the respondents

An independent t-test was conducted to compare mean scores of *freedom on mobility* for male and female respondents. The results showed a significant difference in freedom on mobility for female respondents (M=2.46, SD=1.14) and for male respondents (M=4, SD=0) on conditions, (t(165)= 17.398, p=.00, d= 1.54). On average men have 1.54 times higher freedom on mobility than women.

4.6.2.2 Social Norms (Marriage age)

Figure 4.9 Marriage age of male respondents

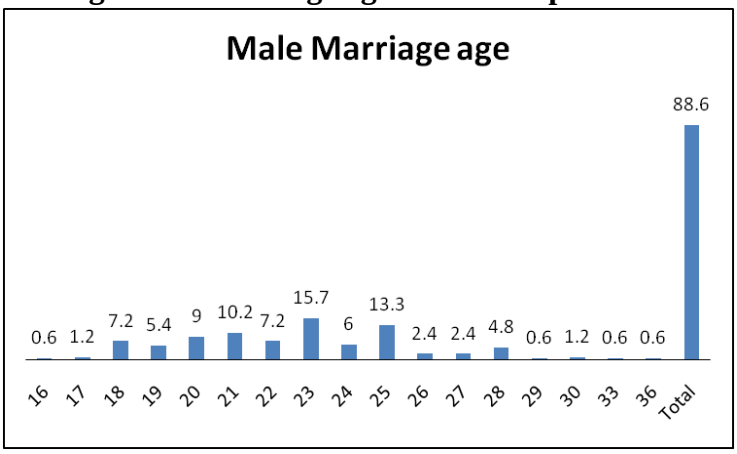
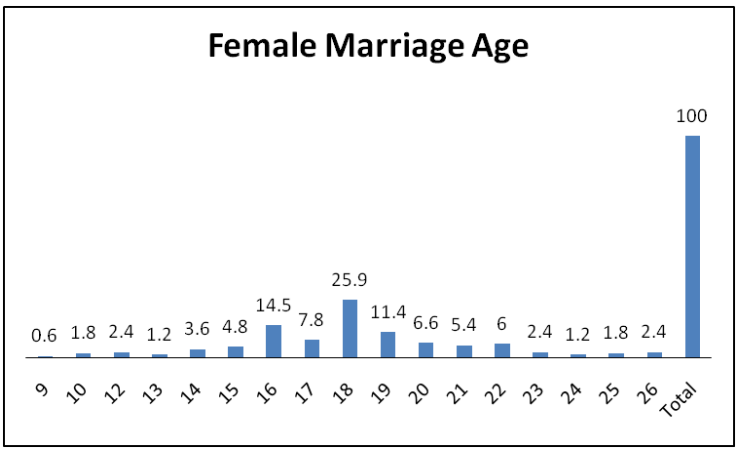


Figure 4.10 Marriage age of female respondents



The average age at which respondents got married was 18 years for females and 23 years form males. A notable difference was in the minimum and maximum marriage age, 9 years and 26 years respectively for female respondents and 16 years and 36 years respectively for male respondents. 29% of female respondents were married by the age of 16 years as compared to .7% of male respondents. A larger proportion of the sample (83% females and 85% males) were married.

An independent t-test was conducted to compare mean scores of age of marriage for female and male respondents. The results showed that there was significant difference in the mean scores for female (M=18, SD=3) and male respondents (M=23, SD=3.27) on conditions, (t(311) = 12.732, p = .00, d = 4.6). Women on an average, get married 4 years earlier than men.

4.6.2.3 Social Status (Decision Making Power)

To identify if there is a difference in inclusion in decision making in the households between men and women, respondents were asked specifically if they are consulted or involved in making decisions within the household. The findings indicate that 20% of female respondents and 0 male respondents are never included or consulted when decisions are made in the household, just 31% of female respondents said they are always consulted in decision making in comparison to 98% of male respondents.

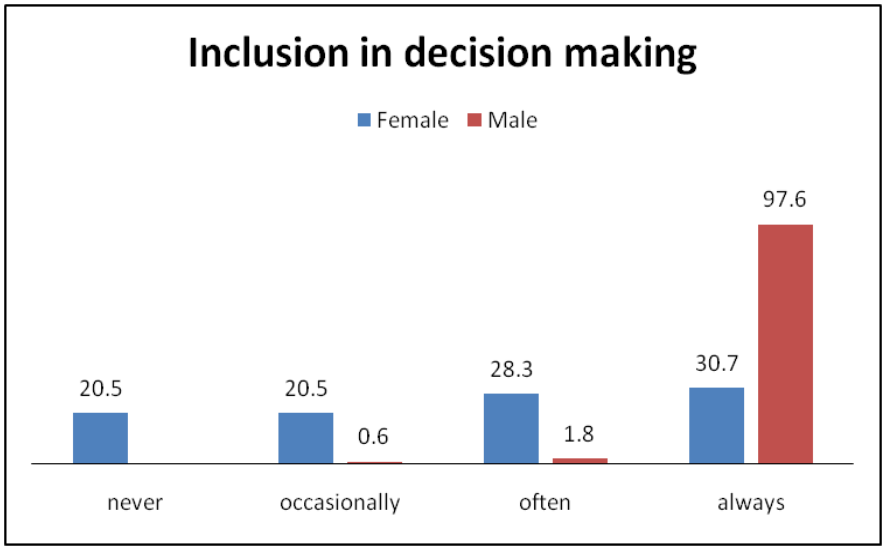
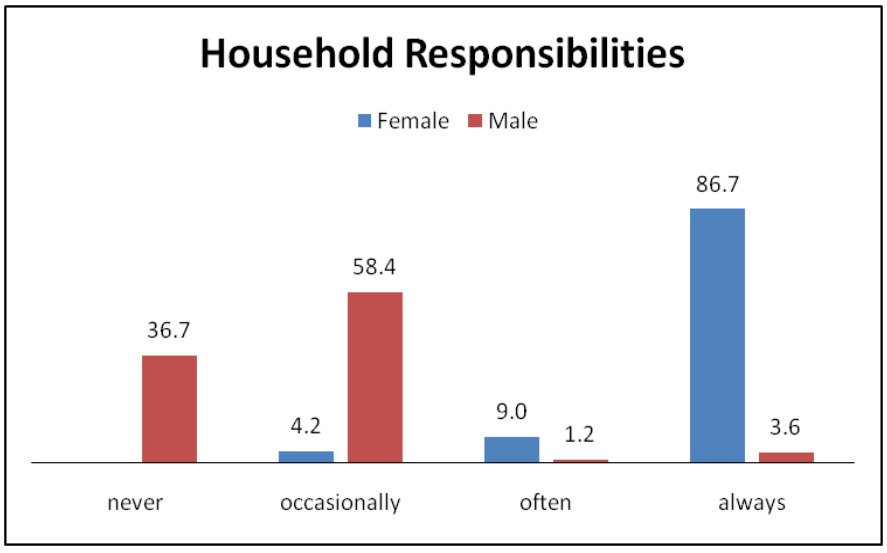


Figure 4.11 Inclusion in decision making

An independent t-test was conducted to compare scores of inclusion in decision making for male and female respondents. The results again showed a significant difference in the mean scores of female respondents (M=2.69, SD=1.11) and male respondents (M=3.97, and SD=.204) on conditions, (t(175.99)= 14.51, p=.00, d= 1.277). Men on average are 1.2 times more included in decision making than women.

4.6.2.4 Ideology (Household responsibilities)

Figure 4.12 Level of household responsibilities



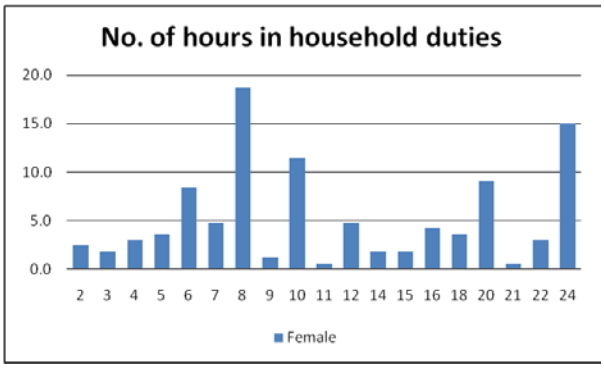


Figure 4.13 No. of hours spent in performing household responsibilities (females)

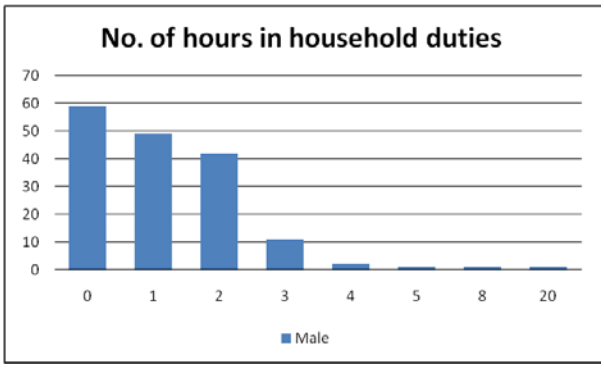


Figure 4.14 No. of hours spent in performing household responsibilities (males)

To understand the division of household responsibilities, the respondents were asked *'how often do they have to take care of household responsibilities in the household* (including daily chores, cleaning, taking care of elderly and children', and were asked to respond on a scale of never, occasionally, often, always. king, cleaning, taking care of elderly and children. 37% of male respondents said they never have to take care of household responsibilities, whereas not a single female respondent said that she does not have to take care of household responsibilities. 87% of female respondents answered that they always have to take care of household responsibilities in comparison to just 4% of male respondents. 58% of male respondents answered they occasionally take care of household responsibilities which includes grocery shopping or taking family members to the doctors.

In order to compare the *number of hours spent in household responsibilities*, respondents were also asked how many hours (per day), on an average, do they spend in taking care of household responsibilities. Responses of 97% of male respondents ranged from 0-3 hours, where for 85% of female respondents, it ranges from 2 to 24 hours, with very low frequency below 6 hours. Most of the household work that men perform includes activities like getting groceries and taking family members to the doctor.

An independent t-test was conducted to compare mean scores of level of household responsibilities and hours spent in taking care of household responsibilities for female and male respondents. There was a significant difference in the mean scores of female respondents (M=3.51, SD=.89) and male respondents (M=1.38, SD=.42) on conditions, (t(234)=27.86, p=.00, d=2.1). Women are on average 2 times more obliged to take care of household responsibilities.

4.6.3 Vulnerability Perception

As regards vulnerability perception, respondents were asked how much do they feel vulnerable to the effects of a possible future climate threat or natural disaster. The research findings show that just 1.2% of female respondents said they don't feel vulnerable to climate change at all in comparison to 34% of male respondents. 47% of female respondents said that they feel highly vulnerable to climate change in comparison to 4.8% of male respondents.

An independent t-test was conducted to compare mean scores of how vulnerable men and women feel. The results indicate a significant difference in the mean scores for female respondents (M=3.38, SD=.66) and male respondents (M=1.99, SD=.884) on conditions, (t(306.54)=16.13, p=.00, d=1.38). Women on average feel 1.38 time more vulnerable to the effects of a possible future climate threat or natural hazard than men.

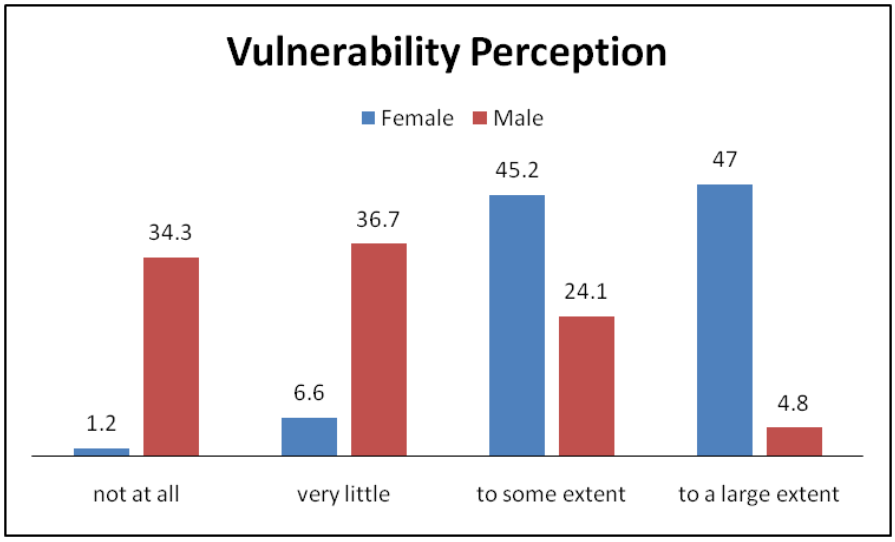


Figure 4.15 Vulnerability perception of the respondents

4.7 Multiple Linear Regression

Further, in order to understand the influence of the independent and mediating variables on vulnerability perception, a linear regressions was conducted. As shown in the conceptual framework, in this case, socio-cultural dynamics is the independent variable, vulnerability perception is the dependent variable and socio-economic status is the mediating variable. Accordingly, the section below is divided into four parts.

- Linear regression with socio-cultural dynamics (IV) predicting vulnerability perception (DV)
- linear regression with socio-cultural dynamics (IV) predicting socio-economic status (mediating)
- linear regression with socio-economic status (mediating) predicting vulnerability perception (DV)
- linear regression with socio-cultural dynamics (IV) and socio-economic status (mediating) predicting vulnerability perception (DV)

4.7.1 Socio-cultural dynamics (IV) predicting vulnerability perception (DV)

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.630[a]	.397	.389	.808	.397	50.622	4	308	.000

a. Predictors: (Constant), mean score of household responsibilities and recoded household hour groups, Marriage_age, Decision_making, Mobility

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	132.110	4	33.027	50.622	.000[b]
	Residual	200.951	308	.652		
	Total	333.061	312			

a. Dependent Variable: Vulnerability_perception

b. Predictors: (Constant), mean score of household responsibilities and recoded household hour groups, Marriage_age, Decision_making, Mobility

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	3.330	.404		8.247	.000		
	Mobility	-.132	.053	-.145	-2.487	.013	.575	1.740
	Marriage_age	-.029	.013	-.112	-2.191	.029	.751	1.332
	Decision_making	-.110	.057	-.111	-1.923	.055	.586	1.706
	mean score of household responsibilities and recoded household hour groups	.316	.050	.391	6.372	.000	.521	1.919

a. Dependent Variable: Vulnerability_perception

A multiple linear regression was conducted to see the influence of independent variable socio-cultural dynamics on the dependent variable vulnerability perception. A significant regression equation was found ($F(4,308) = .50.622$, $p < .000$, with adjusted R^2 of .389. This value of adjusted R^2 means that the model (IVs) explains 38.9% of variation in vulnerability perception. The null hypothesis, i.e. the model has no explanatory power, in this case was hence rejected. No collinearity was found in the independent variables (appendix).

Vulnerability perception of respondents is equal to -.132(Freedom on mobility) -.029(Marriage age) -.110(Decision making) +.316(mean score of household responsibilities and hours spent in household responsibilities), where mobility is coded as 1 = never, 2 = occasionally, 3 = often, 4 = always, decision making is coded as 1= never, 2 = occasionally, 3 = often, 4 = always and household responsibilities are measure as a mean score of division of household responsibilities, i.e., 1 = never, 2 = occasionally, 3 = often, 4 = always, and hours spent for household responsibilities.

The model predicts that for 1 unit increase in freedom on mobility (keeping in mind mobility is measured on a scale of 1 to 4), vulnerability perception will decrease .132 times, for a 1 year increase in marriage age, vulnerability perception will reduce by .029 units, for 1 unit increase in decision making power, vulnerability perception will reduce by .110 units and for 1 unit increase in the mean score of household responsibilities and hours spent in performing household responsibilities, vulnerability perception will increase by .316 units.

Independent variables including, freedom on mobility, marriage age, decision making and household responsibilities were found to be significantly influencing vulnerability perception among the respondents.

4.7.2 Socio-cultural dynamics (IV) predicting socio-economic status (Mediating)

A multiple linear regression was conducted to see the influence of independent variable socio-cultural dynamics on socio-economic status.

A. Level of reading and understanding texts

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.332[a]	.110	.098	1.25195	.110	9.508	4	308	.000

a. Predictors: (Constant), mean score of household responsibilities and recoded household hour groups, Marriage_age, Decision_making, Mobility

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	59.608	4	14.902	9.508	.000[b]
	Residual	482.753	308	1.567		
	Total	542.361	312			

a. Dependent Variable: mean score of reading and understanding level

b. Predictors: (Constant), mean score of household responsibilities and recoded household hour groups, Marriage_age, Decision_making, Mobility

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	1.687	.626		2.696	.007		
	Mobility	.123	.082	.106	1.489	.138	.575	1.740
	Marriage_age	.060	.021	.180	2.902	.004	.751	1.332
	Decision_making	.038	.089	.030	.431	.667	.586	1.706
	mean score of household responsibilities and recoded household hour groups	-.103	.077	-.099	-1.334	.183	.521	1.919

a. Dependent Variable: mean score of reading and understanding level

A significant regression equation was found ($F(308) = 9.508$, $p < .000$, with adjusted R^2 of .098. The null hypothesis, i.e. the model has no explanatory power, in this case was also rejected. . This value of adjusted R^2 means that the model (IVs) explains 9.8% of variation in mean score of reading and understanding level. The null hypothesis, i.e. the model has no

explanatory power, in this case was also rejected. No collinearity was found in the independent variables (appendix).

Level of reading and understanding texts of the respondents is equal to .123(Freedom on mobility) +.060(Marriage age) +.038(Decision making) -.103(mean score of household responsibilities and hours spent in household responsibilities)

The model predicts that for 1 unit increase in freedom on mobility (keeping in mind mobility is measured on a scale of 1 to 4), level of reading and understanding texts will increase by .123 units, for a 1 year increase in marriage age, level of reading and understanding texts vulnerability perception will reduce by .029 units, for 1 unit increase in decision making will increase by .060 units, for 1 unit increase in decision making power, level of reading and understanding texts will increase by .038 units and for 1 unit increase in the mean score of household responsibilities and hours spent in performing household responsibilities, vulnerability perception will reduce by .103 units.

Independent variables including, freedom on mobility, marriage age, decision making and household responsibilities were found to be significantly influencing the level of reading and understanding texts of the respondents.

B. Level of Income

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.677[a]	.459	.452	2866.258	.459	65.296	4	308	.000

a. Predictors: (Constant), mean score of household responsibilities and recoded household hour groups, Marriage_age, Decision_making, Mobility

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2145739203.153	4	536434800.788	65.296	.000[b]
	Residual	2530354596.208	308	8215437.001		
	Total	4676093799.361	312			

a. Dependent Variable: Income

b. Predictors: (Constant), mean score of household responsibilities and recoded household hour groups, Marriage_age, Decision_making, Mobility

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	1351.454	1432.678		.943	.346		
	Mobility	537.511	188.877	.157	2.846	.005	.575	1.740
	Marriage_age	161.635	47.488	.165	3.404	.001	.751	1.332

Decision_making	350.014	203.344	.094	1.721	.086	.586	1.706
mean score of household responsibilities and recoded household hour groups	-1235.963	175.859	-.408	-7.028	.000	.521	1.919

a. Dependent Variable: Income

A multiple linear regression was conducted to see the influence of independent variable socio-cultural dynamics on level of income. A significant regression equation was found (F(308) = 65.296`, p < .000, with adjusted R^2 of .452. This value of adjusted square means that the IVs explain 45.2% of variation in Income. The null hypothesis, i.e. the model has no explanatory power, in this case was again rejected. No collinearity was found in the independent variables (see appendix).

Income level of the respondents is equal to 538(Freedom on mobility) +.162(Marriage age) +350(Decision making) -1236(mean score of household responsibilities and hours spent in household responsibilities)

The model predicts that for 1 unit increase in freedom on mobility (keeping in mind mobility is measured on a scale of 1 to 4), income level of the respondents will increase by 538 Indian Rupee (INR), for a 1 year increase in marriage age, income level of the respondents will increase by 162 INR, for 1 unit increase in decision making, income level of the respondents will increase by 350 INR and for 1 unit increase in the mean score of household responsibilities and hours spent in performing household responsibilities, income level of the respondents will reduce by 1236 INR.

Independent variables including, freedom on mobility, marriage age, decision making and household responsibilities were found to be significantly influencing the level of income of the respondents.

4.7.3 Socio-economic status (Mediating) predicting vulnerability perception (DV)

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.439[a]	.193	.188	.942	.193	39.329	2	329	.000

a. Predictors: (Constant), mean score of reading and understanding level, Income

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	69.736	2	34.868	39.329	.000[b]
	Residual	291.685	329	.887		
	Total	361.422	331			

a. Dependent Variable: Vulnerability_perception

b. Predictors: (Constant), mean score of reading and understanding level, Income

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	3.366	.140		24.077	.000		
	Income	.000	.000	-.415	-8.095	.000	.932	1.073
	mean score of reading and understanding level	-.057	.041	-.071	-1.384	.167	.932	1.073

a. Dependent Variable: Vulnerability_perception

A multiple linear regression was conducted to see the influence of socio-economic status on vulnerability perception. A significant regression equation was found ($F(329) = 39.329$`, $p < .000$, with adjusted R^2 of .188. This value of adjusted R^2 mean that IVs explain 18.8% of variation in vulnerability perception. The null hypothesis, i.e. the model has no explanatory power was rejected. The model was checked for multicollinearity and none was found (appendix).

Vulnerability perception of the respondents is equal to .000(Income) - .057(Mean score of reading and understanding level) However the results show that mean score of reading and understanding level is not a significant predictor and although income is a significant predictor for vulnerability perception, it will have a very small influence on vulnerability perception because of small value (.000) of income coefficient.

4.7.4 Socio-cultural dynamics and Socio-economic status predicting vulnerability perception

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.631[a]	.399	.387	.809	.399	33.825	6	306	.000

a. Predictors: (Constant), Marriage_age, mean score of reading and understanding level, Decision_making, Income, Mobility, mean score of household responsibilities and recoded household hour groups

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	132.811	6	22.135	33.825	.000[b]
	Residual	200.250	306	.654		
	Total	333.061	312			

a. Dependent Variable: Vulnerability_perception

b. Predictors: (Constant), Marriage_age, mean score of reading and understanding level, Decision_making, Income, Mobility, mean score of household responsibilities and recoded household hour groups

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	3.296	.409		8.049	.000		
	Decision_making	-.107	.058	-.108	-1.860	.064	.580	1.723
	Mobility	-.130	.054	-.142	-2.396	.017	.557	1.795
	mean score of household responsibilities and recoded household hour groups	.305	.054	.377	5.689	.000	.448	2.232
	mean score of reading and understanding level	.029	.037	.037	.791	.430	.887	1.128
	Income	-1.154E-005	.000	-.043	-.716	.475	.539	1.855
	Marriage_age	-.029	.014	-.112	-2.116	.035	.707	1.414

a. Dependent Variable: Vulnerability_perception

A multiple linear regression was conducted to see the influence of independent variable socio-cultural dynamics and mediating variable socio-economic status on dependent variable vulnerability perception. A significant regression equation was found ($F(306) = 33.825$`, $p < .000$, with adjusted R^2 of .387. This value of adjusted R^2 mean that the model (IVs) explains 38.7% of variation in vulnerability perception. The null hypothesis, i.e. the model has no explanatory power, was thus rejected. There was no multicollinearity found in the model (appendix).

Vulnerability perception of the respondents is equal to -.130(Freedom on mobility) -1.154E-005(Income) -.029(Marriage age) -.107(Decision making) + .305(Household responsibilities) + .029(Mean score of reading and understanding level)

The model predicts that for 1 unit increase in freedom on mobility, vulnerability perception will reduce by .130 units, for a 1 unit (INR) increase in income, vulnerability perception of respondents will reduce by 1.154E-005 , for a 1 year increase in marriage age, vulnerability perception will reduce by .029 units, for 1 scale increase in decision making, vulnerability perception will reduce by .107 units, for a 1 unit increase in household responsibilities, vulnerability perception will increase by .305 units and for a 1 scale increase in the mean score of reading and understanding text, vulnerability perception will increase by .029.

However the regression results show that out of all these predictor variables, mean score of reading and understanding level and income are not significant predictors of vulnerability perception.

4.7.5 Socio-cultural dynamics and gender predicting vulnerability perception

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.664[a]	.441	.428	.782	.441	34.331	7	305	.000

a. Predictors: (Constant), Gender, mean score of reading and understanding level, Marriage_age, Decision_making, Income, Mobility, mean score of household responsibilities and recoded household hour groups

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	146.778	7	20.968	34.331	.000[b]
	Residual	186.283	305	.611		
	Total	333.061	312			

a. Dependent Variable: Vulnerability_perception

b. Predictors: (Constant), Gender, mean score of reading and understanding level, Marriage_age, Decision_making, Income, Mobility, mean score of household responsibilities and recoded household hour groups

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	4.206	.439		9.581	.000		
	Marriage_age	-.008	.014	-.032	-.596	.552	.639	1.565
	Mobility	-.047	.055	-.052	-.858	.392	.502	1.990
	Decision_making	-.070	.056	-.071	-1.246	.214	.569	1.756
	mean score of household responsibilities and recoded household hour groups	.125	.064	.155	1.964	.050	.294	3.403
	mean score of reading and understanding level	.041	.036	.053	1.153	.250	.882	1.133
	Income	4.200E-006	.000	.016	.264	.792	.516	1.938
	Gender	-.934	.195	-.452	-4.782	.000	.205	4.872

a. Dependent Variable: Vulnerability_perception

A multiple linear regression was conducted to see the influence of independent variable socio-cultural dynamics along with gender on dependent variable vulnerability perception. Although a significant regression equation was found ($F(305) = 34.331$`, $p < .000$, with adjusted R^2 of

.428, none of the IVs except household responsibilities and gender were found significant. Also muticollineariy was detected in this regression model between several variables (appendix).

4.8 Ranking

The respondents were also asked to choose the factor between freedom of mobility, reduced household responsibilities, higher marriage age, more decision making power within the household, education and better financial status that they believe is most important in reducing their vulnerability to a possible future climate threat and natural hazards. The graphs below show the scores for female and male respondents.

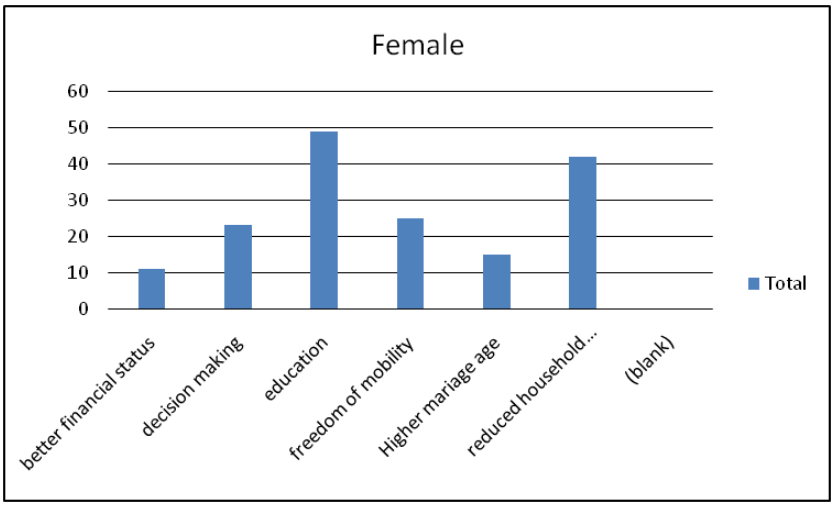


Figure 4.16 Ranking of options which the female respondents think are most important in reducing their vulnerability to climate change or natural hazards

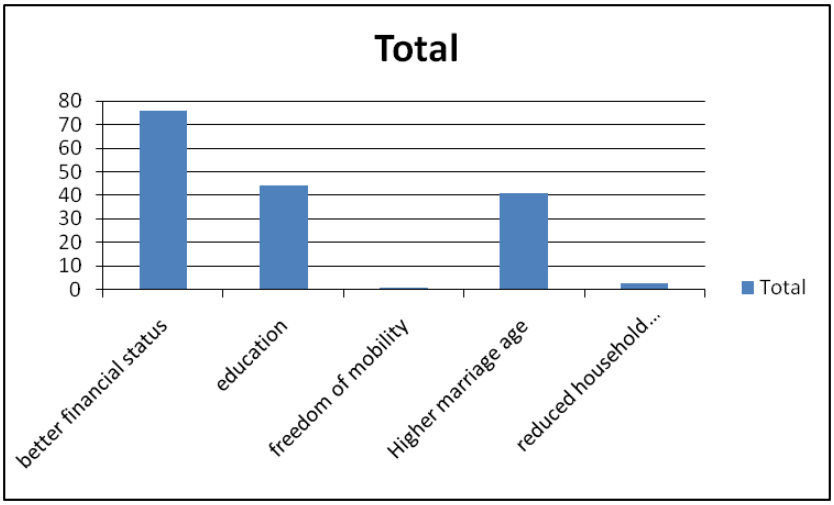


Figure 4.17 Ranking of options which the male respondents think are most important in reducing their vulnerability to climate change or natural hazards

Chapter 5 : Conclusions and recommendations

5.1 Introduction

Vulnerability perception is an important concept to consider in the vulnerability assessments of climate change and natural hazards and while developing response strategies. Assessments and strategies based on assumptions, of local people's needs and behaviour, may not be in consistence with how the local people perceive their risks and vulnerabilities. Individuals living in the same household may perceive vulnerabilities differently. Poor women are considered one of the most vulnerable groups to the threats of climate change and natural hazards. It is important to understand that women's needs and priorities may not be the same as men in terms of climate change and natural hazard adaptation. Understanding how women perceive vulnerability and if they feel more vulnerable than their male counterparts is critical in determining the root cause of their vulnerabilities.

The purpose of this study is to understand in what way socio-cultural dynamics influence vulnerability perception. The study tries to understand if men and women perceive vulnerabilities differently and how do socio-cultural dynamics influence differences in vulnerability perceptions between men and women.

5.2 Findings

To answer the research question, a survey approach was adopted and questionnaires were used as the tool to collect data in 28 slums in the city of Indore, in India. Equal number of male and female respondents were included in the study. A conceptual framework was developed integrating the relationships between the concepts including socio-cultural dynamic, socio-economic status and vulnerability perception.

To answer the research questions, several hypotheses were formed and tested. To compare the differences based on gender, t-tests were performed for variables of socio-cultural dynamic, socio-economic status and vulnerability perception, all of which were significant.

The mean score of freedom on mobility showed strong evidence of difference between females (2.47) and males (4) with 0 standard deviation for male respondents indicating that males have no restriction on mobility whereas females have considerable restrictions on going out of the house. There was also significant difference found in the marriage age of female (18 years) and male (23 years) respondents indicating that females get married considerably earlier than men. Moreover, on being asked about inclusion in decision making in the household, the mean score for females was much less (2.67) with not a very high standard deviation of (1.11) in comparison to males (M=3.97). Also the low SD score of .204 for males indicate that they are more or less always included in decision making in the household. As discussed in the theoretical review, individuals with little voice and power in decision making have little influence over outcomes. In some communities, women do not enjoy the right to take decisions in terms of their marriage, career and other critical issues. However, what society or other members of the household decide for women may not coincide with the needs and priorities of women. This may have an influence on how they perceive their vulnerabilities. Furthermore, there was again a big difference in the mean scores for household responsibilities for females (3.51) with a very a low SD (.89) indicating that most women spend considerably more time in household responsibilities in comparison to males with low mean score (1.99) and also a low SD (.884) meaning that the response was consistent and most male respondents spend considerably less amount of time in household responsibilities.

For socio-economic status, the second hypothesis of the study was that on an average, men and women, have similar educational levels and reading and understanding skills. A significant

difference was found in the mean scores of reading and understanding levels of text (female M= 2.77, male M= 3.63) indicating that females have lower reading and understanding levels than males. For income, the null hypothesis, that females and males, on an average have similar levels of income, was also rejected with very high mean score for males (6933 INR) in comparison to females (1931 INR).

In the regression for socio-cultural dynamics as IV and socio-economic status as DV, the model was significant, although with a low score of adjusted R^2 (.098) in case of mean score of reading and understanding level as DV and also in this case decision making was not a significant predictor. However in the case of income as DV, the model had a higher adjusted R^2 score (.452) and all the IVs were found to be significant. Secondly, socioeconomic status was also found to be significantly predicting vulnerability perception with an adjust R^2 score of .188. However, in this case, mean score of reading and understanding was not a significant predictor of vulnerability perception and income also was found to have a very low influence on vulnerability perception. Thirdly, in the regression results for socio-cultural dynamics and socio-economic status on vulnerability perception, with an adjusted R^2 of .389, the regression results show that socio-economic status (mean score of reading and understanding level and income) is not a significant predictor of vulnerability perception. Finally, the regression results indicate that socio-cultural dynamics significantly influence vulnerability perception. However, when gender was added to this model, only household responsibilities and gender was found to be significant predictors of vulnerability perception.

5.3 Discussion

The findings of t-test suggest that females indeed have a lower socio-economic status than men and also deal with discriminatory socio-cultural dynamics as compared to men. For instance, in traditional societies, there is a trend of early marriages. The findings also support these arguments. This could be due to the fact that women are considered to be responsible for household work and taking care of the family while men are considered breadwinners. As a result, many parents want to get their girls married at early ages. In India, parents aspire to have sons who will earn and take care of them instead of daughters who will be a burden owing to the concept of dowry and will not bring anything in return.

Education is a critical element in climate change mitigation and adaptation and has also been highlighted in the LAC framework (chapter 2). The level of reading and understanding texts can deeply influence how an individual perceives risks. It helps individuals to understand the causes and consequences of climate change. An individual capable of reading and understanding information will feel better equipped to deal with climate change as compared to someone who cannot read. It is also easier to understand and use technologies and tools such as weather forecasts, early warning systems, government released information, awareness programmes, etc for people who can read and understand. The findings of this research support the arguments in the literature review that girl's education is not a priority and considered a liability; they are married at early ages and considered suitable for taking care of the husband's house.

Restrictions on mobility for women are also clearly evident from the research findings. Due to stringent socio-cultural norms in some communities, women are not allowed to go out of the house by themselves. This eventually becomes a barrier in their access to resources and participation in developmental activities, for instance education and employment, both of which (reading and understanding level and income) have low scores in the case of females as compared to males according to the research findings.

The findings also show that the distribution of household responsibilities is not fair, which may restrict women from engaging in and benefitting from economic, social, cultural, political and national development. It might also consequently result in confining their access to resources and limiting their ability to participate in development activities further influencing their vulnerability perceptions. The findings also support the discussion in the theoretical review, which highlighted that in many households, while men enjoy the right to make choices, as regards education, career, marriage, and other important aspects of their lives and are looked upon as the breadwinner, women are considered more suitable for household work, taking care of children and elderly. Here, it is also important to note that when asked about their employment status, 31% of the female respondents said that they are unemployed but willing to work, in comparison to .6% of the total male respondents. The big difference in income for females and males indicate that even when females can engage in employment, they are mostly casual workers or work from home. Although education could also be an important underlying factor the influence of socio-cultural aspects cannot be neglected.

Also the research findings show that women are not included in decision making in the household as much as men further supporting the arguments about low status of women in the society and women having less voice and power. Furthermore, as discussed in the literature review, even individuals living in the same household may perceive risks and vulnerabilities differently. Vulnerability perception may differ between individuals depending on several factors including their age, gender, education and their specific circumstances. According to the finding women, on an average, have higher vulnerability perceptions than men, even though they exist in the same surroundings.

As depicted in the conceptual framework, this study makes an effort to understand the relationship between vulnerability perception and socio-cultural dynamics and how this might differentiate the vulnerability perception of men and women with similar backgrounds. The results from most statistical tests support the discussion and arguments of the theoretical review. In the regression results, although socio-cultural dynamics was found to be a significant predictor of vulnerability perception, socio-economic status was not found to significant. This could be because of the approach used to measure education (mean score of reading and understanding).

The findings show that ‘better access to education’ and ‘reduced burden of household responsibilities’ are the most important factors for female respondents in reducing their vulnerabilities to the threats of climate change and natural hazards; whereas for men, the most important factor was ‘better financial status’.

5.4 Conclusion

How do socio-cultural factors make women feel more vulnerable to climate change or natural hazards? Study of informal settlements in Indore, India.

- Do women have a lower socio-economic status than men?
- Do women have lower opportunities and rights than men?
- Does this translate into a higher perceived vulnerability to climate change?

It has been widely recognized that women, especially poor women, are one of the most vulnerable sections as regards climate change and natural hazards. While the idea is being discussed at local, national and global forums, poor women are often excluded from these discussions. The research findings also indicate that women have a lower status than men. Since different individuals may perceive risks and vulnerabilities differently depending on their

individual circumstances, this also results in differing needs and priorities. Therefore, strategies and plans to address vulnerabilities relating to climate change and natural hazards and those addressing adaptation may not be efficient if based on assumptions. The 'one size fits all' approach may not serve the interests of the ones most vulnerable or at risk. It is important that any strategies addressing these issues should take into consideration local people's perceptions to get to the root cause of their vulnerabilities. The results are indicative of inequalities that are embedded in the way society functions. Women suffer from many disadvantages. Prominent among these are mobility restrictions, exclusion from decision making, burden of household responsibilities, early marriages; which further restrict their access to other essential inputs that are needed for building adaptive capacity. Because of these socio-cultural factors, women are less educated and financially dependent therefore they are often excluded from dissemination of information and capacity building. Thus development of a database of women's access to essential inputs is critical to identify, understand and address the root causes exacerbation women's vulnerabilities.

Besides, the findings show there are differences in vulnerability perceptions of men and women. Therefore, it is important to understand whether these differences are related to climate impacts alone or can have a link with other factors, for. e.g. how much participation a woman has in the decision making in the family or the community. One of the biggest barriers, especially in countries like India, is that there is very little gender segregated data available for different sectors. It is essential to assess adequacy, effectiveness and need for support related to climate change and natural hazards, especially targeting the most vulnerable populations. Moreover, there is also a need to understand that women's vulnerabilities, especially in traditional countries may be rooted in socio-cultural dynamics that may restrict their access to resources and deprive them of opportunities necessary for addressing their vulnerabilities. It is also important to include the local people in vulnerability assessments as it affects their lives.

5.5 Recommendation

The study opens doors to further understand whether women from specific religion or caste feel more vulnerable to the threats of climate change and natural hazards due to social or cultural constraints. Additional research is also needed to understand if socio-cultural norms that deprive women from rights and opportunities are reproduced in specific communities or regions.

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Annex 1:

1. **Research Instrument**

Questionnaire

1. Participant name

.....

2. Gender

a) Male
b) Female

3. Age

.....

4. Marital Status

a) Single
b) Married
c) Divorced
d) Widowed

5. What was your age when you got married?

.....

6. What is the highest level of education you have completed?

a) Less than 8th grade
b) Primary school
c) Secondary school
d) Senior school
e) Bachelor's degree
f) Master's degree
g) No education

7. Are you able to read information in Hindi?

a) Not at all
b) Very little
c) To some extent
d) Fluently

8. Can you understand the main idea in a text?

a) Strongly disagree
b) Disagree
c) Neutral
d) Agree
e) Strongly agree

9. Which of the following best describes your employment status
a) Self-employed
b) Salaried
c) Regular wage
d) Casual labor
e) Unemployed but willing to work
f) Unemployed and not willing to work

10. What is your individual monthly income?

.....

11. Do you take care of household responsibilities in your household (including daily chores, cooking, cleaning, taking care of elderly and children)?

a) Never
b) Occasionally
c) Often
d) Always

12. How many hours in a day do you send performing household duties (including daily chores, cooking, cleaning, taking care of elderly and children)?

.....

13. Are you able to go out of the house, for work or for instance to attend an educational programme, without being accompanied by any other family member, relative or friend?

a) Never
b) Occasionally
c) Often
d) Always

14. Until what time of the day can you stay out of the house, for work, without being accompanied by any other family member, relative or friend

a) Not possible
b) > 2 PM
c) 2 PM - 5 PM
d) 5 PM - 8 PM

e) 8 PM <

15. Are you consulted or involved in important decisions in your household?

a) Never
b) Occasionally
c) Often
d) Always

16. How much do you feel vulnerable to the effects of a possible future climate threat (including floods, droughts, temperature rise, natural hazards)

a) Not at all
b) Very little
c) To some extent
d) To a large extent

17. Rank the below mentioned factors in order, you think, if increased or reduced, will help you prepare better for a future climate related threat (including floods, droughts, temperature rise, natural hazards)
[1 being the least important, 5 being the most important]

a) Improved Freedom on mobility
b) Reduced household responsibilities
c) Better Financial status
d) Improved education level
e) Improved health
f) Greater decision making power in the household

2. T test results

2.1 Income

Group Statistics

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Income	Male	166	6933.73	3420.129	265.453
	Female	166	1930.78	2396.400	185.997

Independent Samples Test

	Levene's Test for Equality of Variances	t-test for Equality of Means

		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Income	Equal variances assumed	4.488	.035	15.435	330	.000	5002.952	324.130	4365.330	5640.574
	Equal variances not assumed			15.435	295.547	.000	5002.952	324.130	4365.056	5640.847

2.2 Level of reading and writing text

Group Statistics

	Gender	N	Mean	Std. Deviation	Std. Error Mean
mean score of reading and understanding level	male	166	3.6355	.82278	.06386
	female	166	2.7771	1.54086	.11959

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
mean score of reading and understanding level	Equal variances assumed	9.122	.003	6.332	330	.000	.85843	.13558	.59173	1.12514
	Equal variances not assumed			6.332	252.018	.000	.85843	.13558	.59143	1.12544

2.3 Freedom on mobility

Group Statistics

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Mobility	male	166	4.00	.000	.000
	female	166	2.46	1.142	.089

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Mobility	Equal variances assumed	677.572	.000	17.398	330	.000	1.542	.089	1.368	1.717
	Equal variances not assumed			17.398	165.000	.000	1.542	.089	1.367	1.717

2.4 Marriage age

Group Statistics

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Marriage_age	male	147	22.72	3.279	.270
	female	166	18.10	3.135	.243

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Marriage_age	Equal variances assumed	1.517	.219	12.732	311	.000	4.619	.363	3.905	5.332
	Equal variances not assumed			12.697	302.586	.000	4.619	.364	3.903	5.335

Marriage age (female)			Marriage age (male)		
Age	Frequency	Percent	Age	Frequency	Percent
9	1	0.6	16	1	0.6
10	3	1.8	17	2	1.2
12	4	2.4	18	12	7.2
13	2	1.2	19	9	5.4
14	6	3.6	20	15	9
15	8	4.8	21	17	10.2
16	24	14.5	22	12	7.2
17	13	7.8	23	26	15.7
18	43	25.9	24	10	6
19	19	11.4	25	22	13.3
20	11	6.6	26	4	2.4
21	9	5.4	27	4	2.4
22	10	6	28	8	4.8
23	4	2.4	29	1	0.6
24	2	1.2	30	2	1.2
25	3	1.8	33	1	0.6
26	4	2.4	36	1	0.6
Total	166	100	Total	147	88.6
			Unmarried	19	11.4

Marriage age frequency table

2.5 Decision making

Group Statistics

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Decision_making	male	166	3.97	.204	.016
	female	166	2.69	1.116	.087

Independent Samples Test

	Levene's Test for Equality of Variances		t-test for Equality of Means					
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference
								Lower / Upper

Decision_making	Equal variances assumed	435.198	.000	14.510	330	.000	1.277	.088	1.104	1.450
	Equal variances not assumed			14.510	175.996	.000	1.277	.088	1.103	1.451

2.6 Household responsibilities

Group Statistics

	Gender	N	Mean	Std. Deviation	Std. Error Mean
mean score of household responsibilities and recoded household hour groups	female	166	3.5181	.89424	.06941
	male	166	1.3825	.41894	.03252

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
mean score of household responsibilities and recoded household hour groups	Equal variances assumed	8.605	.004	27.862	330	.000	2.13554	.07665	1.98477	2.28632
	Equal variances not assumed			27.862	234.099	.000	2.13554	.07665	1.98454	2.28655

2.7 Vulnerability perception

Group Statistics

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Vulnerability_perception	female	166	3.38	.666	.052
	male	166	1.99	.884	.069

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Vulnerability_perception	Equal variances assumed	3.971	.047	16.131	330	.000	1.386	.086	1.217	1.555
	Equal variances not assumed			16.131	306.541	.000	1.386	.086	1.217	1.555

3. Regression

3.1 Sociocultural dynamics on vulnerability perception

Correlations

		Vulnerability_perception	Marriage_age	Mobility	Decision_making	mean score of household responsibilities and recoded household hour groups
Pearson Correlation	Vulnerability_perception	1.000	-.394	-.481	-.461	.593
	Marriage_age	-.394	1.000	.411	.359	-.467
	Mobility	-.481	.411	1.000	.554	-.584
	Decision_making	-.461	.359	.554	1.000	-.586

	mean score of household responsibilities and recoded household hour groups	.593	-.467	-.584	-.586	1.000
	Vulnerability_perception	.	.000	.000	.000	.000
	Marriage_age	.000	.	.000	.000	.000
	Mobility	.000	.000	.	.000	.000
Sig. (1-tailed)	Decision_making	.000	.000	.000	.	.000
	mean score of household responsibilities and recoded household hour groups	.000	.000	.000	.000	.
	Vulnerability_perception	313	313	313	313	313
	Marriage_age	313	313	313	313	313
	Mobility	313	313	313	313	313
N	Decision_making	313	313	313	313	313
	mean score of household responsibilities and recoded household hour groups	313	313	313	313	313

3.2 Socio-cultural dynamics (IV) predicting socio-economic status (Mediating)

3.2.1 Income

Correlations

		Income	Marriage_age	Mobility	Decision_making	mean score of household responsibilities and recoded household hour groups
Pearson Correlation	Income	1.000	.453	.515	.480	-.632
	Marriage_age	.453	1.000	.411	.359	-.467
	Mobility	.515	.411	1.000	.554	-.584
	Decision_making	.480	.359	.554	1.000	-.586

	mean score of household responsibilities and recoded household hour groups	-.632	-.467	-.584	-.586	1.000
	Income	.	.000	.000	.000	.000
	Marriage_age	.000	.	.000	.000	.000
	Mobility	.000	.000	.	.000	.000
	Decision_making	.000	.000	.000	.	.000
Sig. (1-tailed)	mean score of household responsibilities and recoded household hour groups	.000	.000	.000	.000	.
	Income	313	313	313	313	313
	Marriage_age	313	313	313	313	313
	Mobility	313	313	313	313	313
	Decision_making	313	313	313	313	313
N	mean score of household responsibilities and recoded household hour groups	313	313	313	313	313

3.2.2 Reading and understanding Level

Correlations

		mean score of reading and understanding level	Marriage_age	Mobility	Decision_making	mean score of household responsibilities and recoded household hour groups
Pearson Correlation	mean score of reading and understanding level	1.000	.281	.254	.212	-.263
	Marriage_age	.281	1.000	.411	.359	-.467
	Mobility	.254	.411	1.000	.554	-.584
	Decision_making	.212	.359	.554	1.000	-.586

Sig. (1-tailed)	mean score of household responsibilities and recoded household hour groups	-.263	-.467	-.584	-.586	1.000
	mean score of reading and understanding level	.	.000	.000	.000	.000
	Marriage_age	.000	.	.000	.000	.000
	Mobility	.000	.000	.	.000	.000
	Decision_making	.000	.000	.000	.	.000
	mean score of household responsibilities and recoded household hour groups	.000	.000	.000	.000	.
N	mean score of reading and understanding level	313	313	313	313	313
	Marriage_age	313	313	313	313	313
	Mobility	313	313	313	313	313
	Decision_making	313	313	313	313	313
	mean score of household responsibilities and recoded household hour groups	313	313	313	313	313

3.3 Socio-economic status predicting vulnerability perception

Correlations

		Vulnerability_perception	Income	mean score of reading and understanding level
Pearson Correlation	Vulnerability_perception	1.000	-.434	-.179
	Income	-.434	1.000	.261
	mean score of reading and understanding level	-.179	.261	1.000

Sig. (1-tailed)	Vulnerability_perception	.	.000	.001
	Income	.000	.	.000
	mean score of reading and understanding level	.001	.000	.
N	Vulnerability_perception	332	332	332
	Income	332	332	332
	mean score of reading and understanding level	332	332	332

3.4 Socio-cultural dynamics and socio-economic status predicting vulnerability perception

3.5

Correlations

		Vulnerability_perception	Marriage_age	Mobility	Decision_making	mean score of household responsibilities and recoded household hour groups	mean score of reading and understanding level	Income
Pearson Correlation	Vulnerability_perception	1.000	-.394	-.481	-.461	.593	-.163	-.448
	Marriage_age	-.394	1.000	.411	.359	-.467	.281	.453
	Mobility	-.481	.411	1.000	.554	-.584	.254	.515
	Decision_making	-.461	.359	.554	1.000	-.586	.212	.480
	mean score of household responsibilities and recoded household hour groups	.593	-.467	-.584	-.586	1.000	-.263	-.632
	mean score of reading and understanding level	-.163	.281	.254	.212	-.263	1.000	.257
	Income	-.448	.453	.515	.480	-.632	.257	1.000
Sig. (1-tailed)	Vulnerability_perception	.	.000	.000	.000	.000	.002	.000

	Marriage_age	.000	.	.000	.000	.000	.000	.000
	Mobility	.000	.000	.	.000	.000	.000	.000
	Decision_making	.000	.000	.000	.	.000	.000	.000
	mean score of household responsibilities and recoded household hour groups	.000	.000	.000	.000	.	.000	.000
	mean score of reading and understanding level	.002	.000	.000	.000	.000	.	.000
	Income	.000	.000	.000	.000	.000	.000	.
N	Vulnerability_perception	313	313	313	313	313	313	313
	Marriage_age	313	313	313	313	313	313	313
	Mobility	313	313	313	313	313	313	313
	Decision_making	313	313	313	313	313	313	313
	mean score of household responsibilities and recoded household hour groups	313	313	313	313	313	313	313
	mean score of reading and understanding level	313	313	313	313	313	313	313
	Income	313	313	313	313	313	313	313

3.5 Socio-cultural dynamics and gender predicting vulnerability perception

Correlations

		Vulnerability_perception	Marriage_age	Mobility	Decision_making	mean score of household responsibilities and recoded household hour groups	mean score of reading and understanding level	Income	Gender
Pearson Correlation	Vulnerability_perception	1.000	-.394	-.481	-.461	.593	-.163	-.448	-.651
	Marriage_age	-.394	1.000	.411	.359	-.467	.281	.453	.585
	Mobility	-.481	.411	1.000	.554	-.584	.254	.515	.680
	Decision_making	-.461	.359	.554	1.000	-.586	.212	.480	.614
	mean score of household responsibilities and recoded household hour groups	.593	-.467	-.584	-.586	1.000	-.263	-.632	-.829
	mean score of reading and understanding level	-.163	.281	.254	.212	-.263	1.000	.257	.314
	Income	-.448	.453	.515	.480	-.632	.257	1.000	.672
	Gender	-.651	.585	.680	.614	-.829	.314	.672	1.000
Sig. (1-tailed)	Vulnerability_perception	.	.000	.000	.000	.000	.002	.000	.000
	Marriage_age	.000	.	.000	.000	.000	.000	.000	.000
	Mobility	.000	.000	.	.000	.000	.000	.000	.000
	Decision_making	.000	.000	.000	.	.000	.000	.000	.000

	mean score of household responsibilities and recoded household hour groups	.000	.000	.000	.000	.	.000	.000	.000
	mean score of reading and understanding level	.002	.000	.000	.000	.000	.	.000	.000
	Income	.000	.000	.000	.000	.000	.000	.	.000
	Gender	.000	.000	.000	.000	.000	.000	.000	.
	Vulnerability_perception	313	313	313	313	313	313	313	313
	Marriage_age	313	313	313	313	313	313	313	313
	Mobility	313	313	313	313	313	313	313	313
	Decision_making	313	313	313	313	313	313	313	313
N	mean score of household responsibilities and recoded household hour groups	313	313	313	313	313	313	313	313
	mean score of reading and understanding level	313	313	313	313	313	313	313	313
	Income	313	313	313	313	313	313	313	313
	Gender	313	313	313	313	313	313	313	313

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