

REPRODUCTIVE HEALTH OF TRIBAL POPULATIONS IN INDIA: A SUSTAINABILITY
APPROACH

by

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ABSTRACT

REPRODUCTIVE HEALTH OF TRIBAL POPULATIONS IN INDIA: A SUSTAINABILITY APPROACH

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In the context of global climate change, the sustainability approach takes a holistic view of development through preservation of nature during the course of socioeconomic and human development. Reproductive health functions as an integral component of human development, enabling 'continuity' of human species through successful 'reproductive processes'. Prior studies on reproductive health are restricted to determinants such as fertility, family size, and infant mortality with limited focus on developing a holistic or comprehensive explanation of reproductive health. Although social and economic factors have been identified as reproductive health factor in prior studies, ecological component has been overlooked historically in understanding reproductive health. The present study takes a sustainability approach to reproductive health and examines its relationship with socioeconomic and ecological correlates.

Theoretical model of the present study is built on the concept of sustainability, ecosystem perspective, and Sen's (1992) 'capability approach to health' which explain the aggregate effects of economic, social, and ecological factors on the reproductive health of tribal populations in India. The proposed framework suggests that the state of reproductive health

reflects the aggregate effect of economic and social opportunities and ecological resources available for tribal women mediated through their level of power. Against the backdrop of environmental deterioration, this study focuses on the extent to which the changes in tribal habitat influence tribal women's power and reproductive health of tribal women. The data are from the National Family Health Survey (NFHS) conducted in 2005-06. Structural equation analysis is used to analyze the data. It is found that social and ecological factors are more influential than economic and power factor in determining tribal women's reproductive health outcomes. Overall, the results of the study partially support the proposed model. Implications for social work practice, policy, and research are discussed. The model proposed in this study can be utilized in understanding the reproductive health experiences of marginal populations in developing nations.

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CHAPTER 1

INTRODUCTION

With the second largest population, India has emerged as one of the fastest growing economies in the world (Pradhan, 2010; Singh & Dahiya, 2010). India has secured its place among the ten most emerging industrialized nation in the world resulting from steady growth, mainly in services and manufacturing sectors (Singh & Dahiya, 2010). Industrial growth in India has attributed to its trillion dollar economy in the midst of decade long global economic crisis (Pradhan, 2010; Singh & Dahiya, 2010). GDP per capita in India has increased to US\$ 1154, and the nation received attention for its rapidly growing consumer and financial market (Pradhan, 2010). Growing number of cities and city dwellers are replacing the traditional rural India and its lifestyles (Sridhar, 2010).

While cities skylines are changing rapidly, poverty remains a crucial problem for most of the Indian population. About 42% of the total population earns US \$1.25 per day which places them below international poverty line (United Nations Children's Fund [UNICEF], 2010). Despite a large competent technical workforce with high reputation worldwide, India still struggles with high unemployment and poverty. Rapid economic development of India has not benefitted all, and income gap between rich and poor shows an increasing trend. This is particularly true for the marginalized social class such as tribals of India who appears to be dispossessed by the Indian society resulting in exclusion from the mainstream socioeconomic development process. The next section of this chapter describes the social background of current study.

Background of the Study

Exclusion of tribal population from the mainstream economic development process needs to be understood in the context of traditional Indian social system. A thousand year old caste system has resulted in the formation of a highly marginalized tribal population. Caste determines an individual's socioeconomic position, occupation, and many other aspects of life, inherited from his or her parents. Out of four main divisions, the Brahmins, who are entitled to be the priests, scholars, and philosophers are at the top of the hierarchy, with the Shudras' or the laborers and servants, also known as untouchable, at the bottom. The traditional Hindu caste system excludes the lower castes including the tribals, from mainstream society and exploits them in various nature (Mohindra, Haddad, & Narayana, 2006; Padel & Das, 2010; Snaitang, 2004). The advantageous position within the social structure with privileged access to resources provides the upper castes with more opportunities than for the lower castes. Thus there is an association between socioeconomic position and caste of an individual (Mohindra et al., 2006). Tribal communities in such context are situated in the peripheral or marginal position of the overall Indian socioeconomic stratum.

It is, however, very important to note here that not all the tribes in India are Hindu by religion. As a matter of fact, in the states with high proportion of tribal population such as, Manipur, Nagaland, Mizoram and Meghalaya of north-eastern India, an overwhelming majority of the tribals are Christian by religion (Chaube, 1999). According to 1981 Indian census, about 60% of tribals are the followers of Hindu religion. Tribal Hindus practice and celebrate many customs and rituals retained from their origins which pre-date the Aryan invasion resulting in the imposition of Aryan social structure causing isolation (Mitra, 2008; Chaube, 1999). The indigenous culture was influenced by Aryan invasion and later by the caste system to 'judge and classify people within the fixed social hierarchy' (Chaube, 1999).

The tribals of India constitute about 8.2% of the total population. Majority of Indian population are non-tribals and mainly are followers of Hindu (82.41%) religion (Census of India, 2001). Even though, tribals are not perceived as untouchable 'lower caste Hindu' population by the mainstream upper-caste Hindus, they are marginalized and considered as backward and primitive '*jati*' or caste with a pariah status (Mitra, 2008). This perception however, did not help the tribals. Whereas, lower caste Hindus enjoyed minimal opportunities to integrate with mainstream society and to share few common custom and traditions, the tribals have been excluded and isolated from the mainstream society (Mitra, 2008). Regardless of the tribals' perspectives toward caste systems, they are the victims of an imposed oppressive caste-based social structure (Snaitang, 2004).

The increasing disparities in socioeconomic and demographic indicators between tribals and rest of the population of India demonstrate the peripheral, marginalized and exploited condition of tribals (Mohanty, 2002). Major initiatives have been taken by the Indian government since independence in 1947 to improve the 'backward' conditions of tribal communities with a view to eliminate the social exclusion and to assimilate them into the mainstream society. However, the so-called 'development projects' have achieved very limited success so far, due to critical "failure to comprehend the distinctive characteristics of the tribal areas and schedule tribes" (Mohanty, 2002, p. 96). Even though objectives of such projects resonate with the Indian constitutional commitment to protect tribal rights and improve tribals' socioeconomic condition (Mohanty, 2002), it appears that such measures have barely reached their targets. This can be observed in a verdict from the Indian Supreme Court, which stated:

“..such a predicament of human being facing the prospects of starvation, death, distress sale of crops, labour and even the children, and the helplessness of those who are unable to organize the minimum basic necessities of life can easily be described as too grim a reality for any kind of detached debate.” (as cited in Patnaik, 2002, p. 91)

Marginal position of tribals is evident from their health and human development indicators which are lower than India's national average (Sarkar, Mishra, Dayal, & Nathan, 2006; Bala & Thiruselvakumar, 2009; Subramanian, Smith, & Subramanyam, 2006). The socioeconomic, education and nutrition indicators presented in the table below show the disparity between the tribal and non-tribal population in India.

Table 1: Selected Socioeconomic and Nutrition Indicators for Tribal and Non-tribal Population

Indicators	Tribal	Non-tribal/National
Poverty headcount index [*]	43.8% (2005)	27.5 % (2005)
Literacy rate [†]	47.10% (2001)	64.84% (2001)
Employment status [*]		
Male (1991)	53.7%	51.0%
Female (1991)	30.0%	16.0%
Nutrition status ⁺		
Underweight (women)	46.6%	33.0%
Anemia (women)	69.2 %	56.2%

Source: ^{*} Estimates based on 'consumption expenditure survey' of Indian National Sample Survey (2004-05) round. [†] Indian Ministry of Tribal Affairs (2010). ⁺ Percentage distribution of ever married women; source: Indian National Family Health Survey-3 (NFHS, 2005-06). ^{*} Majority of the tribal are engaged in agriculture and non-formal economic activities such as food gathering and hunting; rarely they are engaged in formal occupation. For tribal population employment rate should be considered as work participation rate; source: Primary census abstract for general population, Scheduled Castes and Scheduled Tribes, 1971-1991 (Shankar & Thamilarasan, 2003).

Exploitation and marginalization of tribals have been intensified due to India's rapid economic growth demanding mineral resources to be extracted from tribal habitats. Sustainable and subsistence tribal livelihood is under threat from the flow of global and local capital in exploitation of their physical environment. Growth oriented economic development model demands rapid industrialization and promotes mega development projects, and mineral resource extraction to accelerate the national production. This economic development model under the shadow of liberalization, privatization and globalization is strongly buttressed by the governments of developing countries (Meher, 2009). India is not an exception, and, like many

other developing nations, such development process is displacing marginalized tribals from their habitats. Between 1951 and 1990, about 21 million people were displaced to accommodate development projects in India, 40% of which (about 8.5 million) were tribal (Meher, 2009; Government of India [GOI], 2002). Another estimate suggests that the total number of displaced people within last six decades as high as 60 million (Mathur, 2008). Since the habitats of most of the tribal groups are located in the mineral-rich geographical regions, they become the victims of modernizing invaders. (Meher, 2009; Padel & Das, 2010). The process of displacement has not always been smooth and in many cases the victims received minimal compensation and rehabilitative assistance (Blaser, Feit, & McRac, 2004). Growth oriented Indian economic development is taking over the traditional subsistence lifestyle of tribals and is benefitting the advantaged social class with access to sociopolitical power and resources (Mathur, 2009; Meher, 2009). Such exploitation of tribals' common resource and displacement from their land and homes have created 'increasing conflict' between ecosystem-dependent tribals and the elites of the Indian society (Meher, 2009).

Tribal response to the exploitation and marginalization has ignited severe social unrest and protest (Meher, 2009). Six decades long exploitation has caused the emergence of extreme leftist movement in the tribal dominated states in India. States located in the northeastern region of India are now known as "red corridor" to symbolize the dominance of communist influence in the region. Significance of geo-political unrest in the tribal regions is indicated in assessment by the Indian Prime Minister Mr. Manmohan Singh, who singled out the emergence of '*maoist insurgency*' as the "biggest internal security threat to India" (Thotam, 2010). Increase of militancy and maoist movement in the tribal dominated localities indicate the involvement of tribal population in so-called 'insurgency'. But how did the tribal communities with minimal education and resources pose the 'biggest threat' to the largest democracy in the world? Noble laureate economist Professor Amartya Sen (2010) pointed out the lack of social justice as the

reason behind such violent response. It is noteworthy to quote Mr. Sen (2010) where he argued that tribal dominated areas are 'sidelined by the country's development agenda' and underscored such disregard as the possible reason behind insurgency:

“Neglect of tribals is a huge spot on India's pursuit of justice. I very much rebel against the view saying we ought to do something about it otherwise they would join the Naxalites. The reason we should do something about them is precisely because it's matter of justice”.

The accusation against tribals of being the 'biggest threat to' India therefore should be examined against the backdrop of ongoing exploitation by not only the private capitalists but also by the public representatives (Meher, 2009). Often the state governments or the public sector agencies have taken initiatives to acquire land from the tribal residents to set up mining industries or industrial projects (Meher, 2009). When the economic policy framework formulated by the central government supports the invasions in tribal habitats in the name of modernization and development by the powerful local government and corporate houses the marginal tribals are left with very few options but leaving their homes and land. Eminent booker-winner author, Arundhati Roy (2010) captures the experience of exploitation and exclusion of marginal population:

“Almost from the moment India became a sovereign nation, it turned into a colonial power, annexing territory, waging war. It has never hesitated to use military interventions to address political problems—Kashmir, Hyderabad, Goa, Nagaland, Manipur, Telangana, Assam, Punjab, the Naxalite uprising in West Bengal, Bihar, Andhra Pradesh and now across the tribal areas of Central India. Tens of thousands have been killed with impunity, hundreds of thousands tortured. All of this behind the benign mask of democracy”.

Question can be raised whether India as the largest democracy in the world failed to ensure the rights of marginal population. Inquiry should also be made on the effects of Indian exemplary economic growth on the lives of these disadvantaged population groups. From social work perspective, the issue of social justice and equality lead us to examine the situation of

tribals' lives. Social exclusion and marginalization of tribals of India raises a significant point of interests: how the deprived and disadvantaged tribal communities are coping within such adverse environment?

From the above discussion, it can be predicted that tribals of India fall behind the non-tribal population with respect to health indicators. The table below presents the disparity in health indicators between tribal and non-tribal population.

Table 2: Health Indicators of Tribal and Non-tribal Population in India

Indicators	Tribal	Non-tribal or National
Neo-natal mortality*	41.9	35.2
Infant mortality*	63.7	50.4
Child mortality*	37.9	9.3
Under 5 mortality*	101.6	59.7
Total fertility rate ⁺	3.12	2.68
Not currently using any contraception ⁺	60.9 %	46.5 %
Access to healthcare: [†]		
Pregnant mothers who received antenatal care from a health professional	40.2%	50.7%
Mothers who received postnatal care from a health professional within 2 days of delivery for their last birth	22.1%	36.4%
Birth assisted by a health professional	26.9%	48.3%

* Number of deaths per 1000 live births, source: Indian National Family Health Survey-3.

⁺ Rates for women age 15-49 years; source: Indian National Family Health Survey-3

[†]Source: Indian National Family Health Survey-3 (NFHS, 2009).

The poor health condition of the Indian tribals is reflected in the status of their reproductive health correlated with individual and household social and economic conditions (Middleberg, 2003). Reproductive health also represents the overall health condition of a population. The reproductive role of women all through the process of gestation, birth, breast-feeding, and child-rearing places her at the focal point of a population's reproductive health (Shankar & Thamilarasan, 2003). Moreover, women are central to various social and economic activities in tribal communities requiring reciprocal interactions with the contributing factors of reproductive health. Hence, current study focuses on the reproductive health of tribal women to

understand the overall condition of the tribals' reproductive health in India. Discussion in the next section explains the rationales for investigating reproductive health of tribals from social work perspective.

Significance of the Study

The basic definition of reproductive health encompasses the reproductive processes, functions and system at all stages of human life (United Nations Population Information Network [POPIN], 2010). The United Nations (1995, p.2) defines reproductive health as “a state of complete physical, mental and social well-being, and not merely the absence of reproductive disease or infirmity, in all matters relating to the reproductive system and to its functions and processes”. The intrinsic attribute of the definition of reproductive health emphasizes the right of individuals of both genders to be informed about healthy reproductive practice and process, such as, knowledge on safe, effective, affordable and acceptable methods for regulation of fertility, and, men and women's access to appropriate health care services to enjoy such rights (Sunil & Pillai, 2010).

Reproductive health is associated with a wide range of issues including the sexual health of an individual or of a community, the condition of the environment where the reproduction takes place, and the collaborative and reciprocal relationship between human and environment. Reproductive health is an indicator of the state of social justice, human rights, and empowerment of the tribal population central to social work values. These three indicators are related to the two core components of 'sustainability', namely, *social development* and *inter-generational equity transfer* (World Commission on Environment and Development [WCED], 1987). Social development, which is also known as developmental social work, focuses on building basic capacity of individuals, groups and communities and addresses very fundamental values of social work such as human dignity and right to self determination.

Reproductive health of tribal populations depends on their ability to access ecological resources, and their capacity to participate in social and economic institutions (Pillai & Wang, 1999). The socio-political power held by the tribals in Indian society determines the level of human rights, self-determination and access to socioeconomic and ecological resources they enjoy. This is particularly true for the ecological resource which influences the reproductive health of tribal population directly. For instance, women's health is highly correlated with availability of adequate food and nutrition with its dependence on tribals' access to forestland. However, because of institutional policy framework, such as, Indian forest policy, tribal groups may have limited access to such traditional common resources, resulting in declines in reproductive health. Women's access to 'power and resources' emerged as the important contributing factor to their reproductive health at the fourth world conference on women in 1995 held in Beijing which emphasizes increasing women's economic and educational status, and as a consequence, women's reproductive rights (Pillai & Wang, 1999). Thus, reproductive health indicates the level of self-determination, women's reproductive rights, and strength of tribals' socio-political power.

State of social justice is also linked to the status of reproductive health of Indian tribal population. Such linkage is substantiated by the social justice principle which demands an egalitarian perspective from social workers with a view to ensure clients' right to have basic needs and opportunities for their reproductive well-being. Tribals' right to transfer their resource and indigenous knowledge is central to the 'sustainability' which emphasizes ensuring well-being for the current and future generations. Hence, examination of tribal reproductive health is useful in assessing the extent to which populations enjoy the human rights to maximize their opportunity to enhance reproduction in a secured environment. Moreover, the peripheral position of tribals' community in the Indian society restricts tribals' access to socioeconomic institutions and resources related to their level of empowerment. In the backdrop against

reproductive health, social work perspective views 'empowerment' as the tribals' ability to participate in decision making in regards of reproductive decision and to utilize their own strength and resources to continue or sustain reproduction.

The above discussion illustrates the robust shade of sustainability which is embedded in the framework of reproductive health. The basic definition of sustainability emphasizes the transfer of intergenerational equity while continuing socioeconomic development without neglecting social justice and violating human rights (WCED, 1987). Social Work as a profession and as a discipline has promoted these values and principles since its emergence, and has invested its knowledge and resources in caring and helping individuals and communities to protect their rights and uphold social justice. Moreover, in the backdrop against human-made environmental crisis, the social work profession is embracing sustainability paradigm very strongly.

In such context, studies on reproductive health of a marginalized community requires an alternative view to incorporate the ecological approach to sustainability which views the environment as "a dynamic outcome resulting from interaction among all elements that population the environment" (Pillai & Gupta, 2011).

Prior studies on reproductive health have predominantly looked into this phenomenon from demographical, anthropological, or medical point of views. These studies in general have focused on the causes and factors of reproductive performance. Moreover, attempts have been made to gather information on diseases, health and hygiene practices among tribals with special references to reproductive health. However, role of environment on reproductive health as an integral component of the system of reproduction has been overlooked historically. With a view to fill up such gap, the current study takes a holistic approach to explain reproductive

health as the outcome of economical, social and ecological factors. Even though social work perspective emphasizes the influences of multiple factors on client systems at micro, mezzo, or macro level, reproductive health has not been examined from an ecological point of view. Despite the emphasis on 'person in environment' (PIE) within social work theory base, very few studies actually have conducted empirical test to measure the influence of environment on a particular community's reproductive health.

From the methodological point of view, it is noteworthy that only a limited number of empirical studies have attempted to explain tribal reproductive health systematically with appropriate use of theoretical perspectives (Mohindra & Labonte, 2010; Maharatna, 2005). Only a small proportion anthropological and public health studies have focused on tribal reproductive health from a holistic approach. In most the cases, these studies have examined only the demographic pattern of tribal populations. Maharatna (2005) points out the lack of 'systematic and scientific studies on tribal demographic behaviour' and underscores the absence of theoretical perspectives in the existing researches. I found this observation very substantial while searching literature on tribal reproductive health. From a social work approach, very few systematic studies have examined tribal reproductive health and tested theory-based hypotheses.

Finally, current study attempts to capture the embedded similarities between sustainability and social work approach which has not been explored yet. Recognizable similarities between these two approaches can be characterized by the shared goal of rehabilitating, restoring, and maintaining client systems to satisfactory level of functioning (Pillai & Gupta, 2011). Despite such similar characteristics, sustainability approach is yet to be established within social work scholarship. Social work's commitment to sustainability is captured in the Brundtland Commission report (WCED, 1987, p. 49) which identified: "our

inability to promote the common interest in sustainable development is often a product of the relative neglect of economic and social justice". The Brundtland Commission report strongly suggested 'social justice' – a core principle of this discipline for achieving sustainability.

Even though the sustainability paradigm emerged in contemporary period, the building blocks of this new paradigm pre-existed within social work, most likely with different labels. Social work as a discipline needs to adopt this emerging concept in the context of global climate change and environmental degradation. This current study can bridge the gap between these two collaborative aspects to some extent. The objective of this study is to examine reproductive health of women among the tribals in India.

Our discussion in next chapter presents the findings from the review of related literature on tribals' reproductive health, followed by explanation of theoretical perspective in chapter three and methodology in chapter four.

CHAPTER 2

LITERATURE REVIEW

Reviewing literature on tribal women with respect to their reproductive health suggests very limited numbers of studies on tribal women's reproductive health with a specific research question. Studies conducted by scholars from other disciplines such as, anthropology, medicine, and demography, on tribal communities with respect to their health and reproductive health, mainly reported descriptive statistical information obtained from cross sectional surveys and field observations. These studies have focused on reproductive health of tribals at micro and macro level. This chapter reviews the literatures on tribal reproductive health and attempts to generalize the reported findings and observations with a view to discuss the limitations of existing literature, and to identify the factors correlated to reproductive health of tribal women in India. The literature review includes peer reviewed articles, relevant books and book chapters, and articles from recognized news sources.

Searches of the literature for this study were conducted on several electronic databases including "Academic Search Complete" hosted by Ebsco, Social Work Abstract, Pubmed, Social Science Citation Index, Social Service Abstracts, Sociological Abstracts, and Google scholar. Websites of several development organizations and think tanks were also searched for this purpose such as: India Human Development Survey, World Health Organization (WHO), Demographic and Health Surveys (DHS), United Nations Development Program (UNDP), and the World Bank. The key words used in the search include the following: health, reproductive health, tribals of India, sustainability, ecosystem, social development, economic development,

social factors, economic factors, reproductive health, and reproductive health in India, indigenous population, and developing countries.

It is noteworthy to underscore the diverse geographical, environmental and socio-cultural contexts of Indian tribal groups requiring specific research strategies for each group which is an obstacle to generalize the findings with respect of reproductive health. Hence, it is observed that a study on tribal health usually addresses health problems of a selected tribe from a distinct region and environment (Chakravarty, Palit, Desai, & Raha, 2005; Gautam & Jyoti, 2005; Kshatriya & Basu, 2005; Pati, 2002). Limitations of existing studies on tribal reproductive health suggest shortcomings in the definitions of tribal population and reproductive health, weakness in research design and measurement, and lacking of theoretical basis. The following section of this chapter presents these limitations.

Limitations of Existing Studies

Limitation of Definition

Almost all of the studies have followed the guideline established by Indian government which identifies approximately 700 ethnic groups as “scheduled tribes” (Ministry of Tribal Affairs [MOTA], 2004). The Indian constitution recognizes these scheduled tribes as a distinct community based on the criteria of (i) occupying a specific geographical area, (ii) having a distinct culture featuring a tribal way of life, (iii) being engaged in primitive livelihood of occupations, and, (iv) lacking education and techno-economic development (Dash & Pati, 2002). The problem in regards of definition lies in the differences in the level of assimilations of tribals. Some of the India tribes are in the advanced stage of assimilation than that of other

tribes who are identified as 'primitive' because of their backwardness. The guideline established by the Indian Government recognizes all the ethnic groups listed as scheduled tribe regardless of their level of socio-cultural assimilation with greater society. Most of the studies on tribal's health have merely addressed this limitation and have rationalized their selection by confirming the inclusion of the tribe in the Indian government's schedule. Selection of tribe to study on the basis of erroneous uniform criteria increases the likelihood of misrepresentative comprehension.

Studies on tribal reproductive health have emphasized mainly tribal maternal health, and have conceptualized reproductive health from a holistic perspective. There are studies on tribal women focusing socio-cultural correlates of health; however, reproductive health has been mostly viewed through the lens of morbidity (Reddamma, Reddy, & Rani, 2002), fertility (Mohanty, 2003), mortality of mother and children (Baruah, 2003; Pati, 2003a), and, health and hygiene practice (Biswas & Kapoor, 2005; Chowdhuri, 2005; Dash, 1986; Kshatriya & Basu, 2005; Pandey, 2002; Pati, 2002).

Most studies lacked a theoretical basis. Only two studies used theoretical or conceptual framework (Pati, 2003b; Upadhyay, 2005) to define tribal reproductive health. However, objective of Pati's (2003b) study mainly focused on assessing tribal women's fertility, their social status, tribal people's knowledge on family planning, and women's trend of contraceptive use. It is noteworthy to underscore the narrow focus of the reproductive health definition on fertility behavior, contraceptive use, and status of women used in Pati's (2003b) study. The important aspect of ecology which highly influences the women's economic power, nutrition and health practice was not considered in this study. Pati (2003b) developed a conceptual framework which lacks explanation of any established theoretical perspective.

Definition of reproductive health used by Upadhyay (2005) also focuses on health status of pregnant women and, their pre and post experience of child birth, and few socio-cultural factors such as magico-religious belief. Ecological and social aspects of reproductive health are also excluded from Upadhyay's (2005) theoretical framework.

Problems with research design and measurement

In general the methodological limitation of prior studies shares the common shortcoming of sampling. Most of the sample populations were selected on the basis of accessibility and availability (Nembiakkim, 2008). For example, Mohanty (2003, p. 242) rationalizes the sampling process of the study: "The study was conducted among Santal women from two areas Khunta block and Baripada block considering the location of the villages nearer to the township and communicated through metal/all weather road, presence of Government office, Health centres within 1 k.m. of radius etc." Sampling of research participants on such criteria obviously is a severe flaw of research method which is a critical threat to generalizability of the research finding.

Methodological problem of the studies also manifests the absence of hypotheses which I have mentioned earlier. Without substantial theoretical input these studies merely developed any hypothesis or research question to construct a well-organized research design. This explains the reason behind lacking of experimental or quasi-experimental design among the studies on tribal women's reproductive health. Moreover, very few studies took a comparative perspective to understand the situation of tribal health with that of the general population of India except some analytical studies using secondary data sources (Tandon, 1994; Basu, 1995).

Most of the studies measured different indicators of reproductive health by collecting data using structured or semi-structured interview schedule on fertility, mortality, morbidity and other socio-cultural correlates. Predominantly the studies used descriptive data analysis techniques which commensurate their research objectives as almost all of the studies aimed to explore or assess the situation of tribal reproductive health.

A common inquiry of the prior studies on the tribal women's fertility was measured using different methods (Ray & Roth, 1991; Basu, 1967; Basu & Kshatriya, 1997). For example, many studies calculated the fertility by averaging the number of children ever born to women at the end of their reproductive period. Interestingly, the average number of children was obtained by dividing the total number of children by 'the number of currently married women' (Basu & Kshatriya, 1997; Kapoor & Kshatriya, 2000; Sharma & Khan, 1990) in some cases, or by 'the number of ever married' (Basu & Kshatriya, 1989; Das & Shah, 1991) in other cases (Maharatna, 2000). Similarly, age groups of the women used in the studies were not the same. For instance, some of the studies considered women at age 50 and above in the past reproductive period, where other studies considered women at age 45 and above (Maharatna, 2000). Such varied measurement methods compute different values of fertility for the same group which is a disadvantage to comparing and generalizing research findings.

Next section of this chapter discusses the various factors correlated to reproductive health with respect to tribal women in India on the basis of findings from prior literature.

Reproductive Health Factors

The identified factors related to reproductive health can be divided into economic, social and ecological groups. Prior literature also suggests strong associations between reproductive health and gender equality, women empowerment, and socioeconomic condition. On the basis of findings from prior literature, the following section discusses on these factors in details under the respective group.

Economic Factors

Economic factors influence reproductive health in several ways. Economic development and income both account for improving reproductive health of women by influencing their reproductive behaviors in both micro and macro levels. At the macro level, economic development of a community can facilitate improved quality of reproductive facility and services. In micro level, higher income can provide more resources for women to access health care services. The identified economic factors correlated to reproductive health are discussed below.

Women's Participation in Labor Force

Tribal women's participation in labor force is higher than that of non-tribal general population in India (Shankar & Thamilarasan, 2003). In some tribes, particularly the matrilineal ones, women's labor force participation rate is higher than that of male's (Maharatna, 2005). Participation in labor force may be considered as a proximate factor since it shapes the lifestyle (Frenk, Bobadilla, Stern, Frejka, & Lozano, 1991). Participation in workforce also determines the employment status which can strongly influence women's reproductive health (United Nations, 1987; Sunil & Pillai, 2010). Tribal women participate in various economic activities such as, food gathering, farming, animal husbandry, in addition to the regular household responsibilities such as, child bearing. Participation in workforce provides women with income and earning

opportunity, which can influence their reproductive health by empowering them to have control over reproductive decision.

Family Structure or Household Size

Type of family structure and women's fertility is robustly correlated (Davis & Black, 1956; Paydarfar, 1987; Stycos, 1958). Davis (1955) underscored the socioeconomic solidarity of extended family which stimulates early childbearing and fertility of women. While reviewing the studies on family types and fertility in Bangladesh, India and Taiwan, Nag (1975) observed lower fertility of women living in extended or joint families compare to that of women living in nuclear families. On the other hand living in joint family may cause higher level of sexual abstinence and consequently can influence the fertility and the likelihood of pregnancy (Upadhyay, 2005). Hence, in tribal context, family structure can be a strong economic factor of the reproductive health, since size of the family actually determines the workload for a woman living in the family. Compared to the small or nuclear families, large families have more economic advantage of workforce leading to higher capability of the family to invest in health of its member including the women.

Social organization of Indian tribes is structured on descent groups generally known as 'clan' consisting of members who have a common ancestor. Even though most common descent group among Indian tribals is the extended family, studies have reported the prevalence of nuclear type families among the tribes as well (Debbarma, 2005; Kshatriya & Basu, 2005; Pandey, 2002). This shows a trend of change in the family size from the joint or extended families to smaller one (Debbarma, 2005). Availability of other essential input for reproductive health, such as nutrition, may differ among the women within the same tribe due to variation in family size. Economic necessity of the family and tribe for large workforce may demand increased family size causing enhanced fertility of tribal women.

Sector of Occupation

Because of the high prevalence of women's participation in workforce, sector of occupation can be a significant determinant factor of their reproductive health. Differences in their living ecology attributes to the varied categories of tribal's occupation such as, food gathering, and hunting, jhum cultivating, farming, cattle herding, and working as wage laborer (Basu, 2000). Even though a tribe can be characterized with a special occupational skill, its members may have different trade and livelihood (Debbarma, 2005; Gautam & Jyoti, 2005; Kshatriya & Basu, 2005). Tribal women's occupation often requires hard labor for long hours requiring high nutritional input. Varied pattern of tribal women's occupation, along with the influence of mediating factors like nutrition, can strongly affect their reproductive performance. For example, women living in a food gatherer tribe require more nutritional input to attain a satisfactory reproductive health compared with the women living in a hunter tribe which does not encourage women's participation in workforce. Mediating factor such as, deforestation and environmental degradation have resulted in shifting from traditional occupation of many tribal groups (Mitra, 2008) which can influence their reproductive behavior and performance.

Life Expectancy

Life expectancy is a general health indicator which summarizes the risk of mortality for a given population, and influences the reproductive health in several ways. For instance, life expectancy can robustly influence maternal mortality which is a strong determinant of fertility, total number of pregnancies, accessibility and quality of maternal healthcare etc (Middleberg, 2003). In addition, increased life expectancy may result in decrease in fertility (Menard, 1987; Zhang & Zhang, 2005). Life expectancy of women also affects the overall reproductive health by influencing the crucial determinants such as birth intervals, and marriage at appropriate age which in turn influence the age of first childbirth. Because of such strong correlation with

mortality, life expectancy can influence the productivity of the tribal group and its women resulting in increases of decreased economic capability to invest in reproductive health.

Self Perceived Health Condition

A person needs to perceive self as a capable human being in order to be productive which highly depends on the view he or she possesses in regards of health. Hence, self-perceived health condition is considered as an economic factor. Perspective to health status is highly influenced by socio-cultural beliefs and practices. In the context of reproductive health, tribals' perspective is a vital determining factor which influences their health and hygiene practice. For instance, women in many tribes continue their regular hard-working economic activities during advance stage of pregnancy (Basu, 1993); such practice may prevail over the post natal period which can adversely impact the health of newborn children. Tribals' perception in regards of their health status in general is 'not very good' (Roy Burman, 1986) which, from tribals' point of view, resulted from lack of access to nutrition and healthcare (Roy Burman, 1986; Mohanty, 2002). Because of the strong association between 'being well' and increased capability of an individual, self perceive health condition is an economic factor correlated to reproductive health.

Access to institutional support

Poverty stricken tribal groups and tribal women of India (Beck & Mishra, 2011; Ministry of Tribal Affairs [MOTA], 2004; Planning Commission of India, 2008) has very limited access to resource and institutional support. In the backdrop against well-established link between poverty and vulnerable health condition (Das Gupta & Chen, 1996; Mohindra, 2009), reproductive health of tribal women can be influenced by the institutional input of pro-poor health strategies such as, microcredit schemes. Tribal women's access to such schemes would increase their capabilities to produce health, and good health would result in economic well-being of the

individuals and families resulting in increased reproductive health (Mohindra, 2009; Mohindra et al., 2006; Mohindra & Haddad, 2005). Hence access to institutional support is an economic factor correlated to reproductive health.

Social Factors

Several social factors were reported as the social factor correlated to tribal women's reproductive health such as, marriage practice (Chakravarty et al., 2005), social status of women (Mann, 1996; Sikdar, 2009), and health and hygiene practice (Ali, 1994; Chaudhuri, 1994). Discussion on social factors in details is presented below.

Marriage Practice

The cultural norm of marriage practice has robust direct and indirect effect on reproductive health of tribal women. For instance, in tribal marriage, spouse is selected according to traditional custom which may directly influence the reproductive practice by deciding the partners in a sexual union. On the other hand, marriage practice indirectly influences the reproductive health of women by determining several other factors such as, age at marriage, pattern of family organization, women's status in society, and, women's decision making ability (Kshatriya, 1992). Tribal marriage broadly can be categorized into (i) endogamy, (ii) exogamy, and (iii) consanguineous patterns (Basu, 1995). In addition, cross-cousin marriage is practiced in many tribal societies (Basu, 1995). Each of this marriage practice may influence the reproductive health in distinct way; for instance, consanguineous marriage can lead to increased miscarriage, still births, neo-natal deaths, and physical and mental defects (Basu, 1993, 1995).

Marriage practice also indicates whether a woman is in a polygamous or monogamous relationship. Several Himalayan tribes such as, Naga and Lusia practice polygamy, mainly for economic reason of having enough helping hands for agricultural activities (Basu, 1995). By

contrast, many tribes such as, Jausaris and Todas used to practice polyandry (Basu, 1995), and there are many tribes who strictly practice monogamous marriage such as, Lodhas of West Bengal (Chakravarty et al., 2005). Such marriage practice strongly shapes the family and social structure, division of labor within the group, women's status and decision making ability, and in turn influences the reproductive health of the women.

Age of Marriage

Tribal women's age of marriage not always reflects their age at entry to sexual union, since unlike non-tribal Indian society, virginity is not crucially 'valued' by many tribal groups (Vidyarthi & Rai, 1977). Usually, tribal girls are married off at matured age compared to the age of non-tribal women, however, influence of mainstream Hindu society is changing this trend (Sinha, 1986). The average age at marriage for tribal women was found higher (16.39) than that of the non-tribal rural women (15.39) in Indian Census of 1971 (Basu, 1995). However, age of marriage varies across the tribal groups in India. Tribal women's from north-eastern region of India enjoy higher age of marriage compare to the tribals in the central and south regions (Sinha, 1986).

Age of marriage directly influences the reproductive health of tribal women by determining the age at entry to sexual union which is a strong determinant of fertility. Marriage at younger age increases the risk of abortions, miscarriages, maternal mortality and still-births (Basu, 1995). Marriage at delayed or matured age may attribute to higher level of economical and educational attainment by the women, which in turn can influence their reproductive health.

Education

Level of education and several indicators of reproductive health are strongly correlated such as contraceptive use (Martin, 1995; United Nations, 1987), exposure to sexual intercourse (Cleland & Rodriguez, 1988; Cochran & Farid, 1989; Sunil & Pillai, 2010), age at first

menstruation (Sunil & Pillai, 2010), and, decision making power of women (Bawah, 2002; Cleland & Rodriguez, 1988). Particularly in the tribal context with limited healthcare resources, education of mother becomes very crucial which is a strong correlate of infant mortality (Basu, 1995). In general, literacy among the tribals is very low (Basu, 1995). Primary Census Abstract of India shows the notable difference in the female literacy rate between the tribal (14.50%), and non-tribal (39.29%) or general population in India in 1991 (Shankar & Thamilarasan, 2003). Moreover, level of education and literacy among tribals vary. Literacy level of women not only influence their reproductive performance, it also influences their income, and consequently other factors of reproductive health such as health seeking behavior, health and hygiene practice, and age at first marriage.

Social System of Gender Hierarchy

Unlike the mainstream Indian society, tribal women may enjoy the privilege of living in a matriarchal society. Tribal societies in India generally are patriarchal (Basu, 1995; Zaman, 2008), but there are few matrilineal tribal groups such as, Khasi, Garo, Jaintia, Lalung and Rabha of North Eastern India (Mann, 1996; Sikdar, 2009). The higher status of tribal women in matrilineal societies compared to that of women in patrilineal tribal societies has been noted in studies (Basu, 1995; Sikdar, 2009). Even in patriarchal tribal societies, women enjoy relatively more freedom and higher status than the women in non-tribal societies.

However, overall status of tribal men is higher than that of tribal women, and change in the status of women leading to inferior position in tribal societies has been underscored by scholars (Chauhan, 1990; Mann, 1996). In such context, tribal women's experience of living in a patriarchal or matriarchal society would determine whether or to what extent they have control over reproductive decision making, their earning, sexuality, and other reproductive behavior related to fertility.

Status of Women

Status of women in a society is strongly influenced by the dominant social values and societal gender perspective. The traditional privileged position or status of tribal women within groups is going through change which is reflected in the shifting trend in Indian tribal societies from matrilineal system to the patrilineal system, and often from polyandry practice to monogamy practice (Mann, 1996). Status of women therefore should not be taken granted in tribal context, particularly against the backdrop of declining sex ratio, which dropped from 987 to 972 within three decades (1961–1991) (Basu, 1995). Sex ratio suggests to what extent the females are treated equally to males in a human population, as such, higher sex ratio indicates higher status of women and the presence of social and culture values protecting women's interest. Status of women also correlates to women's economic power, opportunity for education, access to community resources and networks, and most importantly reproductive decision making power (Das Gupta & Chen, 1996; Mohindra, 2009; Sunil & Pillai, 2010). All these successively can influence the reproductive health of tribal women.

Religion and Caste System

Hindu caste system marginalizes the tribals and limits their access to resources and networks in the mainstream society. Even though majority of the tribes in India are not Hindu by religion, reproductive health of tribal women are influenced due to social exclusion practiced by Hindu caste system. Such exclusion limits tribals' opportunities in many areas such as, education, earning, and healthcare. On the other hand tribal religion plays a crucial influential role in the system of reproductive health by mediating health and hygiene practice which is discussed in the next section.

Health and Hygiene Practice

Tribal's health and hygiene practice can be characterized as a system contributed by their social values, traditional knowledge, religious belief, material culture e.g., tools and techniques, and social organization (Ali, 1994). Reproductive health strongly correlates to health and hygiene practice of tribal population which is comprised of supernatural beliefs related to illness and treatment, strong role of traditional medicinemen or shamans, community involvement in disease control and treatment, and mixed interventions of traditional and modern health care (Chaudhuri, 1994).

The ecosystem and surrounding environmental or physical setting are strongly linked with the latter components of tribal hygiene (Chaudhuri, 1994; Khera, 1994). It is important to underscore the strong role of community in the health practice as a collective unit (Ali, 1994; Chaudhuri, 1994). Tribal health and hygiene practice emphasizes holistic cure of a disease comprising physical, psychological, and spiritual well-being. Unlike modern-day doctor, tribal shamans and medicinemen provide the patient with spiritual and mental support along with the remedies for physical illness. The relationship between a tribal woman and traditional healthcare is based on trust, responsibility, charity, power, and respect, from which she expects more than skill-based interventions as treatment (Ali, 1994). Reproductive health of tribal women can be highly influenced by such input from their traditional health and hygiene practice.

Presence of supernatural entities is dominant in tribal health and hygiene practice in traditional mode of treatment, which constructs the concept that, disease is caused by supernatural, human, or, natural reason (Ali, 1994; Chaudhury, 1994; Gupta, 1986; Dash, 1986). Hence, tribal's perspective on health emphasizes spiritual aspect of prevention instead of maintaining cleanliness and hygienic sanitary living condition (Ali, 1994). Traditional tribal socio-religious practice also can adversely affect their women's reproductive health as well as tribal's general health, such as alcohol consumption during pregnancy.

Health practice can impose taboo over crucial determinant of reproductive health such as food habit and diet. For instance, Birhor tribe of West Bengal views food as 'agent' of inducing disease and restricts taking ingredients essential for nutrition, such as, salt taking is prohibited for women in postnatal period at least for three days after child birth (Bhattacharya & Sengupta, 1986). Negligence to special maternal and child health care has been observed among the Kutia Kondh, Santal, Jainsari, and Kharia tribal group as a common practice (Basu, Jindal, & Kshatriya, 1990).

Ecological Factors

Ecological factors highly influence the tribal women's reproductive health (Chaudhuri, 1994). A reciprocal interaction and interdependence between tribals and their natural habitat attributes to such strong correlation. The identified ecological factors correlated to tribal women's reproductive health are discussed in following section.

Environment and Ecology

Tribals' health and their women's reproductive health are strongly connected with the environment and surrounding ecology (Chaudhuri, 1994). This relationship is based on multiple foundations attributing to a total functional ecosystem. Environmental factor of reproductive health addresses the functionalities of other subsystems within the system of tribal health such as, forest based economy is the economic subsystem functioning under the greater tribal health system which provides tribal women with nutrition and occupation to build capital.

Traditional tribal health practice is largely shaped by the symbiotic relationship between the tribes and the nature, which has developed the knowledge-base of their traditional healthcare. Environment can influence the reproductive health of tribal women directly, for instance, availability of adequate food and nutrition is likely to keep the women's health in

satisfactory condition. The effect can be felt indirectly through socioeconomic factors; for example, tribal fertility differs between two clans of a tribe residing in two different terrains due to spatial variation in economic, socio-cultural, and ecological factors (Maharatna, 2005).

Tribal women is central to the forest based economy where she plays a vital role in meeting basic necessities by collecting food, fuel, medicine, and housing material from the forest, and by participating in forest-dependent shifting cultivation and animal husbandry (Dash & Pati, 2002; Menon, 1988). Destruction of ecology because of deforestation therefore disrupts the supply of nutrition of tribals, and in turn can adversely affect the reproductive health of women (Ali, 1980; Patel, 1985). Deforestation also affects women's reproductive health by increasing their workload. Tribal women need to walk more distance and spend more time to communicate between wilderness and their residences which could be harmful for the women in antenatal stages (Menon, 1988). In the context of Indian forest policy's emphasis on 'commercial forestry' rather than ecologically sustainable forestry to meet the needs of forest dweller tribals (Dash & Pati, 2002), environmental condition should be taken into account to measure the reproductive health of tribal women.

Food and Nutrition

Nutrition is a must requirement for any life to survive which comes from the food intake. Food and nutrition have strong influence on the reproductive health of women, possibly, than any other factor. Tribal women's nutrition demand primarily is met from the proximate ecology which is currently under threat of deforestation and environmental degradation (Ali, 1980; Menon, 1988; Patel, 1985). This may attribute to the malnutrition or undernutrition of tribal population in India, in general (Basu, 1995; Beck & Mishra, 2011; Tandon, 1994).

The nutrition status among the tribals in India varies, however, in general, its status is not satisfactory. Tribal women's diet is commonly deficient in calcium, vitamin A, riboflavin and animal protein (Basu, 1995; Rizvi, 1986). The most common disease that tribal women

experience from malnutrition is anemia (Basu, 1995; Gupta, Gupta, Zafar, Mangal, & Sharma, 1983; Pati, 2002; Reddamma et al., 2002) which can affect the reproductive health of women very adversely by lowering their resistance to fatigue and energy to work, and by increasing vulnerability to other diseases. The other reported prevalent diseases among tribal women are pyrexia, respiratory complaints, gastro-intestinal diseases and rheumatic diseases, and gynecological problem (Basu, 1995; Gopalan, 1987). Food habit and nutritional input have a direct and strong influence on the reproductive performance of tribal women, particularly, for pregnant women nutrition is a vital determinant of the baby's growth chances of survival.

Tribal socio-cultural norms and values, and their health practice also attribute to their women's nutritional deficiency (Basu, 1995; Basu, et al., 1990). For instance, in many tribes, women do not take special or extra food while continuing their hard labor during pregnancy (Rizvi, 1986) resulting in reduced body weight and hemoglobin of pregnant mothers leading to maternal mortality (Basu, 1995). In the male dominant traditional patriarchal tribal groups, women living in the joint families might be deprived of adequate nutrition because of the social custom which limits the women's food intake by preferring the male members of the family to the females.

Proximity to Mainstream Society

The extent of contact with mainstream society determines the level of tribe's assimilation. In 1961, Dhebar Commission identified four categories among Indian tribals in terms of their level of assimilation with mainstream society and the level of adopting non-tribal lifestyle (Basu, 2000). According to the Dhebar Commission, the most assimilated tribal groups were identified as the 'acculturated' tribals who had adopted almost the modern lifestyle and had travelled far from their original habitat (Basu, 2000). And the least assimilated tribal groups were placed in the 'primitive group' category that were at very underdeveloped stage, and were leading a very isolated nomadic life (Base, 2000). With respect to the tribal women's

reproductive health, proximity to mainstream community is vital since it determines the extent of tribals' access to modern healthcare which can strongly influence the status of their reproductive health. Proximity also denotes their level of socio-cultural influence of dominant culture upon tribals' culture. As we have discussed in earlier section, influence of Hindu culture can be observed among tribals' culture which can affect their reproductive health and performance. For instance, influence of patriarchal Hindu dominant culture may downgrade the status of tribal women which in turn can affect their reproductive health.

Tribal Group Strength

The social, economic, and ecological factors attributes to the tribal women's reproductive health through their distinct culture consisting of a strong tribal identity. It's the social cohesion among the members of the tribes which make them unique and sustains the tradition of health practice, societal attitude to women, food habit, mode of production, and social organization. Tribal culture nurtures the solidarity and tradition, therefore, strength of tribal culture indicates whether or to what extent the tribe will survive with their own ethnic identity. But survival of tribal culture depends on the existence of ecology where the tribes live. Therefore strength of tribal group depends on the condition of their surrounding ecology which provides the tribes with the sense of right and access to their territory, food security, and sound physical and psychological health. India's rapid economic growth may appear as a threat to the tribal's habitat and ecology because of the increasing demand of minerals by the industrial sector requiring exploration of mines which are mostly located in the tribal regions (Padel & Das, 2010). Strength of tribals addresses this issue, whether or to what extent such challenges would influence their reproductive health and performance.

In the next chapter I attempt to develop the theoretical model for current study using these identified economic, social, ecological factors correlated to tribal women's reproductive health.

CHAPTER 3

THEORETICAL PERSPECTIVES

It is well documented that, very few empirical studies have attempted to explain tribal reproductive health systematically with appropriate use of theoretical perspectives (Mohindra & Labonte, 2010; Maharatna, 2005). This limitation has been noted by scholars for last several decades. It is noteworthy to quote S. Chandrashekhar, the distinguished Indian demographer, who substantially identified this limitation as far back as in 1950s by stating,

“For some strange reason, all the studies on Indian demography have hitherto ignored the question of India’s aboriginal population... In fact, we do not have a single demographic study of any one of the tribes based on the intensive field work” (Mamoria, 1958; p. vii).

Within last six decades, the situation remained almost unchanged. There are numerous studies on tribal health condition accomplished by scholars from the field of anthropology, public health, medicine, demography, and sociology, however, a small proportion of these studies made inquiry on tribal reproductive health from a holistic approach. It is noteworthy to quote Maharatna (2000, p. 1342) who points out the absence of substantial number of empirical studies on tribal reproductive health examining theory based hypothesis:

“In fact, anyone looking for a systematically established explanation of observed distinctive features of tribal fertility would almost certainly be disappointed so far as the existing literature on India’s tribal demography is concerned. Almost none of the studies sets out with an explicit theoretical background discussion, containing plausible and testable hypotheses about differential demographic behaviour between tribal and nontribal groups.”

Indeed, I found this observation very substantial while searching literature on tribal reproductive health. In the context of tribals' experience of social exclusion and oppression, understanding the inherent social epidemiology of tribal women's health requires knowledge on existing empirical studies with conceptual or theoretical framework. In the absence of theoretical framework in the area of tribal women's reproductive health, I had to conduct a literature search in relevant areas, such as, public health, women's health, and gender studies. The next section presents discussion on relevant theoretical perspectives to identify the social mechanism consisting social, economic and ecological factors that influence reproductive health of tribal women.

Life-Course Approach

Reproductive health has received serious attention from public health field, even though lack of theoretical foundation to explain this comprehensive issue is noticeable. Studies from public health generally aim to identify the factors which may influence the reproductive health indicators of a particular community (Mishra, Tom, Cooper, & Kuh, 2009; Rich-Edwards, 2002). Studies conducted from this point of view consider the factors which influence women's reproductive health throughout the life typically from menarche to menopause (Blell, Pollard, & Pearce, 2008; Mishra, et al., 2009). The theoretical model known as 'life course approach' to reproductive health has attributed to this analytical viewpoint. This approach to reproductive health examines the independent, cumulative and interactive effect of behavioral, social and biological factors on reproductive health throughout the life of women, and, how these effects pass from generation to generation (Kuh, Ben Shlomo, Lynch, Hallqvist, & Power, 2003).

It is evident from numerous studies on several populations that social determinants of health have a cumulative effect on the possibility of illness from several diseases such as,

cardiac illness (Blane, 2006; Raphael & Farrell, 2002). Moreover, the life-course perspective focuses on how the social determinants of health influence the different stages of development, i. e., from early childhood to the stage of elderly. In the context of reproductive health, life-course approach consider women's exposures to risk factors and possible adverse effects from such exposures resulting in harmful impact on women's reproductive health from the exposure induced diseases.

Life-course perspective proposes four different models to capture the exposures at different points in life which may influence reproductive health: (i) critical period model, (ii) critical period model with later life effect modifiers, (iii) accumulation of risk model, and, (iv) chains of risk models (Kuh, et al., 2003). In brief, critical period model assumes that if a critical exposure to risk occurs in the early phase of life, there will be an irreversible change in the physical system causing adverse effect later (Ben-Shlomo & Kuh, 2002). Accumulation of risk model on the other hand, assumes that combined impact of exposure to risk factors throughout the life actually determines the health risk regardless of the degree of exposure to such risk factors in early life. Finally, the chain of risk model is a modified form of the accumulation model which assumes that exposure to risk factors may ignite the following exposure, which can result in a sequential exposure (Mishra, Cooper, & Kuh, 2010). For instance, risky sexual behavior correlates to increased risk of sexually transmitted disease (STD) leading to increased risk of infertility (Gray, Wawer, & Serwadda, 2002). Even though theoretical perspective of life-course approach to tribal women's reproductive health considers several social determinants, this perspective minimally incorporates the economical and ecological effects on reproductive health.

The Person in Environment (PIE) perspective is well suited to accommodate the strong interdependence between the tribal population's reproductive health and the surrounding

physical and social environment. This perspective also captures the linkage between problems of individuals and macro level issues. Under the meta-theoretical perspective of PIE, rest of this chapter aims to develop a theoretical framework to understand the contributing factors of tribal women's reproductive health and the embedded relationships.

Under the PIE perspectives, the most appropriate theoretical framework to examine the reproductive health of tribal women of India is social ecological system theory or ecosystem theory which recognizes the association between human problems, life situations, environmental and social conditions. This is particularly valid for the tribal women's reproductive health which is directly influenced by the surrounding physical environment, or ecological setting. Several studies corroborate this association; for instance, Reddamma et al, (2002) found maternal morbidity as the outcome of direct influence of 'socio-cultural setting'. By contrast, low fertility among tribal women living in a harsh environment was reported due to deficient diet and excessive physical activities (Howell, 1979). The next section discusses ecosystem theoretical perspective with a view to develop the theoretical model of current study on reproductive health of tribal women of India.

Social Ecological or Ecosystem Perspective

Scholars from the diverse field have utilized this perspective to explain and define problems and to offer interventions in the areas of public and community health across diverse populations (Naar-King, Podolski, Ellis, Frey, & Templin, 2006; Raneri & Wienmann, 2007; Visser & Schoeman, 2004). For instance, Naar-King et al. (2006) demonstrated the efficacy of social ecological model of illness management in high risk urban diabetic adolescents. This approach is sensitive to the distinct socio-cultural context such as, cohesive relationships within

the members of a group, and the historical background of a community (Dalton, Elias, & Wandersman, 2001).

The social ecological perspective which is also known as ecosystem perspective emphasizes the interrelationship between environmental condition and human's response. Environmental or ecological setting is a core component of this framework with physical, social and cultural dimensions influencing multiple health aspects, such as, physical and emotional health (World Health Organization [WHO], 1986). Hence, this perspective can be useful with special reference to the Indian tribal women's reproductive health because of the strong correlation between the geophysical specificities and their reproductive health (Basu, 1993; Maharatna, 2000). In such context, explanation from social-ecological approach may capture the underlying risk factors behind reproductive health of Indian tribal women.

Social ecological theory also encompasses the personal or individual attributes, hereditary or genetic feature, psychological and behavioral characteristics (Stokols, 1996) which influence the reproductive health of tribal women. The strength of this perspective lies in the fact that it focuses on the interaction among environmental and individual level factors, rather than focusing on a particular factor (Stokols, 1996). Social ecological theory is actually a derivative of ecosystem perspective which provides an advantageous framework for understanding the effects and influence of individual, family, and community level factors on behavioral outcomes (Bronfenbrenner, 1979; Corcoran, 1999).

The perspective of system theory can be used to understand the interaction between various reproductive behavior patterns of tribal women and the available resources in the surrounding ecology. Particularly in the backdrop against the deforestation, displacement and ecological destruction, the degree of mutual interdependence between tribal women and nature

should be examined with this theoretical perspective. The ecosystem theory identifies broadly three levels or layers of surrounding environment in which the set of systems interact with each other in order to maintain the balance or homeostasis (Payne, 1991; Stein, 1974). The innermost environmental layer is the microsystem which refers to the activities and interactions that take place in the individual's closest surroundings; the second layer is the mezzo-system which refers to the connectedness among the microsystems such as homes, or schools, and, macrosystem is the broadest layer, comprised of cultural, organizational, or social class in which micro, and mezzo systems are embedded (Bronfenbrenner, 1979; Payne, 1991; Stein, 1974).

Relevance of ecosystem perspective can be illustrated with the example of women's participation in the labor force among India's tribes (Maharatna, 2005). Ecosystem perspective provides a perspective to incorporate several domains which influence reproductive health such as, culture, ethnology, gender equality, social structure, and traditional technology. Utilizing the ecosystem perspective, these different domains or subsystems can be placed or allotted in micro, mezzo and macro levels. Tribal women's reproductive health receives input at different levels. There are resources available from family, peers, or community – which represent micro and mezzo level systems, as well as, from institutions such as, government health centers, which are located at macro level.

The system perspective however remains inadequate in its ability to incorporate the cultural values and resources related to the desire for continuity of present actions with the future that the tribal communities bring to almost all aspects. It is necessary to integrate the concept of 'sustainability' when ecosystem theory is used for understanding tribal women's reproductive health. The reason behind such necessity lies in the traditional tribal value that emphasizes 'continuity' which contradicts with the dominant social value of 'change' (Padel &

Das, 2010). Tribal value of continuity echoes the concept of sustainable development which emphasizes meeting the “needs of the present without compromising the ability of future generations to meet their own needs” (World Commission on Environment and Development [WCED], 1987). The emphasis on ‘continuity’ of tribal reproduction refers to sustenance of the tribe and maintenance of ecological resources for future generation, which reflect the core concept of ‘meeting intra-generational needs’, along with the aspect of ‘inter-generational development’ of sustainability (United Nations, 2008).

From ecosystem perspective it can be argued that, the ‘continuity’ of tribal reproduction chiefly emphasizes the sustenance of various ‘systems’ in different levels. For instance, tribal women’s nutrition status and consequently, their new born infants’ weight at birth, depend on the food source from surrounding environment. We can consider these as the mezzo level system, and sustenance of this system depends on the Indian forest or environment protection policy – a macro level function. From this perspective, ecosystem of tribal reproductive health may be hampered due to deforestation resulting in malnutrition and additional hardship for tribal women as a consequence of increased distance between habitat and surrounding forests (Basu, 1993), which can in turn affect their fertility. Hence, by borrowing the system idea we can hypothesize the presence of tribal women’s subsystems, and subsystem of their peer groups, and families, within the whole system of women’s reproductive system, and explain their interconnectedness using ‘sustainability’ perspective.

The underlying theoretical perspective which explains tribal women’s reproductive health as an outcome of various social, economic and ecological factors is the sustainability approach – an offspring of the ‘sustainable development’ concept. Sustainable development is defined as an approach to development “that meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED, 1987). The

emphasis on 'continuity' of development refers to concerns for meeting intra-generational needs, along with the aspect of inter-generational development (UN, 2008). In the context of Indian tribals, from this perspective, prime focus of reproductive health should emphasize sustaining the reproductive systems to maintain a healthy reproduction over a long period of time. In addition, sustainability approach emphasizes instituting social justice, and stipulates maintaining development or progress in economic, social and ecological aspects for a certain population or community.

Economic factors such as, chronic poverty, low income, and limited access to resource are common characteristics across Indian tribals (Beck & Mishra, 2011; Planning Commission of India, 2008), which are strongly correlated to the reproductive health of tribal women. Social norms, perceptions and attitude toward gender, and motherhood are correlates of social component of sustainable reproductive health. Tribals' access to natural resources in forest areas reflects the extent of compliance or adherence to the principles of social and justice at the community or state level.

While ecosystem perspective directly addresses the social and ecological factors, they hardly capture the economic aspect of health, particularly reproductive health. In the semi-modern, or, primitive tribal societies, cash or material capital exists minimally. Most of the capital available in these tribal societies are in non-monetary or non-material forms, such as, human capital, social capital etc. The linkages among the various forms of capital, material or non- material with reproductive health, especially in tribal communities remain inadequately conceptualized and poorly specified (Mohindra, 2009). Hence, I examine the conceptual spaces of reproductive health and attempt to measure its dimensions as explained in following section.

Capability Approach to Health

Due to severe limitation in theoretical foundation with respect to tribal women's reproductive health, I reviewed relevant studies on similar marginal population. Mohindra (2009) used Amartya Sen's (1992) capability approach to explore the real health opportunities for poverty-stricken Indian women as the outcome of their participation in microcredit scheme. Sen's (1992, 1979) capability approach offers an alternative 'space' for examining the extent of real opportunities for an individual. Instead of focusing on available resources, the capability approach examines the utility of these resources in people's life (Sen, 1979).

Population of Mohindra's study and the tribal women share the common life-experience of deprivation due to poverty. Hence, utilizing Sen's capability approach to explain the barriers of reproductive health of tribal women appeared appropriate. The basic theoretical structure of capability approach differentiates between the 'means', labeled as 'functioning', and 'ends', labeled as 'capabilities' of well-being (Sen, 1979). 'Functionings' refers to the 'doing and beings' in an individual's life that one would desire, such as, being in good health, or, doing socialization. By contrast, 'capabilities' refers to the "various combinations of functionings that a person can achieve" (Sen, 1992). Based on this perspective, Sen (2002) pioneered the capability approach to health and emphasized the importance of health as a 'human capability'. By implying the similar conceptual framework, Sen (2002) distinguishes between the 'health functioning' and the 'health capability'. In the context of health, 'functioning' can be exemplified by 'being free from HIV' and 'capabilities' can be defined as a person's ability to achieve overall good health in all aspects.

Another integral component of this approach is the 'agency' which refers a person's freedom or ability to define and pursue for own well-being based on his/her values (Sen, 1992).

Agency therefore is a crucial indicator of this 'capability approach to health' which can be used to assess an individual's capability by evaluating the economic, social and political challenges that obstruct one's ability to pursue choice. Importance of 'agency' within capability approach heavily relies on the concept which translates capabilities as freedoms, or the real opportunities in individuals' life (Sen, 1992; 1999). In the context of health, agency should facilitate the individuals and the communities to prioritize and decide what sort of health service they would like to utilize (Ruger, 2004).

The capability approach is an appropriate theoretical perspective for evaluating marginal and deprived communities like tribals. Particularly for the reproductive health of tribal women, the capability approach to health would allow us to evaluate the 'functioning' with reference to reproductive practice and the 'capabilities' influenced by the reproductive functioning. Since, reproductive health is a component of overall health condition of a community, it is appropriate to identify and measure the 'reproductive capabilities' of tribal women's health in Sen's (1992) approach. Tribal women's capability would reflect whether the current levels of functioning of tribal communities are adequate for the maintenance of sustainable reproductive health.

When we are considering the concept of producing input, Grossman's (1972) model of 'health production' provides the scope to estimate the tribal women reproductive health as an outcome from a given quantity of health input (McGuire, Henderson, & Mooney, 1988), which considers health as a stock or capital, for an individual, or a community. This model assumes that, with a given level of technical knowledge on health an individual will attempt to maximize his or her health stock by utilizing opportunities of converting inputs into health while encountering the barriers or constraints (Mohindra, 2009). Grossman (1972) assumes that, over time this stock of health degrades in the absence of 'investments' in health. For instance, lack of

investment for food can decrease the nutritional status resulting in impoverished health. This model views health as 'consumption goods' that produces direct satisfaction and utility, and, as an 'investment goods' which provides consumers with the satisfaction indirectly by increasing individual's productivity, lessening sick period etc. In terms of reproductive health of tribal women, consumption goods should refer their desire to be in good health, and the investment goods can be referred by 'inter-generational equity transfer' – a core component of sustainability aspect. In his model, Grossman included very few health inputs, mainly, education and income. Several scholars have attempted to overcome this limitation of Grossman's model, which I have discussed in next section to illustrate the implication of this model in tribal context.

Influence of Grossman's model can be found in several other scholar's works (Evans & Stoddart, 1990; Lalonde, 1974; Moss, 2002) who attempted to show how multiple factors can interact and impact the health status in a cumulative way. A similar approach was proposed in the framework developed by Frenk, Bobadilla, Stern, Frejka, and Lozano (1991) where three broad categories of determinants or factors were identified: (i) basic – which comprises of population, environment, social organization, and, biological risks (ii) structural – consisting the level of wealth, social stratification, occupational structure, redistributive mechanisms, and (iii) proximate referring working conditions, living conditions, lifestyles, access to health care. Based on a symbiotic relationship between population and environment, Frenk et al. (1991) theorizes individual health as an outcome of systemic, societal, and institutional factors.

This framework conceives population and environment as the basic determinants of health, and links them through social organization which facilitates humans developing 'necessary structures to transform nature, and through human genome which respond to the change in environment (Frenk et al., 1991). The components of social organization, i.e., economic structure, political institutions, science and technology, and culture and ideology,

cumulatively determine the level of resource-affluence and the structure of social stratification, which consequently makes up the 'structural determinants of health (Frenk et al., 1991). At the end, basic and structural determinants constrict the variation in proximate determinants and determine the health status of an individual. The conceptual framework proposed by Frenk et al. (1991) can be implied to explain reproductive health as a 'capability' of Indian tribal women gained from the process of 'functioning' within the ecosystems to attain sustainability or continuity of healthy reproduction. Moreover, proximate, structural, and basic factors of health of this framework can be linked to the micro, mezzo and macro level of the ecosystem respectively. The conceptual framework of current study attempts to establish the linkage between ecosystem perspective, framework by Frenk et al., (1991), Sen's (1992) capability approach and the perspective of sustainability.

The framework presented in figure 1 on page 44 explains the reproductive health of tribal women as an outcome which is located at the right side of the diagram. According to this conceptual framework, reproductive health can be achieved as a 'capability' which is the combination of various functioning of reproductive practices. The hypothesized functions are presented in the central column with the heading 'Sen's (1992) capability approach functionings' which are the desired state for an individual. Functioning of employment, for example, means 'earning income' for self – which is a common desire of individuals.

These functionings are associated with reproductive health factors and are highly influenced by social and cultural elements. For instance, factor of 'sector of occupation' suggests whether a tribal woman belongs to an agrarian or nomadic tribe; factor of education determines whether, or to what degree, the woman receives have scope of income. These reproductive functionings can be categorized into three broad components of sustainability approach, namely, economic, social and ecological.

This framework suggests that, these three components collectively influence the power of tribal women in regards of their ability to achieve better opportunity for reproductive health. In addition to explaining the tribal women's reproductive health, this conceptual framework also presents the reproductive risks of this population and frames these risk factors in the appropriate level of ecosystem.

An additional dimension 'power', within the capability approach, focuses on the likelihood of transformation of resources into immediate inputs for reproductive health. Socio ecological theories discussed with respect to tribal women's reproductive health focuses on the contribution of various types of resources essential for achieving reproductive health. However, the impact of the various resources on reproductive capabilities and well-being depends upon the extent of tribal women's control over the resources and inputs. Thus power plays an important role in transforming resource into their reproductive health. In figure 1 below, the conceptual framework of current study presents the identified economic, social, and ecological factors in the light of ecosystem perspective and Sen's (1992) capability approach to reproductive health, and attempts to establish the link between the factors, 'power', and 'reproductive health of tribal women'.

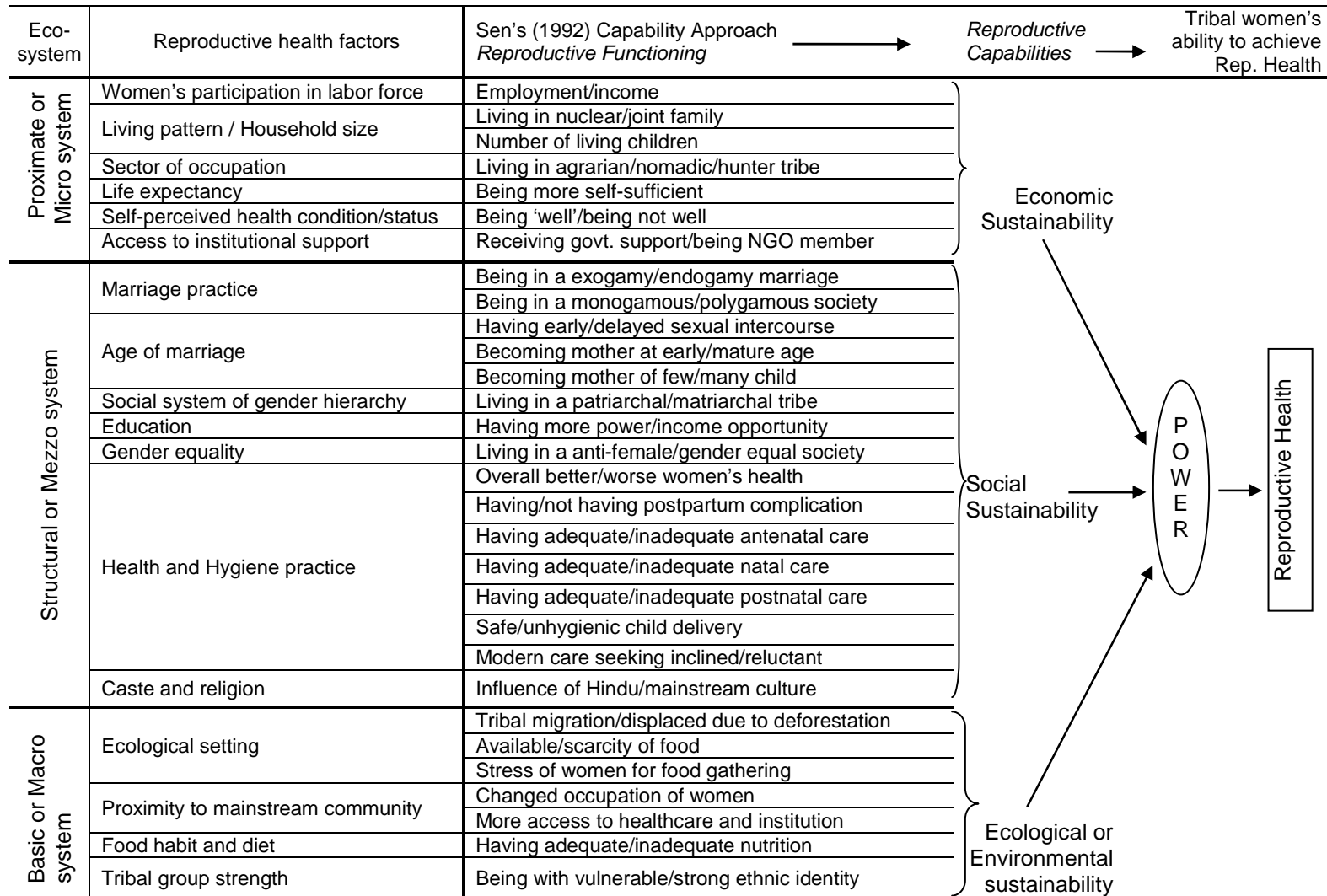


Figure 1: Conceptual Framework of Tribal Women's Reproductive Health.

Theoretical Model of Current Study

In the conceptual framework of our current study, power is an essential factor which significantly affects the social relations. Power links the tribal women reproductive health and its building blocks by facilitating and regulating the flow of energy or resources across the whole system. According to our model, the effects of economic, social and ecological factors determine and influence the power, and ultimately, power influences the reproductive health indirectly by channeling the effect of system energy. The figure-2 below presents the theoretical framework of current study.

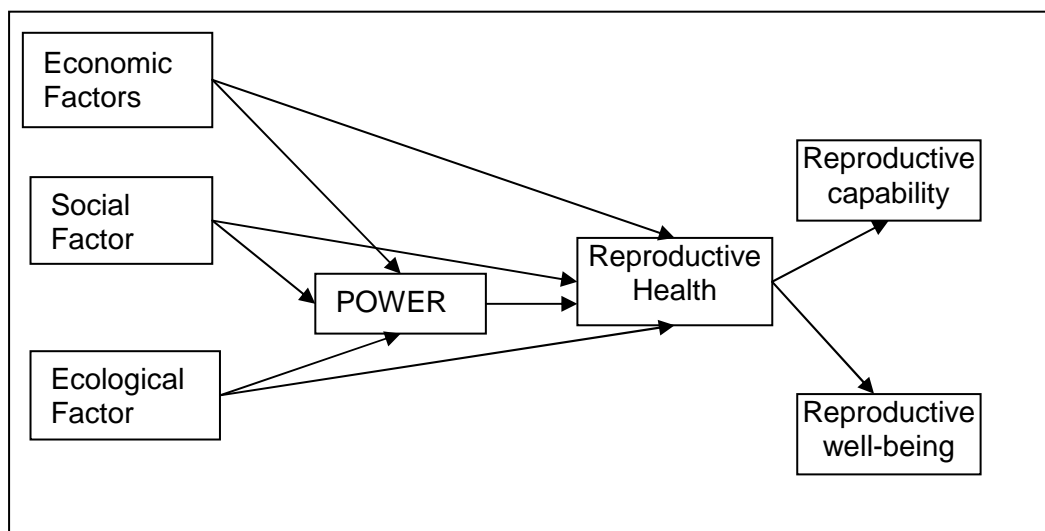


Figure 2: Theoretical Framework of Tribal Women's Reproductive Health.

Historically, power has been a matter of inquiry for social and political studies. Scholarly discussion on power usually focuses on 'political power' which explains the mechanism behind institutional control over a subject such as, population or organization. The radical social thinkers view power as a "structural capability that promotes unequal resource distributions favoring some actors at the expense of others" (Thye, 2000). This perspective is highly influenced by the conflict theorists such as Marx and Engels, who correlates power with status

and prestige (Dahrendorf, 1959; Thye, 2000) and asserts that power controls the distribution process of 'surplus' – the determinant factor behind prestige. However, I should rather understand 'power' from the social, than the political point of view.

Modern thoughts on power has been enriched by the work of Nicollo Machiavelli who emphasizes strategies and views power as a 'means' to gain control over the situation regardless of the morality of the means. Thomas Hobbes, another influential scholar, provides a causal explanation, which views power as an outcome of continuous process within an ordered 'body' or 'social organization' such as, a community or society. Hobbes's thought has been seminal to the work of influential scholar Max Weber (1947) who linked power with the concepts of 'authority and rule' (Sadan, 1997). Noting bureaucracy as the source of organizational power, Weber defined power as a 'factor of domination' possessed by the power holder despite counter resistance.

Robert Dahl (1961) stretched the idea of Webber and defined power as the outcome of 'obedience' to the decision makers. One of the most influential scholars of this age, Michel Foucault (1979, 1980) was also inspired by Weber's thought on power, however, he chose different social institutions instead of a centralized organization to explain this concept. Based on the Nietzsche's idea,

Foucault underscored the 'dynamic, non-egalitarian and asymmetrical nature' of power relation based on the connection between knowledge and power. Foucault pioneered the understanding of micro dimension of power which is not limited only to political institutions, rather 'occurs in everyday life' (Sadan, 1997). Foucault's thoughts illustrate power as a ubiquitous concept over each component and level of the society, which resonate with the ecosystem perspective. Foucault is considered as one of the pioneer structuralists who

considered power not as a position, prize or conspiracy rather defined this concept as the 'activation of political technologies' affiliated with social organizations (Sadan, 1997). Political technology refers to the network of relations through which different social organizations, which can be compared to the subsystems of ecosystem perspective, are connected. Foucault's conception of power as a dynamic and multi-directional resonates with the ecosystem theory's concept of functional open systems where 'energy' flows across the systems.

Foucault's theory of power can illustrate the linkage between the economic factors and reproductive health. Economic factors identified in the conceptual framework on page 49 determine tribals' access to aggregate power-knowledge resources. For instance, income and opportunity to participate in labor force enhances tribal women access to knowledge outside of her family, hence empowered tribal women can enjoy more power within the social structure. Power is considered to be multidirectional in Foucault's theory which commensurate with the reciprocal association between reproductive health and its economic factors. For instance, an economic factor such as employment or education influences the reproductive health of tribal women; but this association is not always unidirectional. Sound reproductive health can be considered as a causal factor behind tribal women's higher participation in labor force. Hence, theoretical model of current study linking economic input and power is supported by the Foucault's theory of power.

Anthony Giddens's explanation of power relation is also contextual to the theoretical framework of this current study. Influenced by Foucault's thought, Giddens (1984) views power as an integral social component and emphasizes the functions performed by individuals in structuring power system. Giddens (1984) opposes the idea of inclusive and centralized organizational power, and presents each individual with his knowledge and consciousness central to power.

Giddens's (1984) theory on power is known as *structuration* which views power as the central component of 'social relations' consisting 'social structure' and 'human agency'. The social structure facilitates the human activity, and also governs or guides such activities by means of laws, rules and resources. Power is seen as the ability of individuals to act voluntarily in order to bring change using their own knowledge. Giddens (1984) theory defines power as the process and a factor that modulates the human activity within social structure which is created by the human agencies. Tribal group as a human agency possess structural attributes, and tribals' social structure consisting their social laws and rules expects to continue the reproductive activity. Power is central to human agency and social structure. The human agency establishes the social structure, and in turn modifies it when needed.

The theory of structuration explains power from micro perspective by relating this concept 'power' to voluntary human activity, as well as from macro perspective by defining power in terms of structure (Giddens, 1984; Sadan, 1997).

In the context of tribal women's reproductive health this theoretical perspective can be used to illustrate the function of power in our theoretical model. Emphasis on social structure and human agency to conceptualize power makes Giddens's theory adaptable to fit in a complex social system. Reproductive health is the outcome of complex process of interaction among the socioeconomic and ecological resources which requires decision makings in micro and macro level systems. Tribals' reproductive behavior is guided by a set of rules and customs which is a form of indigenous knowledge.

While performing reproduction, individuals may need to take several micro-level decisions such as, whether to use contraceptive or, the frequency of intercourse in a week. These decisions are also made by tribals' social structure which limits the reproductive activities

by means of rules, laws and resources. Power in regards of reproduction, if looked through Giddens's lens, is the tribal individual's ability to act voluntarily in order to achieve reproductive well-being under the system's domination of tribals' rules and guidance. Using Giddens theoretical view, influence of social and ecological factors can be linked with the power of 'social relation' consisting social structure and human agency.

According to Giddens theory, power varies in terms of individual's ability and access to resources in the backdrop against social rules, norms or rules. Hence, power is the decision making capability of tribal women in the economic, social and ecological sphere. Within several subsystems, tribal women's decision in regards of reproductive health factors such as marriage practice, health and hygiene practice, food habit and intake, participating in labor force, accessing resources such as education, and, access to institutional support strongly is very much influenced by the power they hold. This power may vary according to the capability to access resources by the tribal women. Hence, social and ecological factors strongly influence the power while indirectly affecting reproductive health. Next section of this chapter proposes the hypotheses to be examined under this study on the basis of theoretical model discussed above.

Hypotheses

The broad theoretical model of current study suggests associations between social, economic, ecological factors and reproductive health mediated by 'power'. Our theoretical model delineates tribal women's power as a function of economic, social and ecological factors mediated by power. These factors directly influence the power of tribal women regarding reproductive health decisions. Tribal women's decision making power in regards of reproductive well being and reproductive capability takes affect within the 'social structure' of tribal groups

which is defined as the tribal laws and rules by Giddens (1984). Diverse tribal culture of India varies in terms of their native reproductive rituals, beliefs and practices; however, these tribal socioeconomic and ecological factors have strong effect on of reproductive health. Indirect association of reproductive health with socioeconomic and ecological factors is mediated by power as an intervening factor which links social structure and human agency (Giddens, 1984). Hence, tribal women's power influences their reproductive health directly channeling the effects of socioeconomic and ecological factors. Hypotheses with respect to the association of reproductive health with social, economic, ecological factors and with power are presented below.

Economic Opportunity

Economic factors correlates directly to power and indirectly to reproductive health. Tribal women's participation in workforce is higher than the non-tribal women in India which indicates the likelihood of higher income and employment opportunities for them. These opportunities are expected to strongly influence women's reproductive health by creating a milieu where women can empower themselves, and in turn, tribal women are expected to have more control or power in reproductive decision making process. Prior studies nonetheless suggest direct influence of employment status of women on their reproductive health (United Nations, 1987; Sunil & Pillai, 2010). Women's income and employment opportunity can be influenced by their occupational sector, educational achievement, and opportunity for accessing institutional support. These factors can directly affect tribal women's reproductive health.

Women's occupational pattern may influences their reproductive behavior and health. Tribal women engaged in food gathering activities may have fewer 'total number of pregnancy throughout life' than the women engaged only in household chores. In addition, women's

knowledge about microcredit scheme may influence their income and subsequently affect their reproductive health. Based on this discussion I propose two hypotheses on economic factors and reproductive health of tribal women:

H₁: Economic opportunity has a significant positive effect on tribal women's reproductive health.

H₂: Economic opportunity has a significant positive effect on tribal women's power.

Social Opportunity

Several social factors attributes to tribal women's reproductive health such as, marriage practice (Chakravarty et al., 2005), social status of women (Mann, 1996; Sikdar, 2009), education (Martin, 1995; Cochran & Farid, 1989), and health and hygiene practice (Ali, 1994; Chaudhuri, 1994). Marriage practice determines critical reproductive event such as age at first marriage, which directly correlates to power, and has a significant direct and indirect effect on reproductive health. Age at first marriage also strongly influences age at motherhood, and, the number of children a woman can have throughout her life, which influences the power of tribal women by modulating her status in the family (Basu, 1995; Sunil & Pillai, 2010). As age at marriage increases, opportunities for extra familial experiences are likely to increase. Increases in women's age at first marriage represent high level of social opportunities resulting in well being of her reproductive health. Educational achievement enhances the status of women in the family resulting in increased power in decision making process which illustrates an indirect association between education and reproductive health mediated by power (Martin, 1995; Cochran & Farid, 1989; Sunil & Pillai, 2010; United Nations, 1987). Pro-female gender perspective to women's reproductive health attributes to greater social opportunities and

subsequently affects their reproductive health. Based on this discussion I propose two hypotheses on social factors and reproductive health of tribal women.

H₃: Social opportunities of tribal women have a significant positive effect on tribal women's reproductive health.

H₄: Social opportunities of tribal women have a positive effective on tribal woman's power.

Ecological Resources

Tribal women's reproductive health is strongly associated with the environment and surrounding ecology (Chaudhuri, 1994). The correlation between ecological resource and reproductive health is related to tribals' dependence on ecology for food and nutrition (Ali, 1980; Patel, 1985). Influence of ecological resources on reproductive health can be mediated by power held by tribal women. For instance, tribal women's performance as the food gatherer for their family may decline because of ecological destruction resulting in lower level of power which in turn may adversely affect their reproductive health. Ecological resource is comprised of input from physical and social environment which may vary among tribes in terms of different terrains and spatial variation (Maharatna, 2005).

In the context of environmental degradation and invasion of mining industries into tribal habitats it can be assumed that their ecological resources are in decline. Changes in physical environment may result in change in food source, nutrition status (Basu, 1995; Beck & Mishra, 2011), and occupational pattern, and may change social environment as well. Process of assimilation and modernization may provide tribal women with more information on reproductive health which can enhance their power and in turn can influence their reproductive health. The

predicted associations between ecological factors and reproductive health are hypothesized as follows:

H₅: As the ecological resources increases, reproductive health of tribal women also increases.

H₆: Ecological resource has a significant positive effect on tribal women's power.

Power

In our theoretical model, tribal women's power sustain in the social relation under the tribal 'social structure' (Giddens, 1984). Power is based on the human knowledge and activity which his guided by community's laws, rules and customs. Within the power relation, women experience the freedom to decide their opportunities including reproduction. Hence, power indicates women's ability to decide for their own wellbeing including economic and reproductive decisions. The level of violence tribal women may experience can be speculated from the norms, values, and customs of tribal societies which in general, are pro-female in mainstream Indian society (Basu, 1995; Sikdar, 2009). In our theoretical model, it is assumed that power of tribal women is the outcome of the effects of social, economic and ecological factors, which directly influence their reproductive health. We hypothesize that as the power of tribal women increases, their reproductive health also improves. The predicted associations between power and reproductive health is hypothesized as follows:

H₇: Tribal women's power has a significant positive effect on their reproductive health.

The figure 3 in following presents the theoretical model of the current study.

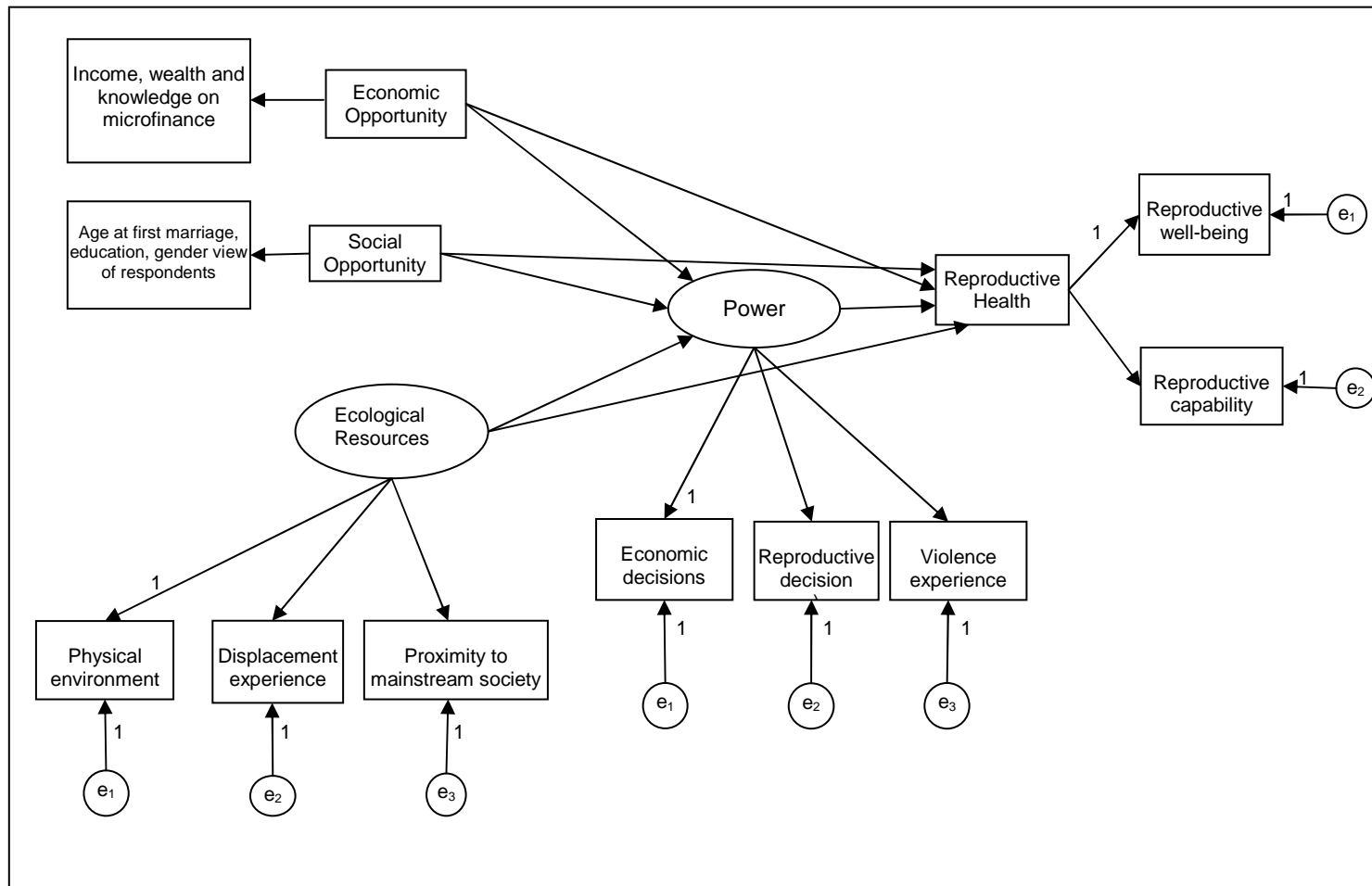


Figure 3: Theoretical Model of Tribal Women's Reproductive Health.

CHAPTER 4

METHODOLOGY

The objective of this study is to examine the effect of social, economic, and ecological factors on the reproductive health of tribal women in India using data from a secondary source. With a holistic perspective reproductive health is conceptualized as a comprehensive component consisting social, economic and ecological inputs. This study aims to understand the effect of change in tribal ecology on the reproductive health of tribal women and their power.

The variables include economic and social opportunity, ecological resources, and power. Data source and sampling, operationalization of dependent variable and independent variable, and data analysis will be discussed in this chapter.

Data Source and Sampling

Data from the third National Family Health Survey (NFHS-3) of India is used in this study. NFHS is a large-scale, multi-round survey conducted in a representative sample of households throughout India (National Family Health Survey [NFHS], 2009). The NFHS have been conducted since early 1990s by the researchers from the International Institute for Population Sciences (IIPS) with the specific goals of: (a) to provide essential data on health and family welfare needed by the Ministry of Health and Family Welfare and other agencies for policy and program purposes, and (b) to provide information on important emerging health and family welfare issues (NFHS, 2009). NFHS collected data on fertility, infant and child mortality, the practice of family planning, maternal and child health, reproductive health, nutrition, anemia

status, and the utilization and quality of health and family planning services of India. Since 1992-93, three rounds of the survey have been conducted including the latest survey, the NFHS-3 in 2005-06 which is used in this study.

Under the guidance of well recognized International Institute for Population Sciences (IIPS), the National Family Health Survey has been regarded as a valid source of demographic, socioeconomic, and health related data. Participation of various international development organizations such as, United States Agency for International Development, the Department for International Development (United Kingdom), the Bill and Melinda Gates Foundation, UNICEF, and, the United Nations Population Fund in this survey series as sponsors signifies the survey series.

The NFHS-3 interviewed more than 200,000 women of age 15-49 and men age 15-54 during the survey using 18 research organizations throughout India (IIPS, 2007). In addition to socioeconomic, demographic and health related data, NFHS-3 also collected information on social and policy context. Moreover, this survey tested more than 100,000 women and men for HIV and more than 200,000 adults and young children for anemia (NFHS, 2009). Data was collected from field between December 2005 and August 2006.

The NFHS-3 is a survey over nationally representative sample of 124,385 women of age (15-49), and 74,369 men of age (15-54) from 109,041 households living in all 29 states (NFHS, 2009). The sample of NFHS-3 covers 99 percent of India's population. In addition to the nationally representative sample, NFHS-3 also collected socioeconomic and health information on slum and non-slum populations from eight major cities of India, namely, Chennai, Delhi, Hyderabad, Indore, Kolkata, Meerut, Mumbai, and Nagpur.

NFHS-3 used three questionnaires in all 29 states for the sample of household, women, and Men (IIPS, 2007). The household questionnaire was used to interview the household head or any adult household member holding information about income and expenditure. Women were asked questions on fertility, marriage, reproductive experience and behavior, food and nutrition, health and hygiene practice, education, and gender relations. Interview of household and individuals also collected data on nutrition status was such as, level of iodine in cooking salt, level of hemoglobin content in the blood of interviewed women, children and men, and measurement of Body Mass Index (BMI) (IIPS, 2007). The current study analyzes the data from collected from tribal married women respondents and the corresponding households.

Operationalization of Dependent Variable

Reproductive Health

Reproductive health variables were selected from the NFHS-3 women's questionnaire. Variables were re-coded if necessary, as dichotomous variable with scores '2' for desired outcome, and '1' for 'not desired outcome'. In total 12 variables were selected to represent the dependent variable 'Reproductive Health' (RH) which were assigned to two groups: reproductive health capability (RH Cap), and, reproductive well-being (RH WB). Reproductive capability encompasses the information related to the tribal women's current reproductive health and nutrition status, and women's knowledge of HIV/STD. Reproductive well-being measures the reproductive performance or outcome and behavior, and negative reproductive experience (if any) of tribal women. The total values for each dimension represent a cumulative reproductive health score. The lower score of RH Cap, and RH WB indicates a lower reproductive health capability and reproductive well-being.

Reproductive health capability (RH Cap) is represented by five variables. This is an indicator which will be obtained by adding values of tribal women's reproductive health status, their knowledge on contraceptive use, and HIV/STD. Tribals women's RH Cap value is obtained by adding the values of respondent's (i) Body Mass Index (BMI), (ii) anemia level, (iii) knowledge on contraceptive method, (iv) knowledge on HIV and (v) knowledge of other sexually transmitted diseases. Respondent's BMI was obtained as a continuous variable, which was converted into a categorical variable using the standard BMI classification guide of WHO (2006). Respondent's anemia level and knowledge on contraceptive, HIV and AIDs are compiled as a categorical variable.

Reproductive well-being is operationalized as a bi-dimensional variable consisting current reproductive performance and outcome of the reproductive system. Reproductive well-being construct is indicated by information on reproductive functioning, such as 'total number of children ever born'. In brief, reproductive well-being inquiries on an individual's (in current case, a tribal woman) attainment of reproduction by asking, 'how well is her being' with reference to reproduction.

Sen (1979, 1992) denotes well-being as the aggregation of person's collection of functioning. Hence, the reproductive well-being is a summation of (i) total number of children ever born to respondent (ii) whether respondent ever gave birth to a boy or girl who was born alive but died later (iii) whether respondent ever had a terminated pregnancy or miscarriage, (iv) whether respondent ever used any contraceptive method and, (v) whether respondent ever had any sexually transmittable disease or HIV. All of these indicators in the NFHS-3 collected information using categorical values except the 'total number of children'.

We transformed the values of this indicator by assigning the value '1' if respondent's total number of children was equal or above the mean number of children (2.8), and the value '2' if respondent's total number of children was less than the mean number of children. The composite score of 'reproductive well-being' is obtained by adding the values of each indicator.

Hence value of the construct RH Cap (= $v445+v457+v301+v750+v751$) can range between '5' and '10', where higher score indicates higher RH capabilities. Reproductive well-being (RH WB = $v218+v206 +v228+v302+v763a+v763b+v763c$) on the other hand, will have a value between '7' and '14' where higher score indicates higher RH well-being. Conceptualization of reproductive health as an aggregate construct combines both RH Cap and RH WB. In accordance with Sen's (1992) perspective, reproductive 'well-being' in our theoretical model, is attributed to reproductive 'capabilities', since, reproductive capabilities derives from reproductive well-being. These two concepts are closely linked but reproductive well-being precedes capability since well-being represents actual achievement and capability represents 'freedom' of achievement. We added these two constructs, RH Cap and RH WB to compute the aggregate value of the variable of 'Reproductive Health' (RH).

It is suggested that, reproductive health status of tribal women depends upon their attained level of opportunity to achieve good reproductive health and thus being able to avoid negative reproductive experience. For instance, the variables related to women's reproductive outcome such as, whether respondent ever had a terminated pregnancy, denotes a harmful reproductive outcome leading to possible decrease of reproductive health.

In current study, reproductive health, labeled as RH in our proposed model, is measured using a composite score of reproductive health obtained by adding the responses to twelve different questions on reproductive health addressing on two sub-dimensions of

reproductive well-being, and reproductive capacity. Out of 12 questions, 7 were selected from measuring reproductive well-being and 5 for reproductive capability. The value for 'reproductive health' is between '12' and '24', where higher value represents higher condition of reproductive health. Figure 4 below presents the structure of the dependent variable.

Table 3 below presents the information on variables from NFHS-3 data set used in conceptualization and operationalization of dependent variable. The table also presents the information on how the variables were re-coded.

Table 3: Variables for Reproductive Health

	Variable ID*	Questions	Options	Recoded
Reproductive health Capability variables ¹	v445	Body mass index for respondent	Score from 12 to 40	1 = if BMI < 18.50 or >25.00 2 = if 18.50 < BMI < 24.99
	v457	Respondent's anemia level	1= severe, 2= mild 3= moderate 4=not anemic	1, 3 = 1 2, 4 = 2
	v301	Respondent's Knowledge of any contraceptive method	0=knows no method 1=knows folkloric method 2=knows traditional method 3=knows modern methods	1= knows no method, or, knows traditional or folk methods 2=knows modern methods
	v750	Respondent ever heard of sexually transmitted disease [STD]	0=No 1=Yes 8=Don't know	1 = No, never heard 2 = Yes heard
	v751	Respondent ever heard of AIDS	0=No 1=Yes	1 = No, never heard 2 = Yes heard

Table 3 - *Continued*

	Variable ID*	Questions	Options	Recoded
Reproductive well-being ²	v218	Respondent's number of total children ever born		Equal and above the mean (2.08)=1 Below the mean (208)=2
	v302	Ever used any method	0 = never, 1=folk 2= tradition, 3=modern	0 = 1 1, 2, 3 = 2
	v206	Have you ever given birth to a boy or girl who was born alive but died later?	Obtained total number of child death by adding v206 and v207, and was assigned the value of 2 if the obtained number was '0' and the value of 1 for any number of child death	1=Yes 2=No
	v228	Ever had a terminated pregnancy?	0=No 1= Yes	1=Yes 2=No
	v763a	Had any STD in last 12 months	0=No 1=Yes 8=Don't know	1=Yes 2=No
	v763b	Had genital sore/ulcer in last 12 months	0=No, 1=Yes 8=Don't know	1=Yes 2=No
	v763c	Had genital discharge in last 12 months	0=No, 1=Yes 8=Don't know	1=Yes 2=No

Note: (1) Reproductive health capability (RH Cap = v445 + v457 + v301 + v750 + v751), has a score range between min 5 and max 10, where higher score indicates higher RH capabilities. (2) Reproductive well-being (RH WB = v218 + v302 + v206 + v228 + v763a + v763b + v763c), has a score range between min 7 and max 14, where higher score indicates higher RH well-being.

* Variable ID refers to the specific string or number used in NFHS-3 dataset to identify the variable.

Operationalization of Independent Variables

Economic Opportunity

The NFHS-3 collected data on economic opportunity available for and attained by the women. Household questionnaire inquired on the possession of wealth or assets such as, land, home, animal, bank account and health insurance (IIPS, 2007). Questionnaire for women inquired on the status of employment, type of employment, and their access to financial institution. Based on the evidence from previous studies suggesting direct association between employment status of women and their reproductive health (United Nations, 1987; Sunil & Pillai, 2010), employment status of tribal women is selected to measure the 'economic opportunity' variable. NFHS-3 provides a wealth index for participating households which represents the economic condition of the household the women are living in. Tribal women's economic opportunity also depends on their household size. Larger tribal families may generate higher income than the smaller families, and subsequently influence the status of tribal women's reproductive health across the tribal groups. Women's access to financial institutions may enhance their economic opportunity, and in turn influence their reproductive health.

We added the value of the variables indicating tribal women's wealth (v190), employment status (v731), total number of household members (v136), respondent's response to whether they knew about load program (w127) and, whether they had money for their own use (w124) to compute the aggregate variable of 'economic opportunity' which is labeled as ECOPRONT in our proposed model.

For the variable presenting the total number of household members (v136), we assigned 1 if the case had number of family members below the calculated mean value (5.8), and, 2, if the case had number of family members over the mean. Other variables selected for

ECOPRONT are categorical, hence, a composite score was obtained by adding the values, where higher score represents higher economic opportunity.

Table 4 below presents the information on 'economic opportunity' variable including the selected questions and their recoding procedure.

Table 4: Variables for Economic Opportunity¹

Variable ID*	Questions	Options	Recoded
v190	Wealth index	1 = poorest; 2 = poorer; 3 = middle; 4 = richer; 5 = richest	1, 2 = 1 3, 4, 5 = 2
v731	Respondent worked in last 12 months	0 = No 1 = in the past year 2 = currently working 3 = Have a job, but on leave last 7 days	0- 1 = 1 (No) 2-3 = 2 (Yes)
v136	Respondent's number of household members		1 = below the mean (5.8) 2 = Over the mean (5.8)
w124	Respondent has money for her own use	0 = No 1 = Yes	0 → 1 (No) 1 → 2 (Yes)
w127	Knowledge of loan programs	0 = No 1 = Yes	0 → 1 1 → 2

Note: (1) Economic opportunity (ECORPONT = v190 + v731 + v732 + v741+ v124 + v127 + v128 + v149 + v155), has a score range between min 5 and max 10, where higher score indicates higher economic opportunity for tribal women.

* Variable ID refers to the specific string or number used in NFHS-3 dataset to identify the variable.

Social Opportunity

NFHS-3 collected information on various social opportunities with special reference to women's reproductive health such as, marriage practice, educational attainment, social status of women, societal perception toward women and gender etc. The social component variables used from the NFHS-3 are the tribal women's age at first marriage (v511), their educational attainment (v149), and, their views regarding reproductive health education for male children (a composite score of s963ac, s963ad, s963ae, s963af, and s963ag) . These seven variables are often associated in the literature with women's status, having a robust direct and indirect effect on reproductive health.

It is suggested that, women who marry at mature age are likely to have a healthy new born upon their decision to have a child. Hence, women who have entered into marriage at later years are expected to have a higher reproductive health than the women who married at earlier age. Educational attainment enhances the social status of women and their income resulting in increased power in reproductive decision making process which subsequently and positively affects their reproductive health (Martin, 1995; Chochran & Farid, 1989; Sunil & Pillai, 2010; United Nations, 1987).

Social opportunity for tribal women largely rests on the societal perspective toward gender which subsequently influences women's perspective to reproductive health. Women of tribal societies with relatively high status are likely to have egalitarian gender perspectives, which may influence their social opportunity, and subsequently their reproductive health. Tribal women from relatively conservative groups may have more anti-female gender view than the women from moderate groups. This variation may influence their reproductive health across the tribal groups. Therefore, a variable of 'gender perspective' was created by adding the values of 5 questions from NFHS-3 women questionnaire representing tribal women's view on whether

boys (male adolescents) should be taught about sex, contraceptive use, HIV, condom use and, changes in girl's bodies.

We added the value of respondent's age at their first marriage, her educational attainment level to the composite score of her 'gender perspective' to obtain the value of composite variable of 'social opportunity' which is labeled as "SOC_OPP" in the proposed model of reproductive health.

Table 5 below presents the information on 'social opportunity' variable including the selected questions and their recoding procedure.

Table 5: Variables for Social Opportunity¹

Variable ID*	Questions	Options	Recoded
v511	Age at first marriage		No coding was used, was used as continuous variable
v149	Educational attainment	0 = no education 1 = incomplete primary 2 = complete primary 3 = incomplete secondary 4 = complete secondary 5 = higher	0→1 = no education 1→2 = incomplete primary 2→3 = complete primary 3→4 = incomplete secondary 4→5 = complete secondary 5→6 = higher
s936ac	Boys be taught about: changes in girls' bodies	0=No 1=Yes	0→1 (No) 1 →2 (Yes)
s936ad	Boys be taught about: sex	0=No 1=Yes	0→1 (No) 1 →2 (Yes)
s936ae	Boys be taught about: contraception	0=No 1=Yes	0→1 (No) 1 →2 (Yes)
s936af	Boys be taught about: HIV/AIDS	0=No 1=Yes	0→1 (No) 1 →2 (Yes)
s936ag	Boys be taught about: condom use	0=No 1=Yes	0→1 (No) 1 →2 (Yes)

Note: (1) Social opportunity (SOC_OPP = v511+ v149 + s963ac + s963ad + s963ae + s963af + s963ag) has a score range between min 5 and max 10, where higher score indicates higher economic opportunity for tribal women indicated higher economic opportunity.

* Variable ID refers to the specific string or number used in NFHS-3 dataset to identify the variable.

Power

Power is explained as the central to social relation consisting 'social structure' and 'human agency' in our theoretical model (Giddens, 1984). Theoretical model of current study conceptualizes power from micro perspective by relating this concept to voluntary human activity, as well as from macro perspective by defining power in terms of structure (Giddens, 1984; Sadan, 1997). In addition, community's laws, rules and customs play a strong role in defining 'power' in our theoretical model. Hence, the 'power' variable comprises of information on women's experience of encountering violence, and, their ability to make economic and reproductive decisions.

This variable suggests that women hold power in terms of social relations with opposite gender under the stewardship of tribal laws, customs, and rules. Tribal women's reproductive decision making ability and experience of violence are measured using a composite score consisting of information obtained from 40 relevant questions on NFHS-3 dataset. Six questions were selected for 'economic decisions', 9 questions for 'reproductive health decision', and, 25 questions for measuring women's experience of violence'. Figure 4 below illustrates the composition of latent 'power variable'.

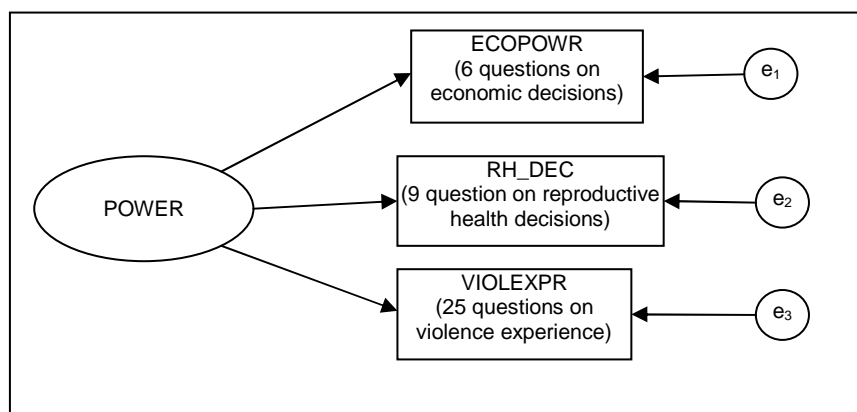


Figure 4: Power as a Latent Construct Measured by Three Composite Indicators.

As a latent construct, “POWER” combines and presents the information on tribal women’s ability to take economic decision, reproductive health decisions, and their experience of being the victims of violence. Composite variable of economic decisions is labeled as ‘ECOPOWR’ in the POWER dimension which represents information on the tribal women’s level of power on purchasing large household goods (v743b) and daily needs (v743c), their level of power on making decisions on using husband’s earning (v743f), and whether they are allowed to go to marketplace (s824a), health facility (s824b) and out of village or community (s824c).

Composite variable of reproductive health decisions is labeled as ‘RH_DEC’ in the POWER dimension providing information on the tribal women’s level of power while taking decision about their own healthcare (v743), and the level of difficulty respondents experience while getting medical help for self regarding obtaining permission to go (v467b), getting money needed for treatment (v467c), distance to health facility (v467d), transport (v467e), travelling alone (v467f), availability of health provider (v467g, v467h), and, availability of drug (v467i).

Tribal women’s experience of violence is represented by ‘VIOLEXP’ in the POWER dimension which provides aggregate information on respondents experience of becoming the victims of emotional, physical, and verbal abuse by their husbands, in-laws and other persons.

All scores were totaled to produce the scores of three dimensions of power factor. In order to get positive direction from each variable, all questions were re-coded in the positive direction. Lower score of these variables indicate lower power of women, such as, low score on economic decisions indicates low power of the respondents in terms of economic decision making. The variables used to operationalize the 'power' construct are presented in table 4 below.

Table 6: Variables for Measuring Power

	Variable ID*	Questions	Options	Recoded
Reproductive health decision ¹	v743	Final say on health own healthcare	1 = Respondent alone; 2 = Respondent and husband or partner 3 = Resp. and other person, 4 = Husband or partner alone, 5 = Someone else 6 = Other	4, 5, 6 = 1 1-3 = 2
	v467b	Getting medical help for self: getting permission to go	0 = No problem 1= Big problem 2 = Not a big problem	0→2 (No) 1,2 → 1 (Y)
	v467c	Getting medical help for self: getting money needed for treatment	0 = No problem 1= Big problem 2 = Not a big problem	0→2 (No) 1,2 → 1 (Y)
	v467d	Getting medical help for self: distance to health facility	0 = No problem 1= Big problem 2 = Not a big problem	0→2 (No) 1,2 → 1 (Y)
	v467e	Getting medical help for self: having to take transport	0 = No problem 1= Big problem 2 = Not a big problem	0→2 (No) 1,2 → 1 (Y)
	v467f	Getting medical help for self: not wanting to go alone	0 = No problem 1= Big problem 2 = Not a big problem	0→2 (No) 1,2 → 1 (Y)

Table 6 – Continued

	Variable ID*	Questions	Options	Recoded
Economic decision ²	v467g	Getting medical help for self: concern no female health provider	0 = No problem 1= Big problem 2 = Not a big problem	0→2 (No) 1,2 → 1 (Y)
	v467h	Getting medical help for self: concern no provider	0 = No problem 1= Big problem 2 = Not a big problem	0→2 (No) 1,2 → 1 (Y)
	v467i	Getting medical help for self: concern no drugs available	0 = No problem 1= Big problem 2 = Not a big problem	0→2 (No) 1,2 → 1 (Y)
	v743b	Final say on making large household purchases	1 = Respondent alone 2 = Respondent and husband or partner 3 = Respondent and other person 4 = Husband or partner alone 5 = Someone else 6 = Other	4,5,6 → 1 1,2,3 → 2
	v743c	Final say on making household purchases for daily needs	1 = Respondent alone 2 = Respondent/husband partner 3 = Respondent and other person 4 = Husband/partner alone 5 = Someone else 6 = Other	4,5,6 → 1 1,2,3 → 2
	v743f	Final say on deciding what to do with money husband earns	1 = Respondent alone 2 = Respondent/husband partner 3 = Respondent and other person 4 = Husband/partner alone 5 = Someone else 6 = Other 7 = Husband /partner has no earning	4,5,6 → 1 1,2,3 → 2
	s824a	Respondent allowed to go to Market	1=Alone 2=with someone else only 3=not at all	1→ 2 2-3 → 1

Table 6 – Continued

	Variable ID*	Questions	Options	Recoded
Violence Experiences ³	s824b	Respondent allowed to go to health facility	1=Alone, 2=with someone else only, 3=not at all	1 → 2 2-3 → 1
	s824c	Respondent allowed to go to out of village or community	1=Alone 2=with someone else only 3=not at all	1 → 2 2-3 → 1
	d103a	Spouse ever humiliated her	0=no 1=often during last 12 months 2=sometimes during last 12 months 3= not in last 12 months 4=yes, but currently a widow, or timing missing	1, 2 3, 4 → 1 0 → 2
	d103b	Spouse ever threatened her with harm	0=no 1=often during last 12 months 2=sometimes during last 12 months 3= not in last 12 months 4=yes, but currently a widow, or timing missing	1, 2 3, 4 → 1 0 → 2
	d103c	Spouse ever insult or make feel bad	0=no 1=often during last 12 months 2=sometimes during last 12 months 3= not in last 12 months 4=yes, but currently a widow, or timing missing	1, 2 3, 4 → 1 0 → 2
	d104	Ever any emotional violence	0 = No 1 = Yes	1 → 1 (Yes) 0 → 2 (No)
	d105a	Spouse ever pushed, shook or threw something	0 = No 1 = Yes	1 → 1 (Yes) 0 → 2 (No)
	d105b	Spouse ever slapped	0 = No 1 = Yes	1 → 1 (Yes) 0 → 2 (No)

Table 6 – *Continued*

	Variable ID*	Questions	Options	Recoded
	d105c	Spouse ever punched with fist or something harmful	0 = No 1 = Yes	1 → 1 (Yes) 0 → 2 (No)
	d105d	Spouse ever kicked or dragged	0 = No 1 = Yes	1 → 1 (Yes) 0 → 2 (No)
	d105e	Spouse ever tried to strangle or burn	0 = No 1 = Yes	1 → 1 (Yes) 0 → 2 (No)
	d105f	Spouse ever threatened or attacked with knife/gun or other weapon.	0 = No 1 = Yes	1 → 1 (Yes) 0 → 2 (No)
	d105h	Spouse ever physically forced sex when not wanted	0 = No 1 = Yes	1 → 1 (Yes) 0 → 2 (No)
	d105i	Spouse ever forced other sexual acts when not wanted	0 = No 1 = Yes	1 → 1 (Yes) 0 → 2 (No)
	d105j	Spouse ever twisted her arm or pull her hair	0 = No 1 = Yes	1 → 1 (Yes) 0 → 2 (No)
	d108	Experienced any sexual violence	0 = No 1 = Yes	1 → 1 (Yes) 0 → 2 (No)
	d115k	Ever physically hurt by: current boyfriend	0 = No 1 = Yes	1 → 1 (Yes) 0 → 2 (No)
	d115l	Ever physically hurt by: former boyfriend	0 = No 1 = Yes	1 → 1 (Yes) 0 → 2 (No)
	d115o	Ever physically hurt by: mother-in-law	0 = No 1 = Yes	1 → 1 (Yes) 0 → 2 (No)
	d115p	Ever physically hurt by: father-in-law	0 = No 1 = Yes	1 → 1 (Yes) 0 → 2 (No)
	d115q	Ever physically hurt by: other in-law	0 = No 1 = Yes	1 → 1 (Yes) 0 → 2 (No)
	d115v	Ever physically hurt by: teacher	0 = No 1 = Yes	1 → 1 (Yes) 0 → 2 (No)
	d115w	Ever physically hurt by: employer or someone at work	0 = No 1 = Yes	1 → 1 (Yes) 0 → 2 (No)

Table 6 – *Continued*

	Variable ID*	Questions	Options	Recoded
	d115x	Ever physically hurt by: other	0 = No 1 = Yes	1 → 1 (Yes) 0 → 2 (No)
	d115xe	Ever physically hurt by: police/soldier	0 = No 1 = Yes	1 → 1 (Yes) 0 → 2 (No)
	d115y	Ever physically hurt by: no one other than spouse	0 = Someone physically hurt her, 1 = No one ever physically hurt her, 6= no response	0,6 =Y→ 1 1 = No→ 2
	d125	Anyone forced respondent to perform sexual acts	0 = Someone physically hurt her, 1 = No one ever physically hurt her, 6= no response	0,6 =Y→ 1 1 = No→ 2

Notes: (1) Reproductive health decision (RH_DEC= v467b + v467c + v467d + v467e + v467f + v467g + v467h + v467i + v743a) has a score range between min 9 and max 18, where higher score indicates higher power of women to take reproductive health decisions (2) Economic decisions (ECO_POWR = v743b + v743c + v743f + s824a + s824b + s824c) has a score range between min 6 and max 12, where higher score indicates higher ability of women in taking economic decisions (3) Violence experience of tribal women (VIOL_EXPR = d103a + d103b + d103c + d104 + d105a + d105b + d105c + d105d + d105e + d105f + d105h + d105i + d105j + d108 + d115k + d115l + d115o + d115p + d115q + d115v + d115w + d115x + d115xe + d115y + d125) has a score range between min 25 and max 50, where higher score indicates higher lower experience of violence had by the respondents.

* Variable ID refers to the specific string or number used in NFHS-3 dataset to identify the variable.

Ecological Resource

Tribal women's reproductive health is strongly associated with the environment and surrounding ecology resulting in a functional ecosystem exchanging inputs or resources. Ecological resources may directly influence the reproductive health of tribal women since availability of food and nutrition is subject to the sustenance and condition of surrounding ecology for many tribes. This is particularly true for the tribes encountering forced displacement to accommodate mining industries and development projects. Influence of ecological resources on tribal women's reproductive health is hypothesized to channel through power factor. For

instance, tribal women's role as food gatherer for their family may account for their level of power in household decision making, which may vary among tribes in terms of different terrains and spatial variation (Maharatna, 2005). On the other hand, tribal communities may experience enriched or declined economic resource due to proximity to mainstream society. Access to modern healthcare, health information, and media indicates the proximity of tribal communities which can influence their women's reproductive health. Ecological resource is operationalized as a tri-dimensional variable, labeled as 'ECOL' in the proposed model consisting (i) physical environment, (ii) displacement experience, and (iii) proximity to mainstream society. Four questions were selected to create 'physical environment' variable, 1 question to measure tribals' migration or displacement experience, and 9 questions to measure the proximity of tribal ecology to mainstream society in terms of health information richness and accessibility to healthcare.

Physical environment plays a vital role in the reproductive health of tribal women. Out of several ecological influencing factors, accessibility to safe drinking water and sanitation, to electricity, and, construction material used in household 'electricity' is used in this model to represent the ecological resources. Access to safe drinking water is a vital indicator of sustainable ecology, and of ecological stress which tribal women may encounter in case of disruption in such accessibility. Incorporating 'access to safe drinking water' as an indicator of sustainable ecology is justified by the UN Millennium Development Goals (MDG) and recent UN declaration of 'safe and clean drinking water and sanitation' as a human right (United Nations News Center, 2010). From the sustainability perspective, access to safe drinking water is an indicator of functioning system with human rights, sound reproductive health and sustainable ecology.

Use of electricity in the household and construction materials used in house indicates influence of modernization and trend of change in tribal lifestyle. Dwelling house and its utility services have strong influence on lifestyle and overall health status of tribals. Composite variable for measuring physical environment is labeled as 'PHYS_ENV2' in the 'ECOL' factor using the information on whether respondent's residential house has electricity (v119), type of respondent's house (snfhs2), source of drinking water (v113), and how long it takes to get to water source (v115).

In order to incorporate the information on tribal communities displacement due to environmental destruction and mining industrialization resulting in forced displacement of tribal communities, one question was selected to operationalize the displacement experience of tribal women. Such forced migration may influence their reproductive health adversely. This variable is labeled as 'DISPLCD' in the ecological resource (ECOL) factor holding information on respondent's displacement experience (v104).

Proximity to mainstream society represents the closeness of the tribal habitats to modern or non-tribal ecology. Tribal reproductive health as a whole system is sensitive to physical, social and cultural factors. Exposure to mainstream society may strongly influence tribal reproductive health. Assimilation of tribal communities with mainstream society should be channeled through education and information exchange which may occur through physical contact, and, as well as through non-physical communication such as radio or television. Figure 5 in following page illustrates the construct of 'ecological resource'.

'Proximity' to mainstream society measures whether the social environment of the tribal community is 'health information rich' using a composite score. Low score of 'Proximity' indicates social environment of the tribal community as 'health information scarce'. Composite variable for measuring proximity of tribal ecology in terms of accessibility to healthcare and

health information richness is labeled as 'PROXIM' in the 'ECOL' factor using the responses of tribal women with respect to, whether or how frequently they are exposed to media such as newspaper or magazine (v157), radio (v158), and television (v159), whether they heard about family planning on radio (v384a), television (v384b) and newspaper (v384c), whether in past 3 months they met or visited any community health worker (s356) and health facility (s367), and where do household members seek treatment (s42).

Ecological resource for tribal women's reproductive health is measured using a composite score consisting information obtained from 14 relevant questions on NFHS-3 dataset. All scores were totaled to produce the score for the three sub-dimensions of ecological resources (ECOL). In order to get positive direction from each variable, selected questions were re-coded in the positive direction. Lower score of these variables indicate availability of lower ecological resources for their reproductive health. Ecological resource dimension is illustrated in figure 5 below.

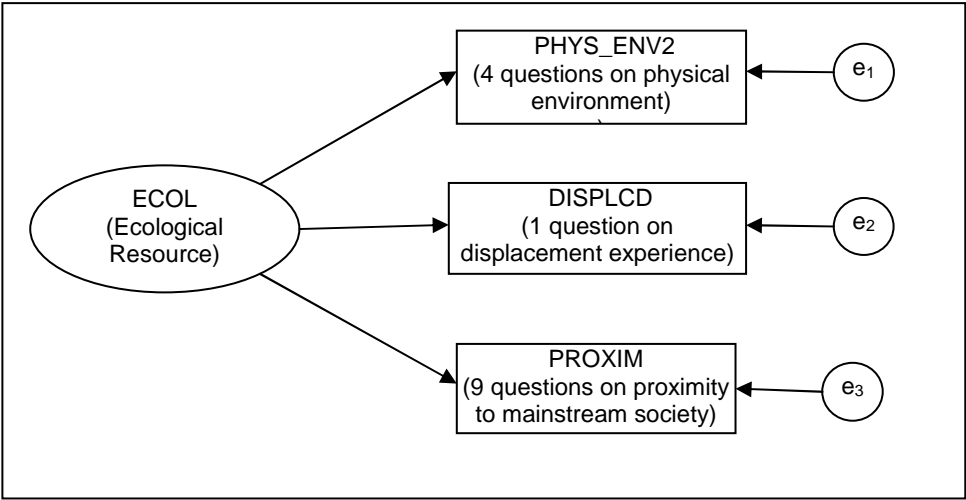


Figure 5: Ecological Resource as a Latent Construct Measured by Three Composite Indicators.

The variables used to operationalize the 'ecological resource' construct are presented in table 7 below.

Table 7: Variables for Measuring Ecological Resources

	Variable ID*	Questions	Options	Recoded
Physical environment ¹	v119	Has electricity	0 = No 1 = Yes 7 = Not de jure resident	0 = No → 1 1 = Yes → 2
	snfhs2	House type (as defined in NFHS-2)	1 = "Kachha" 2 = "semi-Pucca" 3 = "Pucca" 7 = "Not de jure resident"	1, 7 = 1 2, 3 = 2
	v113	Source of drinking water	10 = Piped water, 11 = Piped into dwelling , 12 = Piped to yard plot, 13 = Public tap/standpipe , 20 = Tube well, 21 = Tube well or borehole, 30 = Dug well (open protected), 31 = Protected well 32 = Unprotected well , 40 = Surface water, 41 = Protected spring , 42 = Unprotected spring, 43 = River /dam / lake/ ponds/ stream/ canal/ irrigation channel, 51 = Rainwater, 61 = Tanker truck, 62 = Cart with small tank, 71 = Bottled water, 96 = Other, 97 = Not de jure resident	32, 40, 42, 43, 51, 61, 62, 71, 96, 97 = 1 10, 11, 12, 13, 20, 21, 30, 31, 41 =2
	v115	Time to get to water source (minutes)	996 = "On premises" 997 = "Not de jure resident" 998 = "Don't know"	1 = Not on premise 2 = On premise
Displacement	v104	Years lived in place of residence	95 = Always, 96 = Visitor 97 = Inconsistent: time > age of respondent, 98 = Don't know	96, 97, 98 (Has been displaced or others) = 1 95 (Always, no displacement experience) = 2

Table 7 – Continued

	Variable ID*	Questions	Options	Recoded
Proximity to Mainstream Society	v157	Frequency of reading newspaper or magazine	0 = Not at all; 1 = Less than once a week; 2 = At least once a week, 3= Almost everyday	0-1=0→1 2-3=1→2
	v158	Frequency of listening to radio	0 = Not at all 1 = Less than once a week 2 = At least once a week 3= Almost everyday	0-1=0→1 2-3=1→2
	v159	Frequency of watching television	0 = Not at all 1 = Less than once a week 2 = At least once a week 3= Almost everyday	0-1=0→1 2-3=1→2
	s42	Where do household members go for treatment when sick	11 = "Govt./Municipal hospital" ; 12 = "Govt. dispensary"; 13 = "UHC / UHP / UFWC"; 14 = "CHC / Rural Hospital, or PHC"; 15 = "Sub-centre"; 16 = "Anganwadi or ICDS Centre"; 17 = "Govt. mobile clinic" ; 18 = "Other public health facility" ; 21 = "NGO or trust hospital/clinic" 31 = "Private hospital" 32 = "Private doctor/clinic" 33 = "Private paramedic" 34 = "Vaidya/ Hakim/ Homeopath", 35 = "traditional healer" , 36 = "Pharmacy or drugstore" , 37 = "DAI (TBA)" 38 = "Other private health facility"; 41 = "Other [shop]" 42 = "Other [home treatment]" 96 = "Other", 97 = "Not de jure resident"	At first, the value of 35, 36, 41, 42, 96, and, 97 were coded to 0, the value of 31, 32, 33, 37, 38 were coded to 1, and the value of 11, 12, 13, 14, 15, 16, 17, 18, 21, 34 were coded to 2. Then, we recoded 0 & 1 →1 2 → 2

Table 7 – Continued

	Variable ID*	Questions	Options	Recoded
Proximity to Mainstream Society	s356	In past 3 months met with ANM or LHV	0 = No 1 = Yes	0 → 1 1 → 2
	s367	In past 3 months, visited a health facility or camp	0 = No 1 = Yes	0 → 1 1 → 2
	v384a	Heard FP on radio last months	0 = No 1 = Yes	0 → 1 1 → 2
	v384b	Heard FP on TV last months	0 = No 1 = Yes	0 → 1 1 → 2
	v384c	Heard FP newspaper last months	0 = No 1 = Yes	0 → 1 1 → 2

Note: (1) Note: Physical environment (PHYS_ENV2 = v119 + snfhs2 + v113 + v115) between min 4 and max 8, where higher score indicates better physical environment of respondent's residence (2) Note: Displacement experience (DSPLCD) score ranges between 1 and 2, where higher score indicates higher ecological resources and less ecological stress due to displacement for women's reproductive health. (3) Note: Proximity to mainstream society (PROXIM = v157 + v158 + v159 + s42 + s356 + s367 + v384a + v384b + v384c) between min 9 and max 18, where higher score indicates richer ecological condition in terms of access to health care and health information availability.

* Variable ID refers to the specific string or number used in NFHS-3 dataset to identify the variable.

In total, we have two latent variables in the study, which are ecological resources and power, and four composite observed variables namely, economic opportunity, social opportunity, and reproductive health. The next chapter presents the empirical analyses of data and results and in several steps.

CHAPTER 5

DATA ANALYSIS AND RESULT

This chapter presents the results of data analyses of the proposed model of reproductive health of tribal women in India. I have presented the findings and analyses in four sections of this chapter, of which, the first one presents the descriptive statistics as well as the distributional properties of the variables describing the overall condition of the tribal women's reproductive health.

The second section describes the data screening procedures with a view to prepare data for statistical analysis. The third section assesses the validity of the measures of the two latent variables of the proposed model. Finally, the fourth and the final section presents the results of the model test analysis using both path analysis and the structural equation method (SEM).

To test the hypotheses, the current study uses several analytical strategies. First, univariate statistics, such as frequency distribution, measures of central tendency, and measures of dispersion are used to assess the distributional properties of the variables.

Findings from this descriptive analysis provide the background information of all the observed variables used in the model related to the overall reproductive health condition of the tribal women. In the data screening stage, the current study handles missing data, and uses techniques to achieve the normality of distribution. Three of the seven hypotheses of this

current study predict associations between latent and observed variables. Therefore, in the next step, this study attempts to validate two latent variables such as ecological resource dimension, and reproductive power dimension using confirmatory factor analysis.

In the final stage, after ensuring that the assumptions of multicollinearity, homoscedasticity, and autocorrelation are not violated, this study examines the overall fit of the proposed model for reproductive health of the tribal women in India using the structural equation modeling technique. The SEM technique was preferred over regression because SEM is suggested for testing a model when some of the variables of interest, e. g., the latent variables in the model seem difficult to measure perfectly because of their hypothetical construction using different measuring instruments (Rabe-Hesketh, Skrondal, & Zheng, 2007).

In addition, the current study also examines the gross and net effects of independent variables on the dependent variables in the final stage. The distributional characteristics of the variables are presented in the following section.

Descriptive Statistics

The key statistics of social, economic, and demographic characteristics of tribal women are presented below in the table 8. In order to explore the relationships among the various characteristics cross tabulation analysis was accomplished as discussed in following section.

Table 8: Key Socioeconomic and Demographic Statistics of the Participants

Indicators	Statistics
Economic data:	
Employment rate	50%
Ownership of land/employed in own or family land	28%
Wealth index classification (poorest)	Poorest (21%), Richest (14%)
Demographic and health data:	
Mean age of respondents	31.5 years
Mean age of first marriage (excluding married gauna not performed)	18.17 year
Mean age of first intercourse	18.04 years
States with highest concentration of tribal women	Nagaland (17%)
Major religious group	Christian (45%) Hindu (44%)
Number of average children born to a woman	3.19
Mean number of children born to a woman within last 5 years	0.77
Average family size (number of person)	5.8
Prevalence of contraceptive use	42%
Anemia level (sever/moderate/mild)	49%
Access to safe water	63.2%
Access to safe sewerage	54%
Literacy and Education:	
Has some primary and above education	52.2%
Has some reading capability	48.2%
Partner's education (had some primary & above)	69%

The following section describes the sample in terms of the variables used in this study. Highest proportion of respondents were from the state of Nagaland (17.2%) followed by the second highest proportion from the state of Mizoram (10.2%). In total, the North-eastern states, i. e., the states of Sikkim, Arunachal Pradesh, Nagaland, Manipur, Mizoram, Tripura, and Meghalaya consisted more than half (55.5%) of the respondents. Two third of the women who participated in NFHS-3 are from rural areas, and rest (25%) were urban. In contrast of the mainstream Indian society, majority of the tribal women (45%) reported their religion as 'Christianity'. Almost equal proportion (44%) of the respondents was 'Hindu'. Most of the tribal household head were Male (93%), and on average each household had about 6 members including one child of five or less years of age. About half of the respondents were found

'currently employed'. About 52% of the women were employed in the agricultural farms on own land, and 18.5% on their family land. With a range of 741.20, (minimum value .10, and maximum value 741.30), the average size of agricultural land owned by the respondents or their family was 4.3 acres.

Mean age of the respondents were 31.5 years, even though majority (21%) of the respondents belonged to (25-29) age group, followed by (30-34) age group (19%). About 56% of the respondents' age falls between 25 and 39 years. On average, tribal women marry approximately at 18 years of age which is higher than the average marriage age of the mainstream society. Data shows that tribal women experience first sexual intercourse at an earlier age (18.04 year) than that of marriage (18.17 year). The total fertility rate of tribal women is about 3.20. About half (48%) of the respondents did not have any child-birth within last five years, and 30% of the respondents had at least one child-birth within last five years. Low child-birth among tribal married women indicates high use of contraceptives. About 42% of the respondents were found using some type of contraceptives, of which 'female sterilization' was most prevalent (25%), followed by oral contraceptive pill (about 5%). In contrast of high prevalence of female sterilization, a very low prevalence (1.4%) was reported for male. It is observed that, condom use as a contraceptive method was reported by only 2% respondents.

Overall, 36% of the total participants reported using modern methods of contraceptive, and only 6% of the women were found using traditional methods. About 29% of the all respondents did not have any intention to use contraceptives. About 31% of the respondents wanted at the time of the survey one or more children within two or more years, whereas, 35% did not intend to have children. Preference for male child was more prevalent than the preference for female. Majority (45%) of the women mentioned '1' as the ideal number of girl, whereas, 44% mentioned two boys as the ideal number.

About 23% of the respondents were not anemic and had heard of STD. About 26% of the respondents had anemia (severe, moderate or mild type) and did not have any knowledge of AIDS. In regards of using contraceptives, a bimodal trend can be observed. Overall, about half (49%) of the tribal women had some form of anemia.

About 47% of the respondents never used any contraceptive method in contrast with 45.6% of modern method users. About 7.5% of the tribal women reported using folkloric or traditional method of contraception. About 71% of the women, who use modern method, heard of STD, where 54% of the non-user women had knowledge of STD. Similarly, about 49% of the women non-user of any contraceptive method never heard of AIDS, where 65% of the modern contraceptive users heard of AIDS. About 48% of the respondents reported no birth in last five years and had no STD in last twelve months. Similar proportion of the respondents reported having no genital sore/ulcer. About 48% of the women who did not have childbirth in the last 12 months reported having no genital sores. About 88% of the respondents never experienced terminated pregnancy.

In terms of economic activities, about half (50%) of the respondents had a current job, and 49% of the participants reported being unemployed. Among the currently employed women, more than half (59%) had no money for their own use. Overall, majority (60%) of the employed women did not have money for their own use. Among the women who were employed all the year round, 44% had money for their own use; by contrast, 65% of seasonally employed women had money for their own use.

Only 40% of the tribal women who were employed in previous year reported to earn cash incentive for their labor. About 36% of the women reported that they were not paid at all in return of their work. In total, about half (46%) of the women employed within last twelve months

were either not paid in cash or did not receive any incentive at all. This may be an indication of coherence and cooperation within tribal community which encourages the members to help each other by providing free labor.

About one fourth (24%) of the respondents had knowledge about microfinance and similar loan programs and they received cash payments for their work. Among the participants of the microfinance and similar small scale loan program, only 53% earned cash in return of their work, and 24% had not received any incentive at all. Among the women who earned only 'cash' in return of their work, 50% did not have the ability to read at all. About 48% of the participants of loan program did not have money for their own use.

With respect to the educational attainment by the tribal women, majority of the respondents (47%) were found with 'no education', however, about 36% of them attained some secondary or higher education. Among the women who were employed all the year, more than half (54.3%) had no education, 29% had some secondary or higher education, and, 5% had primary education. Among the women who knew about microcredit programs, majority (53%) had primary and higher education. Tribal women's' participation in the microcredit or small loan program is very low, only 9.3% of the all respondents participated in a loan program. Among the participants of the loan programs, 39% had no education, 33% had incomplete secondary, and about 14% had secondary and higher education.

With respect to the economic condition, the respondents were almost evenly distributed in five different wealth index groups. About 27% of the respondents belonged to 'poorest', 21% to 'poorer', 19% to 'middle', 19% to 'richer' and '14.3% to 'richest' wealth index groups. Majority (32%) of the currently employed women belongs to 'poorest' group. Among the women who did not work in previous twelve months, about 48% belonged to 'richer' or 'richest' wealth index

groups. Women who knew about the loan programs belonged to all five wealth index groups almost evenly (19% to 22%).

It appears that overall, the tribal women and tribal population in general are not exposed to print or electronic media. About 60% of the total respondents reported never reading any newspaper or magazine, 58% never listening to radio, and about 43% reported never watching television. With an electricity connection in the household, 35% of the respondents never listened to radio, and 17% never watched television.

About 41% received healthcare services provided by mainly government facilities and has electricity in their residences. Tribal women who heard family planning programs on radio are likely to seek healthcare from public or government facilities. About 47% of the respondents reported that they learned about family planning from radio programs within last month and their household members seek healthcare services from government facilities.

It appears that, traditional way of tribal living has been changing, as 75% of the respondents were found to live in 'semi-pucca' or 'pucca' house. According to the NFHS-3, 'pucca' or semi-pucca house refers to partial or full use of concrete and/or brick as the construction materials of the house which indicate more stability and affordability. Traditionally tribal populations use materials available from the surrounding areas to build houses.

About 63% of the respondents reported having access to safe water, and 54% to safe toilet and sewerage system. Majority of the participants (21%) mentioned tube well or borehole as their source of drinking water, followed by public tap water (14%). About 30% of the respondents reported using pit latrine or latrine connected to septic tank, and, 44% had no toilet facility at all.

Screening and Transformation of Variables

The distributional properties of the variables were examined to assess the extent of support for assumption of normal distribution of variables in the model. Appropriate measures were taken to minimize the problems of deviations from a normal distribution. Among the initial descriptive properties, we examined the mean, median, mode, standard deviation, skewness, and kurtosis.

Dealing with Missing Values

NFHS-3 of India is a large-scale national level survey consisting information of total 124,385 cases. As our study population is the tribal married women, for analysis convenience, we created a separate data set consisting of only the tribal participants who are married. The total number of cases was reduced to $n = 10,205$. According to our proposed model, initially we selected 88 questions from the NFHS-3 questionnaires of women and their respective households to construct the variables.

While screening the data for missing values, about thirty items had more than 21% cases with missing values. For example, one of the questions on economic decision (v743a: who decides how to spend wife's earned money) had as high as 67% cases with missing values. Four questions on tribal women's violence experience e. g., whether women ever had injury, bruises, broken bones or severe burns because of husband's action, had 76% cases with missing values. Several questions on ecological resources had high proportion of cases with missing values. It was found that only 10 of the initially selected questions had information for all of the cases, and 41 of the initially selected questions had information less than 100 cases with missing values. Hence, we had 68 questions with high proportion of cases with missing values.

Subsequently, a decision was made to drop the questions with more than 30% of cases with missing values, and to replace the questions with similar information seeking questions.

Execution of this decision resulted in exclusion of the following variables: v732 (whether respondent is employed all year round), v741 (types of earning for respondent's work), w128 (whether respondent has been given a loan), v632 (who decides for using contraception), v743a (who decides how to spend wife's earned money), d110a (whether women ever had bruises because of husband's action), d110b (whether women ever had injury, sprains, dislocation or burns because of husband's action), d100d (whether women ever had wounds, broken bones, broken teeth etc. because of husband's action), d110e (whether women ever had severe burns because of husband's action) and, d124 (have anyone other than partner force respondent to have sex in last twelve months). The above mentioned 10 variables were dropped and remaining 78 variables were treated for missing values and were taken into account.

This section of analysis describes the screening and handling of data for missing values which is a crucial step of the current study. Experiencing missing values is a common experience in the social research which can be resulted from systematic errors or data can be missing at random as well. It can be assumed that the large data set of NFHS-3 may have both systematic and randomly missing data. Regardless of the reason behind missing information it is essential to address missing data issues (Byrne, 2001) particularly in multivariate research designs.

Several methods are suggested for treating missing data, of which, listwise deletion, pair-wise deletion, and mean imputation methods are most commonly used. These methods are advised to imply on ad-hoc basis, according to the situation demand. NFHS-3 collected data from a very large number of participants from all over the India. It was assumed that data are

missing at random indicating no particular region reporting high proportion of missing information. With this assumption, the mean imputation by region could be used to retain the missing values of the variables. The mean imputation method replaces missing values with the means obtained by calculating the means of respective variables (Byrne, 2001). Because of the very diverse social, cultural, and geographical background of the Indian tribal populations, mean imputation by region demands identification of participants' residential location at the very micro level, such as, district or sub-district. NFHS-3 data does not provide such information. Information on participants' location only indicates the respondent's state of residence. Therefore, mean imputation by region for tribal women would require calculating mean for each state of the variables and replacing the missing values with the respective means of states. Hence, mean imputation method by region was not used. Moreover, in order to maximize the richness of information no deletion method was considered.

While dealing with the missing values, current study emphasized maintaining the richness of the information without influencing the dispersion and distribution attributes. The composite variables of the current study are comprised of several questions. Any single missing value in any of the questions constituting an index would lead to a missing value in the index. In order to minimize the loss of cases due to missing value, a new method is proposed and implemented in this study. The basic premise of this approach is that the knowledge of a value missing itself is a form of information. Based on this assumption, all variables in any given index in this study are accorded a value for the level of information it carries. If an index is made up of six variables and if all of them have response values from a case (unit of analysis), the index value of the case is the sum of the response values on all six variables with an additional 7 points added for having non missing values on all six variables. This approach was uniformly applied to all the variables in this study.

Against each case, we determined how many questions were missing for a composite variable. Then, a weight value was assigned for each variable on the basis of number of total questions that constructed the respective composite variable as such that the cases with all missing information receive a least point. The more information a case has for that variable receives higher weight value; in other words, the cases are given point in proportion to the 'degree of missingness'. This weight value was added to the previously obtained composite score to compute the final value of the variable.

For example, the economic opportunity variable (ECOPRONT) is comprised of 5 questions. Any single missing value of these five questions will result in the case as missing in the composite variable of ECOPRONT. Since ECOPRONT is comprised of 5 questions, the least point a case could achieve for this variable, if all 5 information was missing was 1. If the case had 4 missing values it could receive 2 point, if the case had 3 missing values it could receive 3 points and so on. A summative value was calculated by adding the available information and replacing the missing values with zero before adding the points for missing value. If the case had an initial score of 2, and, had four missing information, the computed final value of that case for ECOPRONT would be four (previous score, 2 + point for degree of missing, 2 = 4). If the case had none of the five information, it could finally achieve a value of one (previous score 0 + point for degree of missing, 1 = 1). This was done for each of the composite variables.

A weight value of 2 was added with the existing value of variables which comprised of only one question. All the cases had information for one of these two variables, which retains the information on respondent's age at first marriage (MAR_AGE: v511 – age at first marriage). Weight value 2 was assigned on the assumption that the minimum weight value for a missing information was one; therefore, if any case had all the information the case could receive a

value of 2. Similar strategy was used in dealing with the missing values for the other variable, DISPLCD (v104 – whether respondent has been living in the place of residence ever) variable.

Graphical test on the distribution of normality and dispersion were conducted to examine whether added weight value for missing information significantly influenced the distribution pattern. Since no significant differences were noticed, no further treatment was considered for missing values.

Screening of Normality

Once the concern with missing information was resolved, we examined the normality of data to ensure that the assumption of regression is not violated. We assessed the distribution of normality using skewness statistics to measure the degree of normal distribution, and kurtosis statistics to measure the degree of peakness. A value of zero is considered perfect for the skewness and kurtosis value distribution (Mertler & Vannatta, 2002; Morgan, Leech, Gloeckner, & Barrett, 2004). Even though a value between +1 and – 1 (Morgan et al., 2004) is considered as the acceptable range of skewness and kurtosis, Hair, Black, Babin, & Anderson (2010) suggested a value of ± 2.58 (.01 significance level).

In current study we considered the variables with the skewness and kurtosis value out of the range of +3 to –3 as the indication of non-normal distribution. The skewness and kurtosis statistics are presented in table below.

Table 9: Skewness and Kurtosis Statistics of the Variables

Variables	Variables labels	Mean	SD	Skewness	S.E. of Skewness	Kurtosis	S. E. of Kurtosis
ECOPRONT	Economic Opportunity Score (Composite)	12.95	1.142	0.123	0.024	1.065	0.048
ECO_POWR	Economic decision making power (Composite)	16.58	2.618	-2.121	0.024	6.17	0.048
RH_DEC	Reproductive decision making power (Composite)	23.54	2.757	-0.067	0.024	0.1	0.048
VIOLEXPR	Respondents' violence experience (Composite score)	59.02	30.152	-1.391	0.024	-0.036	0.048
PHYS_ENV	Physical Environment (Composite) Score	11.55	1.39	-1.864	0.024	7.206	0.048
PROXIM	Proximity to mainstream society (Composite)	21.96	2.034	0.006	0.024	1.991	0.048
DISPLCD	Respondent's displacement experience	3.41	0.499	0.229	0.024	-1.39	0.048
RH	Reproductive health (Composite score)	34.54	2.753	-2.382	0.024	8.275	0.048
SOC_OPP	Social opportunity for women (Composite score)	37.76	5.872	0.467	0.024	0.424	0.048

As the table 9 above indicates, the kurtosis values for ECO_POWR (6.17), PHYS_ENV (7.206), and RH (8.275) were found considerably high. All the skewness values were found within the acceptable range. Therefore a decision was made to deal with the violation of normality of these three variables. For this purpose, the frequency distributions of the variables were examined to assess the characteristics of the degree of peakness.

Careful examination suggested the extended tails of the distributions as the cause of the leptokurtic pattern of the kurtosis. This led to trimming down the tails, hence, the frequency distribution of the categorical values were reorganized. For the ECO_POWER variable it was found that only 3.2% of the cases were distributed into the lower four values between 1 and 6 with a range of 1 to 19. Hence, categorical values through 6 were recoded to 13, and a new

variable (ECOPOWER) was computed. PHYS_ENV variable had only 6.6% of the cases distributed among the lower two values of 4 and 9 with a range of 4 to 13. Hence, categorical values 4 through 9 were recoded to 10, and a new variable (PHYS_ENV2) was computed. Similarly, dependent variable of reproductive health, RH had only 4.3% of the cases distributed among the lower thirteen values between 8 and 29 with a range of 8 to 38. Hence, categorical values between 8 through 29 were recoded to 30, and a new variable (RH2) was computed. Such modification minimized the degree of peakness of the variables, and normality of the distribution was achieved. The table below presents the skewness and kurtosis statistics of the transformed variables.

Table 10: Distribution Statistics after Modification of the Selected Variables

Variables	Transformed Variables	Mean	SD	Skewness	S.E. of Skewness	Kurtosis	S. E. of Kurtosis
ECO_POWER	ECOPOWER	16.80	1.96	-.545	0.024	-.745	0.048
PHYS_ENV	PHYS_ENV2	11.67	1.05	-.206	0.024	-1.183	0.048
RH	RH2	34.78	1.93	-.583	0.024	.059	0.048

The internal consistency reliability of the measure of variables (or constructs) were tested using Cronbach's alpha. With a score between 0 and 1, a Cronbach's alpha coefficient of .70 or higher is generally considered acceptable to corroborate adequate internal consistency. Reliability tests were run on the composite scales for reproductive health, social opportunity, ecological resource, power, and economic opportunity.

An overall Cronbach's alpha of .075 was obtained which indicates poor reliability of the measurement scale. However, it should be considered that these scales are theoretically constructed. Moreover, these measures were not constructed as scales to be used in collecting data from the participants. Hence, a decision was made to use the composite indicators of

reproductive health, social opportunity, ecological resource, power, and economic opportunity. However, it is acknowledged that this study's findings may have been affected by this limitation in measures.

CFA of Latent Variables

In order to test the validity of the measures of the dimension of ecological resources and, power of tribal women, confirmatory factor analysis (CFA) method was used. The dimension of ecological resource denotes the richness of surrounding ecology in terms of health supportive environment for the tribal women. This latent dimension is labeled as 'ECOL'.

The dimension of the power characterizes tribal women's freedom and capability of taking economic and reproductive decisions along with the degree of violence they experience. This latent dimension is labeled as 'POWER'. Objective of the CFA of these two dimensions is to establish their level of validity.

This section of the analysis presents the stages of the confirmatory factor analysis to assess the presence of these two dimensions manifested by the hypothesized causal structures. It should be noted here that, the statistical program called AMOS is used to conduct the CFA as well as the structural equation modeling in the subsequent analyses of the proposed causal structures consisting hypothetical associations among observed and latent variables.

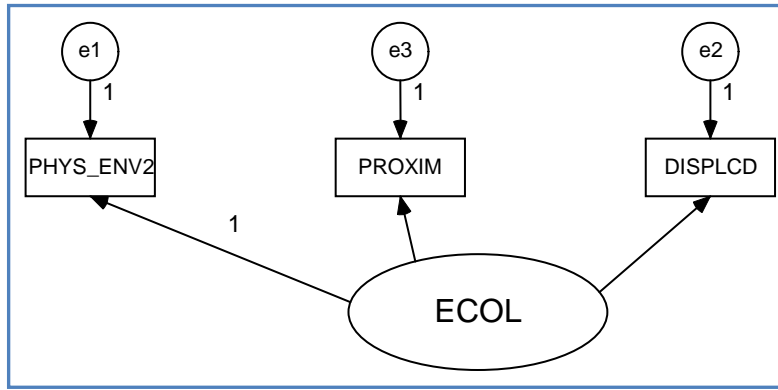
With the assumption that all the variables are continuous this factor analysis used maximum likelihood method for extraction. In current study, four major fit indices are reported to assess model fit. Byrne (2001) suggests the use of at least two goodness of fit indicators to assess the level of fit of a model. The indices used in current study are: low Chi-Square values,

Goodness of Fit Index (GFI), Comparative Fit Index (CFA), and Adjusted Goodness of Fit Index (AGFI), and Root Mean Square Error of Approximation (RMSEA). The indices are chi-square based. The desired value range for GFI, CFA, and AGFI are from .90 to 1.00 (Byrne, 2001; Joreskog & Sorbom, 1994; Rabe-Hesketh, Skrondal, & Zheng, 2007). The next section conducts CFA of ecological resource dimension followed by the reproductive power dimension of tribal women in India.

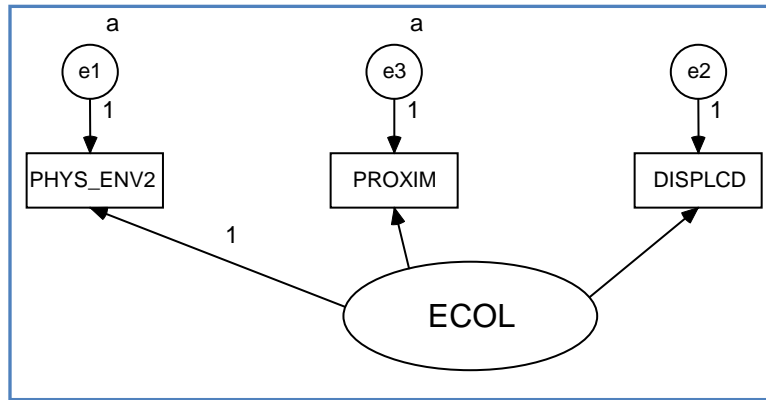
CFA of Ecological Resources (ECOL)

All the ecological resource variables, i.e., composite physical environment (PHYS_ENV2), proximity to mainstream society (PROXIM), and displacement experience (DISPLCD) loaded in one factor. The construct was named 'ECOL'. The model in this stage had a chi-square value of 0 (df=0), along with indication of one negative variance. Major fit indices such as, GFI (1.00) and RMSEA (.210) were inadequate.

Therefore, it was concluded that the model was not a good fit. The model was then revised and modified by constraining the error term variances of physical environment (PHYS_ENV2), and proximity to mainstream society (PROXIM) variables. Figure 6 in the following page presents the initial and modified model of ecological resource dimension.



(a)



(b)

Figure 6: Modification of Ecological Resource model (a) without parameter on error terms, (b) with parameters on error terms of PHYS_ENV2 and PROXIM.

Table 11 below presents the CFA output for the modified model of ecological resource (ECOL) dimension. In table 11 each of the individual observed variable's unstandardized coefficients (estimates) has been divided by the respective standard error (S.E.) to obtain their Z-statistics in order to test the statistical significance of respective variable's factor loading. Z-statistic suggests significance of the respective factor loading if the estimate to standard error ratio turns out to be greater than +1.96 or less than -1.96. Hence, it is understood that, the revised model found all factor loadings statistically significant at .001 level, and highly

associated to the theorized latent construct of ecological resources (ECOL) presented in the last column of table 11 below.

Table 11: CFA for Ecological Resources (ECOL) Dimension

Variables	Estimate	S.E.	Estimate/S.E	Factor loading
PHYS_ENV2	1.000	0.00	0.00	.384 [*]
PROXIM	4.383	.121	36.151	.877 [*]
DISPLCD	.148	.014	10.376	.121 [*]

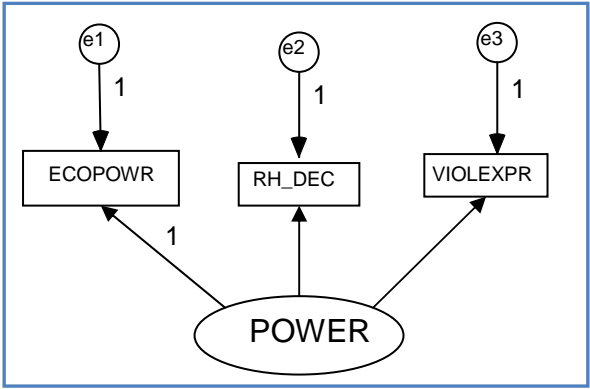
* Significant at .001 level.

The modified model of ECOL yielded a better chi-square value ($\chi^2 = 2.87$, $df = 1$) and fit indices. Obtained goodness of fit values of AGFI (.999), CFI (.999), and RMSEA (.014) were in acceptable range. The variable of PROXIM had a high factor loading of more than 0.8, and, variables holding information on type of residence, source and accessibility of drinking water (PHYS_ENV2) has factor loading close to 0.4. Since this model achieved a low chi-square value and adequate fit indices, no further modification was conducted, and the factor structure for ECOL was retained.

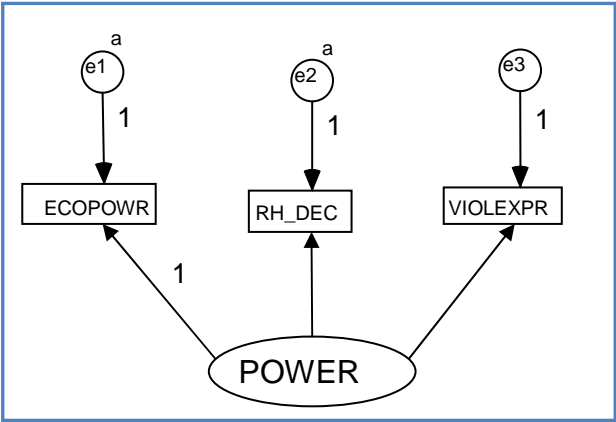
CFA of Power

All the power variables, i.e., composite index of tribal women's ability to take economic decision (ECOPOWER), reproductive decision (RH_DEC), and their experience of violence (VIOLEXP) loaded in one factor. The construct was named POWER. The model in this stage had a chi-square value of only 2.801 ($df = 0$), along with indication of one negative variance. None of the factor loadings were found significant. Major fit indices such as, GFI (1.00) and RMSEA (.151) were inadequate. Therefore, it was concluded that the model was not a good fit.

The model was then revised and modified by constraining the error term variances of two observed composite variables of ECOPOWER and RH_DEC. The model yielded a better chi-square value and fit indices. Figure below presents the initial and modified model of ecological resource dimension.



(a)



(b)

Figure 7: Modification of POWER model (a) without parameter on error terms (b) with parameters on error terms of ECOPOWER and RH_DEC.

The revised model found all factor loadings statistically significant at .001 level except VIOLEXP, and highly associated with the theorized latent construct of ecological resources (ECOL) presented in the last column of table 12 below. The CFA output for the modified model of power (POWER) dimension are presented in the following table.

Table 12: CFA for POWER Dimension

Variables	Estimate	S.E.	Estimate/S.E	Factor loading
ECOPOWER	1.000	0.00	0.00	.330
RH_DEC	3.319	.127	26.139	.758*
VIOLEXP	-.229	.614	-.372	-.005

* Significant at .001 level.

It should be noted that, the variable of RH_DEC has high factor loading of more than 0.7 indicating the strong effect of reproductive decision on power factor. With a low chi-square value ($\chi^2 = 42.98$, $df = 1$) this model yielded better fit indices. Computed goodness of fit index of RMSEA (0.064), GFI (.997), AGFI (.983), and CFI (.940) were in the acceptable range. Since all four indicators reflected a good fit, no further modifications were undertaken.

Model Test

The Path Analysis Model

After examining the validity and reliability of the data, in the final stage of analysis we tested the proposed model of reproductive health using path analysis and structural equation method in order to test the proposed hypotheses. Since only the observed variables are used to conduct path analysis, two new variables, namely 'POWER1' and 'ECOL1' were created by adding the values of the sub-dimensions of the latent factors of POWER and ECOL respectively.

At first we tested the full model of reproductive health including all the variables using path analysis method which is considered as an appropriate procedure to test several theoretical relationships among various concepts within a proposed model.

A path analysis model is the combination of several regression models given the assumption that residuals are homoscedastic, and are normally distributed. In regression it is also assumed that, variables in the model are not multicollinear, and there are no significant outlier cases. In order to ensure that, the assumption of homoscedasticity was not violated, the standardized residuals were plotted against the standardized predicted variable using SPSS.

The bivariate plots showed scattered patterns indicating that the variables in the model did not violate the assumptions of homoscedasticity. On the basis of graphical test, no further statistical tests were conducted. The presence of autocorrelation among residuals was tested using graphical and 'Durbin-Watson' tests. The obtained plots had scattered pattern and the 'Durbin-Watson' or 'd-statistics' had a value of 1.725. The 'd-statistics' values close to zero and four indicates the presence of auto correlation while the value close of '2' indicates absence of autocorrelation. Hence, it is concluded that the residuals did not violate the assumption of autocorrelation.

High or very strong correlation between two or more independent variables indicates the presence of multicollinearity which makes difficult to assess the separate effects of each variable's on the dependent variable (Vogt, 1999). In order to test the presence of multicollinearity among the variables under study was evaluated by examining the bi-variate correlations among all pairs of the variables in the model, and by calculating the variance inflation factors (VIF) for each predictor, and the condition indices (CI) for each dimensions or factors. VIF measures the degree to which the interrelatedness of any independent variable with other predictors inflates the variance of the estimated regression coefficient for that variable.

A high VIF value of an independent variable indicates high multicollinearity of the variable with other independent variables, which makes the regression coefficient estimation

process instable. A VIF value for an independent variable greater than 10 is generally considered as the indication of multicollinearity problem associated with that variable. Information presented in table 13 below shows that none of the variables had such indications.

Table 13: Collinearity Statistics of the Independent Variables

Variables	Collinearity Statistics	
	Tolerance	VIF
ECOPRONT	.869	1.151
ECOPOWR	.929	1.076
RH_DEC	.821	1.218
PHYS_ENV2	.883	1.132
PROXIM	.726	1.377
DISPLCD	.965	1.036
SOC_OPP	.751	1.332
VIOLEXP	.964	1.037

*Dependent variable: RH2 (Reproductive Health)

Another procedure of detecting multicollinearity among variables is to examine the condition index of each dimension. It is suggested that, a high condition index (value greater than 30) along with high variance proportion (value greater than 0.50 for at least two different independent variables) should be considered as the indication of the existence of multicollinearity (Belsley, Kuh & Welsch, 1980). Condition indices presented in table 14 show the absence of any such pair of variables with a CI greater than 30 suggesting that the assumption of multicollinearity was not violated.

The table 14 below presents the collinearity statistics of CI and variance proportion of each dimension indicating the lack of multicollinearity among variables.

Table 14: Condition Indices and Variance Proportion of the Dimensions

Dimension	Eigen value	Condition Index	Variance Proportions								
			(Constant)	ECOPRONT	ECOPOWER	RH_DEC	PHYS_ENV2	PROXIM	DISPLCD	SOC_OPP	VIOLEXP
1	8.725	1.000	.00	.00	.00	.00	.00	.00	.00	.00	.00
2	.191	6.755	.00	.00	.00	.00	.00	.00	.00	.00	.94
3	.021	20.335	.00	.00	.73	.00	.00	.00	.22	.07	.00
4	.020	20.966	.00	.00	.10	.03	.04	.01	.60	.17	.00
5	.016	23.424	.01	.02	.14	.03	.15	.00	.01	.63	.00
6	.010	29.015	.00	.03	.02	.36	.68	.01	.01	.02	.00
7	.009	31.499	.02	.29	.01	.53	.08	.04	.06	.00	.00
8	.005	40.109	.00	.28	.00	.03	.01	.83	.00	.08	.01
9	.003	55.890	.96	.37	.01	.01	.04	.12	.10	.03	.04

The bivariate correlations among the independent variables were also examined to detect any variable with problem of multicollinearity. It is suggested that, correlation coefficient of a paired independent variable above .80 should be considered as an indication for multicollinearity problem.

All of the bivariate correlation coefficient among the independent variables were found less than .60 suggesting that the assumption of multicollinearity was not violated. Bivariate correlation coefficients among independent variables are presented in the following table.

Table 15: Pearson r Correlation Statistics among Independent Variables

	ECOPRONT	RH_DEC	VIOLEXP	PROXIM	DISPLCD	PHYS_ENV2	ECOPOWR	SOC_OPP
ECOPRONT	1	.207**	-.167**	.266**	.025*	.211**	.182**	.223**
RH_DEC	.207**	1	-.016	.331**	.047**	.308**	.251**	.293**
VIOLEXP	-.167**	-.016	1	-.017	.000	-.014	.057**	.015
PROXIM	.266**	.331**	-.017	1	.108**	.337**	.237**	.436**
DISPLCD	.025*	.047**	.000	.108**	1	.031**	.144**	.171**
PHYS_ENV2	.211**	.308**	-.014	.337**	.031**	1	.197**	.292**
ECOPOWR	.182**	.251**	.057**	.237**	.144**	.197**	1	.244**
SOC_OPP	.223**	.293**	.015	.436**	.171**	.292**	.244**	1

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

In order to detect the presence of significant outliers we examined the Cook's distance (D). Values of Cook's distance greater than 1 for a particular case are generally considered as the possible outliers in the regression model (Norusis, 2003). After careful examination none of the cases was identified with a Cook's D value greater than 1.

In order to detect the presence of significant outliers and also detect the level of influence of outlying cases, we examined the influence statistics such as DFBETA. . The influence in regression model of a particular case is measured by the difference between the regression parameter estimates (β) and what they become if that particular case is excluded. Values of Cook's distance greater than 1 for a particular case are generally considered as the possible outliers in the regression model (Norusis, 2003).

The absolute value of DF-Beta for a case greater than $2/\sqrt{n}$ [$|DF-Beta| > 2/\sqrt{n}$], where n is the total number of cases] indicates that particular case an outlier. In current study, $n = 10,205$, hence, absolute value of DF-Beta for each independent predictor and for a particular case should not exceed $[2/\sqrt{10,205}] = 0.0197$. No values greater than 0.0197 were identified for

any independent predictor and for a particular case. Therefore, it is concluded this study did not include any significant influencing outlier case. Figure 8 below presents the path model for the tribal women's reproductive health in India.

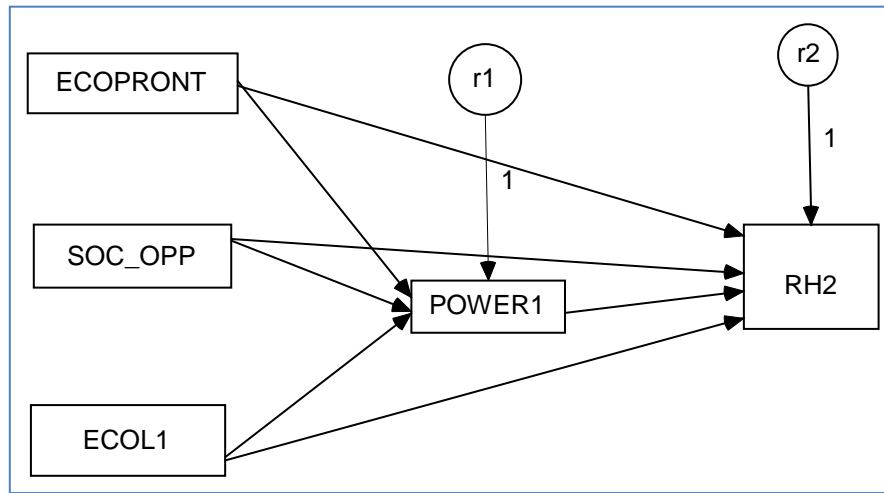


Figure 8: Reproductive Health Model for Path Analysis.

Path analysis of reproductive health model empirically supported all hypotheses except the hypothesized positive association between reproductive health and economic opportunity. The path analysis of the proposed model of current study suggests that social opportunity ($\beta = .346$, $p < .001$), economic opportunity ($\beta = -4.369$, $p < .001$), and ecological resources ($\beta = .607$, $p < .001$) significantly influence tribal women's power in India. However, power did not have a significant ($\beta = .002$, $p = .004$) effect on reproductive health of the tribal women.

Social opportunity ($\beta = .069$, $p < .001$) and ecological resources ($\beta = .204$, $p < .001$) were found to have direct effect on reproductive health indicating that, as social opportunity and ecological resources increase, reproductive health also increases. In contrast of our first hypothesis (H_1) economic opportunity of tribal women did not have a direct significant effect on their reproductive health, and was negatively associated with tribal women's power. This path

model, however did not yield a satisfactory fit; with a high chi-square value ($\chi^2=3278.78$, $df = 3$). The values of 'Goodness of Fit Index' (GFI = 0.884) and 'Adjusted Goodness of Fit Index (AGFI = 0.418) were low, 'Root Mean Square Error of Approximation' (RMSEA = 0.327) were outside the acceptable range (0.05 – 0.09).

Since the path analysis of the full theoretical model did not support all the expected hypotheses including the association between reproductive health, and mediating factor of power, we evaluated a reduced form path model by dropping the POWER1 variable. Exclusion of power variable from the path model produced slightly higher satisfactory estimates of the model fit. With a low chi-square value ($\chi^2 = 906.65$, $df = 2$), the values of AGFI (.796) and RMSEA (0.211) were not in the acceptable range, except GFI (.959), and CFI (.835).

Similar to the path analysis of the full model, economic opportunity (ECOPRONT, $\beta = .016$, $p = .292$) had no significant association with tribal women's reproductive health (RH2). However, in contrast to the full model, economic opportunity had a positive association with the dependent variable. Only social opportunity ($\beta = .069$, $p < .001$) and ecological resources ($\beta = .205$, $p < .001$) showed significant positive association with the reproductive health. Figure 9 below presents the path model for the tribal women's reproductive health in India.

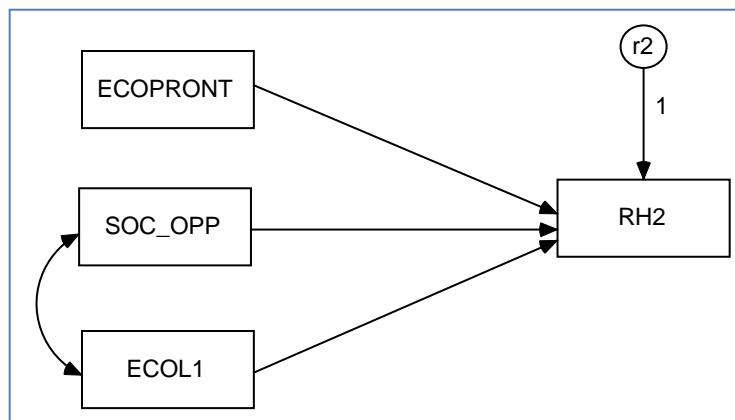


Figure 9: Reduced Reproductive Health Model for Path Analysis.

Above discussion suggests that, not all hypothesized paths were empirically supported. The overall theoretical model was empirically supported by path analysis partially. The table 16 below presents the expected and obtained directions of hypotheses obtained from the path analyses of full and partial models. The information in table 16 suggests that, all the variables are in the expected direction except the economic opportunity. Thus economic variables did not determine power of tribal women.

Table 16: Expected and Obtained Directions of Path and Reduced Path Models of Tribal Women's Reproductive Health

Variables	Variable Label	Hypotheses	Path Model		Reduced Path Model	
			Expected	Obtained	Expected	Obtained
ECOPRONT	Economic Opportunity	ECOPRONT → POWER1	+	—		
SOC_OPP	Social Opportunity	SOC_OPP → POWER1	+	+		
ECOL1	Ecological Resource	ECOL1 → POWER1	+	+		
POWER1	Tribal women Power	POWER1 → RH2	+	⁺ (NS) [†]		
ECOPRONT	Economic Opportunity	ECOPRONT → RH2	+	+ (NS)	+	+ (NS)
SOC_OPP	Social Opportunity	SOC_OPP → RH2	+	+	+	+
ECOL1	Ecological Resource	ECOL1 → RH2	+	+	+	+

* RH2 = Reproductive health of tribal women (Dependent Variable)

† NS = Non significant at 0.001 probability level.

Analysis suggests that current study's predictions about the effect of social opportunity and ecological resources on the reproductive health of tribal women were in the expected direction, i. e., as the social opportunity and ecological resources for tribal women increases, so does their power and reproductive health.

Confirmatory Structural equation modeling (SEM) is used for testing theoretical model with sets of items or constructs or variables of interest which cannot be measured perfectly (Rabe-Hesketh, Skrondal, & Zheng, 2007). Since path analysis only can deal with measured variables, we need to evaluate our model using SEM technique which allows for including latent variables in the model to be tested. Another advantage of using SEM technique in addition to path analysis is to overcome the limitation of path analysis for not being able to “assess or correct for measurement error” (Byrne, 2001, p. 3). SEM is free from such limitation. Thus, after conducting the path analysis, the proposed model was evaluated using structural equation methods. Figure 10 below presents the structural model for reproductive health of tribal women in India.

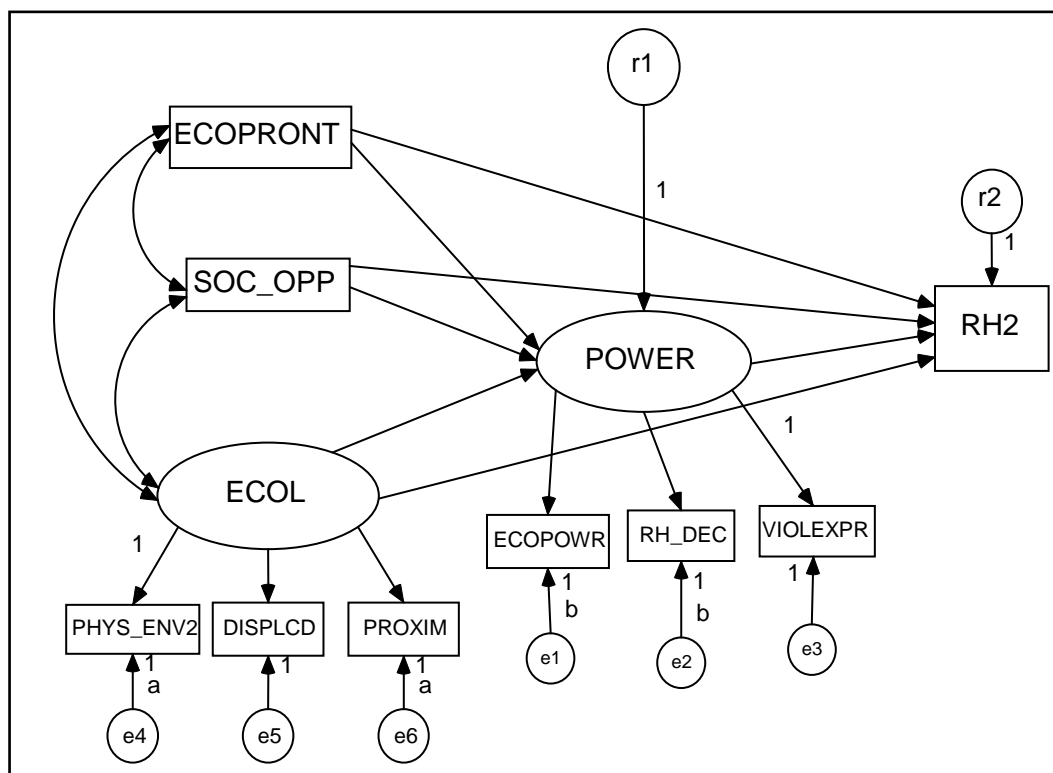


Figure 10: Structural Equation Model of Tribal Women's Reproductive Health.

Analysis results from SEM are similar to the findings of path analysis. Latent variable representing tribal women's power (POWER) did not have significant association with the independent observed and latent variables of economic opportunity (ECOPRONT, $\beta = -.072$, $p = .082$), social opportunity (SOC_OPP, $\beta = -.018$, $p = .081$), and ecological resources (ECOL, $\beta = -.629$, $p = .078$). POWER also had no significant effect on reproductive health ($\beta = -.404$, $p = .084$). Except POWER, tribal women's ecological resource (ECOL), social opportunity (SOC_OPP) and economic opportunity (ECOPRONT), all three variables were found to have significant effect on their reproductive health. Covariances among ECOPRONT, SOC_OPP, and ECOL were found significantly and positively associated. The table 17 below presents the net effect of these variables on the reproductive health of tribal women.

Table 17: Net Effects of Variables on Tribal Women's Reproductive Health

Independent variables (observed and latent)	Labels	Net effect on RH2		Net effect on POWER	
		β	S.E	β	S.E
ECOPRONT	Economic Opportunity	-.065*	.016	-.072	.042
SOC_OPP	Social Opportunity	.042*	.004	-.018	.011
ECOL	Ecological Resource	1.437*	.074	-.629	.357
POWER	Tribal women power	-.404	.234	1.00	

* Significant at .001 level.

It is observed that, economic opportunity (ECOPRONT) of tribal women is negatively associated with their reproductive health. This is similar to the findings of our path analysis. In contrast to the path analysis finding, tribal women's power (POWER) as a latent variable is negatively associated with reproductive health in SEM, though not significant. The goodness fit of the overall model was found adequate. Even though the chi square value was high ($\chi^2 = 1456.939$, $df = 22$) other four major fit statistics, GFI (.970), AGFI (.939), CFI (.873), and RMSEA (.080) were in the acceptable range.

Since the SEM analysis of the proposed theoretical model did not support all the expected effects including the association between reproductive health (RH2) and mediating factor of power (POWER), we tested a modified model by dropping the latent construct POWER from the model. The reduced form model yielded substantial change in statistics of regression weights, though the correlations among the variables were consistent to the full model in terms of significance and directions. Similar to the full model, in the reduced model without the latent POWER factor, economic opportunity (ECOPRONT) had negative and non-significant association with RH2 ($\beta = - .035$, $p = .030$). Tribal women's reproductive health (RH2) had positive and significant association with ecological resource (ECOL) and social opportunity (SOC_OPP) variables. Figure 11 below presents the modified structural model for reproductive health of tribal women in India.

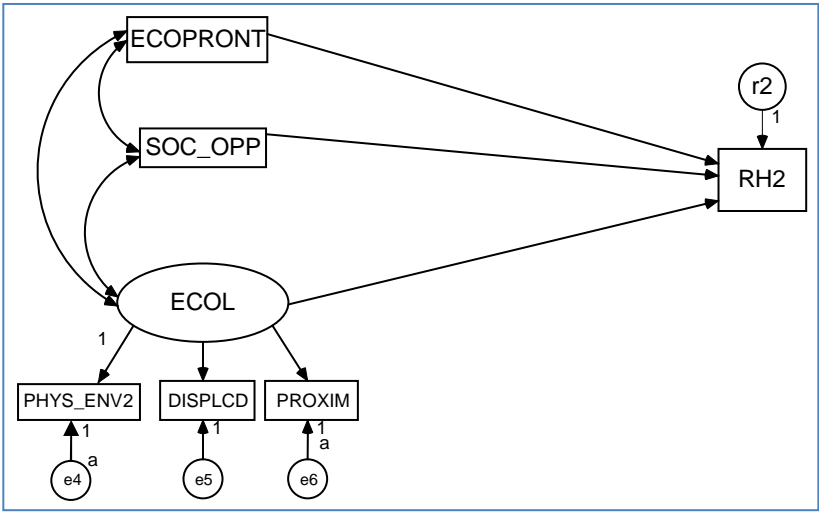


Figure 11: Reduced Model of Tribal Women's Reproductive Health (Modified).

Similar to the full model, covariances among independent observed and latent factor were significant. Net effect of independent variables on RH2 of the reduced SEM is presented in the table below.

Table 18: Net Effects of Variables on Tribal Women's Reproductive Health (Reduced Model)

Independent variables (observed and latent)	Labels	Net effect on RH2	
		β	S.E
ECOPRONT	Economic Opportunity	-.035	.016
SOC_OPP	Social Opportunity	.050*	.004
ECOL	Ecological Resource	1.734*	.071

* Significant at .001 level.

Subsequent modification of model also produced substantial changes in model fit indices. Compared to the fit statistics of overall model fit or of the path analysis, this modified model had a better fit. With a low chi-square value of ($\chi^2 = 463.089$, $df = 7$), all four major fit indices, such as, GFI (.985), AGFI (.956), CFI (.938), and RMSEA (.080) yielded desirable values in the acceptable range. No further modification was conducted.

Above discussion suggests that, not all hypothesized paths were empirically supported by SEM analysis. The full theoretical model was empirically supported only partially. Proposed hypotheses on the association of latent factor power with tribal women's social opportunity, ecological resources, and economic opportunity were not supported. Predicted association between reproductive health and tribal women's power was also not supported by structural equation modeling.

After subsequent modification of model, the analysis yielded better fit estimates, however the direction of association among variables remained unchanged. Ecological resources (ECOL) and social opportunity (SOC_OPP) remained significant and stayed in expected direction in both models. Similar to the full model of reproductive health, ECOL had a positive significant effect ($\beta = 1.734$, $p < .001$) on tribal women reproductive health (RH2) in the

reduced/modified model. The table 19 below presents the expected and obtained directions of hypotheses obtained from SEM of full and modified model of reproductive health.

Table 19: Expected and Obtained Directions of SEM of Full and Modified Models of Tribal Women's Reproductive Health

Variables	Variable Label	Hypotheses	Full Model		Reduced Full Model	
			Expected	Obtained	Expected	Obtained
ECOPRONT	Economic Opportunity	ECOPRONT → POWER	+	— (NS) [†]		
SOC_OPP	Social Opportunity	SOC_OPP → POWER	+	— (NS)		
ECOL	Ecological Resource	ECOL1 → POWER	+	— (NS)		
POWER	Tribal women Power	POWER1 → RH2	+	— (NS)	N/A	
ECOPRONT	Economic Opportunity	ECOPRONT → RH2	+	—	+	— (NS)
SOC_OPP	Social Opportunity	SOC_OPP → RH2	+	+	+	+
ECOL	Ecological Resource	ECOL → RH2	+	+	+	+

* RH2 = Reproductive health of tribal women (Dependent Variable)

† NS = Non significant at 0.001 probability level.

In conclusion, SEM did not support all hypothesized paths. The study did not find tribal women's power to have a direct effect on reproductive health.

CHAPTER 6

DISCUSSION AND IMPLICATIONS

This chapter includes three major sections. In the first section, a discussion on overall summary of findings is presented, followed by the discussion on the limitations of current study. The third and last section discusses the implications for social work of current study and its findings.

In earlier chapter we have discussed the limitations of prior studies on reproductive health manifested by the lack of strong theoretical foundations, and, understanding of reproductive health from demographical, anthropological, or medical perspectives highlighting mainly reproductive performance and its correlates (Reddamma et al., 2002; Mohanty, 2003; Baruah, 2003; Pati, 2003a; Biswas & Kapoor, 2005; Chowdhuri, 2005; Dash, 1986; Kshatriya & Basu, 2005; Pandey, 2002; Pati, 2002). These studies rarely take a holistic approach to explain reproductive health as the outcome of economical, social and ecological factors. Current study attempts to highlight this historically overlooked area and explains the reproductive health combining ecosystem perspective (Bronfenbrenner, 1979; Payne, 1991; Stein, 1974), Sen's (1992, 2002) capability approach, and sustainability approach.

The reproductive health model proposed in the current study advances theoretical foundation by incorporating Sen's capability approach that focuses on the causal association between reproductive functioning and reproductive well-being. Incorporating the sustainability approach to reproductive health along with Sen's concept of capability or freedom advances

and extends current theoretical and empirical models of reproductive health by incorporating a holistic definition of reproductive health emphasizing ecological constituent of reproductive health, and core social work values of social justice, human rights, and community and social empowerment. Thus the proposed model advances the previous models of reproductive health based on demography, anthropology, or physical health, and takes a sustainability approach to reproductive health based on social justice, preservation of nature and intergenerational equity transfer through successful reproduction in the context of indigenous populations in developing nations.

Summary of Findings

The findings of this study partially support the proposed model of reproductive health and subsequently endorse the relevance of theoretical perspectives used in the model. Significant effects of social and ecological resources on tribal women's reproductive health reinforce the implication of ecosystem theory in the context of tribal populations in India. Even though empirical test of ecosystem theory is beyond the scope of the current study, findings of this study suggest that the social and ecological subsystems influence the entire reproductive health system.

Ecological resource is an influential factor of reproductive health that strongly correlates to social factor. This correlation implies that the existence of tribal sociocultural resource and its utilization through customary practice largely depends on whether or to what extent the tribal communities have access to their surrounding ecology and natural habitats. As a matter of fact, in the context of rapid industrialization and mining ventures, tribal women's ability to utilize sociocultural resources depends on whether the tribal populations have any political influence which has been historically very minimal, to advocate their rights and necessities. In the context

of ecosystem perspective, the finding also suggest that at the macro level, environment in the tribal ecological system, performs the role of an overarching system along with the factors belonging to social system at the mezzo level, significantly influencing the tribal women's reproductive health.

From this viewpoint, strength of macro level factors are more visible than the strength of micro level factors such as economic opportunity and power of tribal women, emphasizing the macro sub-systems in the reproductive health system. The concept of Sen's (1992) capability approach to reproductive health, used in the theoretical model of the study is substantiated by the findings of the study. These findings affirm that ecological resources matter for tribal women's reproductive health as ecological resources enable them to make the decisions leading to improvements in reproductive health. In the light of Sen's capability approach, findings of the current study suggest that, tribal women achieve the ability to make better choices with respect to their reproductive health provided they are not displaced, and they have access to natural resources.

In our proposed model we predicted significant effects of economic, social, and ecological resources on the tribal women's reproductive health through the mediating factor of power. We had seven hypotheses that predicted significant associations between these variables in the model. The study yielded mixed results from the two statistical methodologies used in data analysis. The path analysis method strongly supported five of the seven hypothesized paths yielding a partial model fit. Tribal women's social opportunity, economic opportunity, and ecological resources have significant effects on their power. Hypothesized model paths between reproductive health and other variables were supported except the direct effects of economic opportunity and power on reproductive health. Since power did not have a significant effect on reproductive health, we tested a reduced form model that excluded power

factor. Path analysis of reduced model also supported the model partially. All the hypothesized paths except the direct effect of economic opportunity on reproductive health were validated.

Similar to the findings of path analysis, the structural equation modeling (SEM) also supported the proposed model partially. SEM results supported the expected direct effects of economic opportunity, social opportunity and ecological resources on tribal women's reproductive health. Hypothesized effects of economic opportunity, social opportunity and ecological resources on tribal women's power were not supported. Contrary to the hypothesized positive effect of economic opportunity on reproductive health, SEM analysis found a significant negative effect. Moreover, expected effect of power on reproductive health was not supported as well. Subsequently, we reduced the model by dropping the power factor, and reevaluated the structural equation model of reproductive health. The reduced model found partial support; the hypothesized effects of social opportunity and ecological resources on tribal women's reproductive health were found significant at the .05 level. Similar to the full model, the effect of economic opportunity on reproductive health was not supported by SEM of reduced model.

This study found partial support for our proposed model using both path analysis and SEM. Analyses of result suggest that power of tribal women does not have significant effect on their reproductive health. Power was expected to be a mediating factor having significant causal correlations with social, economic, and ecological components of the tribal women's reproductive health. Such significant relationship between power, reproductive health and its socioeconomic and ecological correlates were not supported. Instead, it was found that the independent variables had direct effect on tribal women's reproductive health. Tribal women's power did not have significant effect on their reproductive health. Exclusion of power factor from the model changed neither the strength of the effects of remaining determinants nor their directions.

Based on these findings we do not suggest deemphasizing power as a reproductive health factor. Findings of our study supports the prior empirical studies indicating influence of gender-based power in the reproductive and sexual decision-making practices such as decision of contraceptive and condom use (Harvey, Bird, De Rosa, Montgomery, & Rohrbach, 2003; Loue, Cooper, Traore, & Fiedler, 2004). Tribal women's relatively high status (Basu, 1995; Sikdar, 2009) was expected to provide them the capability or right to decide for their own reproductive and economic wellbeing.

Contrary to our hypothesized association, economic opportunity shows an inverse direct effect on reproductive health. Power, the way it has been defined in this study, did not yield the significant effect on reproductive health. However, when power was withdrawn from the model, economic opportunity was not found to have a significant effect on reproductive health implying that, as a mediating factor, power may influence reproductive health. The lack of support for the hypothesized effects of 'power' and 'economic opportunity' can now only be speculated.

The variable of 'economic opportunity' did not yield the predicted effect on reproductive health and the mediating factor of power. Measurers of economic opportunity often assume that opportunities are individualistic in nature and that individuals rather than collective compete to maximize gains and achieve satisfaction. Through the lens of definitions of 'economic opportunity' in the context of an individualistic society, it appears to be difficult to measure this variable in the tribal context which fosters the concept of common resources. Where power of individuals in modernized and civilized societies is determined by his or her skill in competing for resource accumulation, in tribal societies resources are usually shared among its members.

Hence, this study underscores the necessity to revise the theoretical construction of 'power' and 'economic opportunity' for tribal populations.

A preliminary reassessment of the concept of 'power' may focus on its underlying assumptions. First, it is assumed that the amount of power is uniform across various sub-populations. Thus, it is assumed that tribal women in general share the common plight of lack of power among non-tribal groups in the sample. Second, it is assumed that the effect of power is linear. If the first assumption is not valid, it is likely that the groups with high levels of power may enjoy reproductive health outcomes dissimilar to those with low levels of power. Furthermore, it is also likely that effect of power on reproductive health may depend upon the extent of power. The linear effect of power on reproductive health may either become weak or insignificant at high levels of power.

Thus, it is necessary to view tribal women's power through a different lens because of their unique sociocultural features. While women of mainstream Indian society achieve their power through struggling against social customs, culture, and values shaped by patriarchy, tribal women enjoy many rights partly because of their social tradition and cultural practice shaped by the overarching role and influence of communal aspect of tribal life.

Non-tribal women of India, who are predominantly Hindu by religion, also enjoy the benefits of communal life, mainly because of their belongingness to respective social castes. However, power of a Hindu woman largely is shaped by the patriarchal family environment under the strong influence of social customs, values, and gender perspective. Hindu women's power rests in the conflux of relationships within the traditional joint family consisting of members of two or three generations (Roy, 1975).

By contrast, communal aspect in the life of a tribal woman is broader than that of non-tribal woman. Tribal women have a strong and direct role in the communal life than her non-tribal counterpart. Tribal women's power therefore, should be conceptualized and understood in the context of overarching communal solidarity and egalitarian values that compels its members to share resource and power among them (Roy, 1975). In such an egalitarian socioeconomic system women are entitle to have power as a group member, not as a wife or daughter. While Indian modern society struggles to establish gender equality, attain women's freedom, and change attitude toward sex and virginity, tribal women with relatively high or equal status of men, have been enjoying these privileges since ancient age.

Traditional tribal open attitude toward sex (Roy, 1975; Basu, 1999) reflects their liberal viewpoint with respect to 'sexual freedom for women'. In many tribal societies, pre-marital sex is neither a crime nor is prohibited, virginity is not over-priced, and sex is considered as a happy and open part of life (Roy, 1975; Shashi, 1978). So-called sexual right and freedom for modern women which is yet to be achieved by many developed societies, have been conceptualized and implied in tribal societies for thousands of years. Therefore, tribal women's power should be understood in the context of tribal sociocultural attributes and communal solidarity, not in the context of modern societal value of 'individualism' which is viewed by many tribals as a 'great sin' (Shashi, 1978). Focusing on the differences between these two contexts may be useful with respect to power dimension of tribal women.

Theoretical explanation on how power is formed and exercised in modern individualistic society, perhaps, was most elaborately presented by French and Raven (1959), who identified five 'bases of power' referring to the relationship between a social agent and a person. Social agent, who possesses the power, can be a person, a role, a norm, or a group influences the person through an intentional act (French & Raven, 1959). It is intended to examine which of

the power base suggested by French and Raven (1959) can explain the tribal women's power dimension most appropriately.

It is this researcher's view that, because of the non-existing or loosely existing system of political authority among tribal societies, it is difficult to explain tribal women power using any of the five bases suggested by French and Raven (1959). Only the 'legitimate power' may explain tribal women's power and overall power dimension of tribal populations which is constituted by social structure and cultural values (French & Raven, 1959). Legitimate power of a tribal group as a social agent derives from the traditional tribal values of a woman which provides her group with legitimate authority or right to influence her, which she accepts. Legitimate power influences tribal women's reproductive decisions and other aspect of life. However, it should be noted that as the social agent trial groups hold egalitarian gender values.

Other source of power, as theorized by French and Raven (1959), involves coercive power which universally rests with husbands in their ability to mediate rewards or punishments. It would be difficult to assess this source of power in tribal setting because of the firmly established equal status between man and women in tribal societies (Maharatna, 2005; Roy, 1975; Shashi, 1978). Tribal women in general, do not view her husband or domestic partner as a superior social agent who can influence her due to her action. However, tribal women may accommodate power relations with a social agent with wisdom and long experiences of life such as a shaman, or the chief, who is regarded with high status in tribal societies denoting the power on the basis of 'expertise' (French & Raven, 1959). It should be noted that 'expert power' in tribal societies have very limited practical implication since recognition of wisdom and experience is voluntary and is not imposed upon person (Roy, 1975) in tribal societies. It can be concluded that, tribal women's power would be difficult to explain using an individualistic

viewpoint. Hence, it is argued that power of tribal women needs to be understood and measured using a culturally sensitive measures.

The results from this study found support for the expected effects of social opportunity and ecological resources on reproductive health. As tribal women's social opportunities and ecological resources increase, their reproductive health in terms of reproductive capability and well-being also increase. As a composite variable social opportunity (SOC_OPP) is comprised of measures of educational attainment, age at first marriage, and gender perspective of tribal women. It can be inferred that, tribal women's reproductive health improves if their educational attainment increases, they marry at later ages, and their attitudes toward gender become more egalitarian. This finding supports the hypothesized effect of social opportunity on reproductive health based on the assumption of tribal women's relatively high status (Basu, 1995; Sikdar, 2009).

Additionally, ecological resources is a composite variable that reflects the soundness of the surround physical environment such as, condition of the residential houses, accessibility to safe drinking water, tribal women's displacement experience, and, respective group's proximity to mainstream society in terms of information richness and access to healthcare. Hence, the effect of ecological resources on reproductive health should be understood within the context of improvements in surrounding physical environmental conditions, tribal women's displacement experiences, and proximity to mainstream society.

Social opportunity and ecological resources are the two variables in the model that consistently influence reproductive health. This finding in general supports a sustainability approach to reproductive health. Findings from the data analysis strongly support our argument focusing on the sustainability perspective in explaining reproductive health of tribal populations.

Interdependence between tribal's reproductive health and their surrounding ecology affirms the importance of ecological dimension of sustainability in order to ensure the continuation of tribal life. Largely shaped by a symbiotic relationship, ecological dimension is central to the tribal reproductive health because of its strong role in their economic and social life. Within the ecosystem of tribal reproductive health, forest based economy provides tribal women with food and nutrition (Ali, 1980; Menon, 1988; Patel, 1985), and occupation or employment. Surrounding ecology often is central to the tribal social and religious institutes, culture, and health and hygiene practice (Dash, 2002; Menon, 1988). In the context of ecological constraints of the surrounding environment of tribal habitats, this study highlights the utility of a sustainability perspective for explaining the reproductive health of tribal population.

Above discussion on the ecology, as a central dimension of the tribal reproductive health, suggests that, perhaps ecological resource of vulnerable and changing tribal habitats is influencing the hypothesized relationship between economic opportunity and tribal women's reproductive health. Such an assertion is based on the interconnectedness among the social, economical, and ecological dimensions of sustainability. By taking a sustainability approach we can link the low socioeconomic, health and reproductive health condition of tribal populations in India to the deteriorating nature, biodiversity and ecology, and increasing inequality through tribal population's experience of poverty (Mary, 2008).

With very limited access to institutional services and networks provided by the mainstream the society, Indian tribal populations compete for natural resources resulting in ecological deterioration. In many cases, scarcity of resources leads to prodigal extraction of ecological resources by the disadvantaged population (Mary, 2008). In addition, India's rapid-growth seeking industrialization under the market oriented development strategies demand extraction of natural resources from tribal habitats without preserving resources for future

generations. Consumption patterns of India's newly emerging middle and upper classes increasingly resemble Western-standard of living resulting in increasing disparity and inequality in the society. Tribal populations in India, particularly the women, are the victims of such emerging consumerism, economic development and growing inequality. A sustainability approach to reproductive health encapsulates all these transitions, which have adverse direct or indirect effects on ecological, social and economic dimensions of tribal populations.

It would be worthwhile to focus on the concept of 'social opportunity' among tribal women. The positive effects of tribal women's social opportunity on their reproductive health in this study were indicated by a number of conditional outcomes: if tribal women have education, marry later, and their gender perspective become more egalitarian, their reproductive health improves. This finding can be interpreted in the context of 'modernization' of tribal communities indicated by the spread of education and increases in awareness among tribal populations in India.

But it is evident that tribal women had been enjoying relatively high female age at marriage, and almost equal status of men as traditional sociocultural features long before the modernization took place (Maharatna, 2005). Thus, causal correlation between tribal women's educational attainment and improved reproductive health should not be interpreted as the outcome of modernization, rather, it should be considered as the intrinsic cultural attribute of tribal societies. Instead, through modernization and assimilation, the influence of the mainstream Hindu community on tribal populations resulted in adoption of several anti-female social customs by many tribal groups such as, early marriage and dowry practice (Roy Burman, 1987; Sachichidananda, 1964).

For example, tribal health practice of birth control using herb (Mutharayappa, 1994), relatively high female age at marriage, longer birth interval, greater female autonomy, and gender equity are attributed to the tribal women's relatively lower fertility as the indicator of sound reproductive health (Maharatna, 2005). These sociocultural advantages of tribal women however, like many other tribal societal phenomena, are currently at risk. Studies have found emerging gender biases among tribal groups in terms of sex ratio and, sex differentials in mortality in many tribal groups across India (Basu, 1999; Rajan, Sudha, & Mohanchandran, 2000; Agnihotri, 2003). Anthropological studies have identified the influence of Hindu tradition and its patriarchal norms and values as factors directing tribal gender relation toward anti-female practices (Chauhan, 1996; Thamizoli, 1997).

Another example of change in communal and sexual lives of tribals due to the influence of modernization is the elimination of '*ghotul*' from many tribals culture (Shashi, 1978). As a major social institution of many tribal groups in India, *ghotul* used to play a vital role in educating tribal adolescents on traditional social customs, culture, and above all sexuality and reproductive health under close supervision of older generation in a dormitory-like community living arrangement (Roy, 1975; Shashi, 1978). Extinction of *ghotul* from tribal societies reflects the outcome of change process experienced by the tribals and consequence of such change process on their reproductive health. Existence of *ghotul* in pristine tribal societies denotes the practice of 'equity transfer' to coming generation – a core component of sustainability. Elimination of '*ghotul*' indicates the magnitude of change in reproductive health practice of tribal populations in India.

Significant influences of social and ecological factors on reproductive health indicates the importance of maintaining and sustaining sociocultural practice, customs, structures and physical environment of the tribal habitats. By maintaining and sustaining these factors, it is not

necessary to denounce change or transformation of tribal population, rather, we advocate for a change initiated by the tribal population. At this point, it is noteworthy to discuss, what approach should be taken to improve the reproductive health of tribal population. Should we take the approach to 'No change' and let them struggle against adverse forces? Or, should we attempt to modernize the tribal populations through intervention such as assimilation? This has been the focal point of debate within the tribal policy issues for years.

The adverse consequences of interventions to modernize tribal populations through assimilation process have been noted since the emergence of tribal policy issues in India under British Raj. Historically, the policies dedicated to the 'welfare of tribals' can be grouped into two schools of thought led by the 'isolationist' opposing the 'interventionists' (Ghurey, 1980). Eminent British writer and anthropologist Verrier Elwin who spent a significant portion of his life among the tribals in the forest championed the isolationist school. Also labeled as 'protectionist', this school criticizes and opposes the 'unregulated' rapid process of uplifting or transforming the tribals resulting in 'emasculatation' of tribal life (Ghurey, 1980; Guha, 1996). Influence of mainstream society through assimilation process is considered unfavorable to tribals that hamper their solidarity, destroy their sociocultural institutions, subsistence economy and consequently result in an 'acute psychological trauma' (Ghurey, 1980; Guha, 1996). The isolationist school advocates for establishing reserved geographical areas for tribal populations in order to protect their habitats in their own way.

Interventionists, on the other hand, take the role of an 'expert' and suggest remedy to improve the socioeconomic condition of the primitive 'aborigines'. Prominent among the scholars of this school, A. V. Thakkar identified several problems of 'adivasis' such as, poverty, illiteracy, ill-health and lack of leadership (Ghurey, 1980). By taking a 'problem solving' approach, scholars of this school has been suggesting different strategies to improve the overall

condition of tribal populations, such as, facilitating modern medical treatment, and, educating about hygiene practice. Needless to say, interventionism has been shaping tribal welfare policies because of ideological acceptance of interventionism among scholars and policy makers.

However, the lack of attention to the tribals' right of 'self-determination' by the both school of thoughts needs to be underscored here. Both schools historically have ignored this concept, even though Dr. Hutton, the Commissioner of the Indian Census of 1931, coined this idea as early as in early 1930s by suggesting 'create self-governing tribal areas with free power of self-determination'. However, this approach to providing tribal populations with power of self-determination has not been very popular among the policy makers, and was never given a serious consideration.

It appears that, tribal populations of India have to make a choice between two options, either they are to assimilate into mainstream population seeking refuge in new socioeconomic institutions, modern lifestyle, or, they have to fight and protect their tribal world in the nature. This dilemma is the outcome of centuries long change process in India which has been forced upon the tribals (Roy, 1975). It is difficult to reach a verdict on whether such change has brought any good for the tribal population, however, it is obvious that remarkable progress of India society since ancient age has been the cause of decimation of tribal habitats in forest, destruction of their subsistence economy, elimination of their history, folk, and wisdom, and often, extinction of a whole tribe and its culture (Roy, 1975). This study underscores reproductive health as one such constituent of tribal life that has been going through transition because of changes in health practice, lifestyle, diet and nutrition, and in many other aspects of tribal life.

In the context of rapid destruction of tribal habitats and ecology, decimation of struggling tribal social and cultural resources, ongoing political unrest in tribal regions, and socially marginalized position of the tribal population, facilitating tribal populations with the right of self-determination is strongly recommended. It is the overall understanding of the current researcher from this study that, it is very important not to impose any 'social change process' with a view to 'uplift' the tribal populations, or, 'develop' or 'improve' their reproductive health and overall socioeconomic condition. Objectives of the change, and, the change process, should be designed and determined by the tribal populations. The change or transformation toward a better health and a better life should come from the initiatives of tribal populations. Interventions should principally aim at facilitating necessary resources and utilities to the tribal populations upon demand.

In conclusion to the discussion of this study it may be inferred that this study establishes ecological dimension as an essential factor of tribal women's reproductive health. It also validates the embedded implicit network of mutual interaction and interrelation between tribal populations and their surrounding natural ecology.

Limitations of Study

Limitations of this current study broadly fall into two groups. Some of these limitations are oriented to theoretical frameworks, while other limitations are mainly methodological.

Three key methodological limitations of the current study design deserve mentioning. First one relates to the sampling of NFHS-3, which is not designed exclusively for tribal population. Habitats of many tribal communities are located in very remote areas throughout India which are difficult to access. Even though NFHS-3 inquired on tribal population's health,

this survey did not select tribal participants purposively. There are possibilities that very remote tribal areas were not surveyed because of the difficulty in accessibility. It is very unlikely that proposed sample of current study will be representative of all the tribal population of India.

The other limitation of the current study design relates to the survey instrument used in NFHS-3. The questionnaire used for NFHS-3 was designed for general population of India. Current study uses data on tribal population using NFHS-3 survey instrument which might have excluded vital information with respect to their reproductive health. Because of their uniqueness in lifestyle, culture, and societal perspective, it is crucial to obtain information on tribals through a culturally sensitive instrument. Hence, information collected on tribals through the NFHS-3 may lack comprehensiveness because of this shortcoming.

With an overall Cronbach's alpha of .075, the internal consistency reliability of the measure of variables indicates poor reliability of the measurement scale. Since, these scales are theoretically constructed we decided to use the composite scale in the current study. However, it is acknowledged that this study's findings may have been affected by this limitation in measures.

With reference to theoretical limitation, it should be noted that, theoretical model of current study has not been developed on the basis of a particular theory, rather, it is a synthesis of ecosystem perspective, Sen's capability approach, and sustainability perspective. Use of multiple theories compromises the parsimony offered by single theoretical perspectives. Even though ecosystem theory provides us with a holistic integrated perspective, because of its meta theoretical nature, it is considered as a theory difficult to be tested empirically (Forder, 1976; Payne, 2005). Hence, ecosystem theory may have limited ability to explain the variations in the reproductive health of tribal women.

Another major criticism of ecosystem perspective relevant to this study is that, we have assumed all interdependent systems as open systems, which may not be true in all tribal contexts. Finally, as Siporin (1980) criticized ecosystem theory for ignoring the incompatibilities of class interest, the current study's theoretical model may have failed to capture the tribals' experience of thousand years' long oppression and exploitation on the basis of social class.

The major criticisms of Sen's (1992, 2002) capability approach to reproductive health relevant to this study are the incompleteness and underspecification of the theoretical framework (Alexander, 2008, Alkire, 2002). Sen is criticized for narrowly specifying the set of capabilities (Alkire, 2002) which makes evaluating and prioritizing 'capabilities' difficult due to lack of specific guidelines. In addition, Sen is also criticized for modifying and 'downgrading' the concept of 'capability' while referring to the concept of 'freedom' in order to reach larger audiences (Gasper & Staveren, 2003). These theoretical limitations in Sen's theory are threats to the validity of the operationalization of variables in the current study. Due to lack of adequate guideline in Sen' theory, operationalizing reproductive 'capability' and 'well-being' largely depended on researcher's interpretation of Sen's theory which might have resulted in selection bias from 'misinterpretation of theoretical constructs'.

Similarly, selection of items to operationalize the constructs of social, economic, ecological resources and power might have been affected by researcher's personal preferences, values, and background (Dejong, 2006), posing threat to theoretical objectivity, validity, and generalizability of constructs. Tribal women's power needed to be operationalized with culturally compatible theoretical constructs. However, to minimize such selection bias, all identified scales of the model were validated using confirmatory factor analysis.

Social Work Implications

With a population over one billion, India is the habitat of about 150 million tribals. Like many other countries, reproductive health of such a large marginal population is in demand of serious attention and resources [from the state of India] which is underscored in the assessment of the United Nations Permanent Forum on Indigenous Issues (2006):

“Indigenous and tribal peoples are lagging behind other parts of the population in the achievement of the [Millennium Development] goals in most, if not all, the countries in which they live, and indigenous and tribal women commonly face additional gender-based disadvantages and discrimination.”

Current study can advance the knowledge base of sustainability aspect of social work, and contribute to the policy perspective with respect to reproductive health of marginal populations in developing countries. Another major implication of current study for the knowledge base of social work is the finding that corroborates that environment is not only a context as dominantly considered in person-in-environment perspectives (Mary, 2008).

Studies on reproductive health so far have examined this concept principally from demographic perspective. This study offers a holistic perspective that relates reproductive health to the various social, economic, and ecological factors and explains how these factors influence the ‘power’ of women with respect to their reproductive decision in marginal populations of developing countries. This study examines the effects of socioeconomic opportunities and ecological resources on the reproductive health of tribal women in India from a sustainability perspective which is deeply rooted in social work theories, practice methods, values and ethics.

Strong association between poverty and reproductive health demands professional interventions by social work practitioners in micro and macro levels. A sustainability approach to

reproductive health suggests empowering tribal women with respect to reproductive decisions with a view to ensure common interest of tribals and 'equity transfer' through healthy reproduction. This can be achieved only by implementing 'social justice' – a core principle of social work that promotes human rights. This study can be a resource to identify the scope of implementing the principles of social justice and human rights in the area of tribal reproductive health.

Findings of this study can be used as evidence to formulate reproductive health policy for tribals and similar marginal populations in developing countries. This study also can provide evidences to design a comprehensive or holistic health program for tribals and similar marginal populations to maximize their access to reproductive healthcare. This study also can corroborate the necessity for reforming legal policies with a view to eliminate the discrimination against tribals and similar disadvantaged population with respect to health, reproductive health, and socioeconomic conditions. The findings can address the necessity to involve the tribals as a major stakeholder in formulating and implementing policies of reproductive health emphasizing the relationship between tribals and their habitats as an integral component. This study caters to the need for evidences with respect to significance and magnitude of variables that influence reproductive health in India. Government could offer effective interventions to increase women's reproductive health knowledge and behavior in India.

This study opens new directions for further research to advance and strengthen social work research methodologies such as: designing a survey exclusively for tribal population. Current study uses data on tribal population extracted from NFHS-3, which may have excluded vital information on tribal reproductive health. Because of their uniqueness in lifestyle, culture, and societal perspective, it is crucial to obtain information on tribals through a culturally sensitive instrument.

A future study may focus on the finding from current study that shows no significant effect of economic opportunity on tribal women's reproductive health. In the context of vulnerable tribal social, economic, and ecological context it is crucial to learn the implicit nature of the associations among these reproductive health factors. Hence this study opens the scope of more quantitative and qualitative study to collect data on tribal reproductive health.

Conclusion

In this study, I have attempted developing a theoretical model to test the associations between social, economic and ecological factors of reproductive health mediated by tribal women's power with respect of reproductive decisions. This study validates the importance of ecological factors of reproductive health of tribal populations in India. Proposed model of current study establishes the necessity of sustainability perspective in understanding reproductive health.

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