REPRODUCTIVE HEALTH IN YEMEN: A THEORETICAL APPROACH

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Several developing countries introduced family planning programs to reduce their population growth rates. The rapid spread of birth control programs in the developing countries was at times accompanied by measures which violated human rights. In response to the ethical violations and coercive policies on population control, toward the end of 1980s various international committees formulated a reproductive health approach to overcome the limited population control approach. Unlike other population control programs, the focus of reproductive health program is on "reproductive process," where as the most immediate focus of family planning programs is on fertility.

Although studies refer to reproductive health approach as an extension of fertility control approach, literature on reproductive health provides very few systematic approaches toward developing explanations of reproductive health. The current approaches on population control are influenced by the ideological shift towards a broad-based approach which involves fertility or family size as one of the components of reproductive health. The present study uses intermediate variables framework suggested by Davis and Blake to organize reproductive health explanations. The proposed framework suggests that the state of reproductive health is indicated by intercourse, conception, and gestation variables and assumes that reproductive health is a latent dimensional outcome indicated by the measures of the intermediate variables. Also, there is noticeable lack of studies on reproductive health in Muslim countries. Given this

shortcoming in the literature on reproductive health, the proposed model on reproductive health is used to assess the reproductive health of women in Yemen. The data are from the Yemen Demographic and Maternal and Child Health Survey (YDMCHS) conducted in 1997. Structural equation analysis is used to analyze the data. It is found that gender power or women's empowerment is more influential than economic status in determining reproductive health outcomes. The results of the study provide support for the proposed model. Implications for social policy making are discussed.

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CHAPTER 1

INTRODUCTION

During the late 1950s, the international community was concerned about the rapidly increasing population, particularly in developing countries, and the importance of fertility control measures to control population growth. In order to control this situation, several developing countries introduced family planning programs emphasizing the importance of using contraceptives. Studies indicate that family planning programs have significantly reduced fertility in developing countries since the 1960s. However, during this time there was a growing concern about the ethical issues of population control programs (Westoff, 1994; Bondestam, 1980).

The population control metaphor normalizes coercive policies in several developing countries. The coercive "one-child policy" in China (Cheng and Rajulton, 1992), the legislative policies in Singapore, and the sterilization policies in India in 1970s, are among the few. In countries without coercive population control policies, population control programs often lead to ethical violations. These countries view basic human rights as less important than the goal of fertility regulation. The use of financial incentives is a good example of ethical violations in population control metaphor. Financial incentives were given to acceptors of contraceptives, who may have been influenced by the payments to undergo procedures that they would not otherwise have chosen (Cleland and Mauldin, 1991; Sunil, Pillai, and Pandey, 1999).

In response to the above mentioned ethical violations and coercive policies, toward the end of 1980s, various international communities – The Ford Foundation, the International Women's Health Coalition (IWHC), The Population Council, and the World Health Organization (WHO) – conceptualized a "reproductive health" approach that could replace the limited, and potentially abusive, "population control" approach (Fathalla, 1991; Ford Foundation, 1991; WHO, 1989; Germain, 1987).

There is a vast amount of literature on the reproductive health situation in developing countries. Researchers, particularly demographers, have contributed to the discussion on the differentials in the reproductive health situation. These differentials include urban/rural, illiterate/literate, developing/non-developing countries, and so on. One of the major characteristics considered in this discussion involves comparison of reproductive health between Muslim and non-Muslim countries. Such consideration of differentials between Muslim and non-Muslim countries is common even in the fertility literature.

There are a number of reasons why religious affiliation is a particularly worthwhile dimension in the investigation of fertility differentials. First, in many countries, (e.g., Ireland, India, Israel, Philippines, and Lebanon) it is a characteristic that has immense social, economic, and political significance. For example, Yaukey (1961) described that in Lebanon, religious affiliation is the single most important characteristic defining group status.

Second, religious affiliation has considerable theoretical bearing on fertility. A couple's religious status connotes a system of values that can influence fertility via two routes: (1) directly, by imposing sanctions on the practice of birth control or legitimizing

the practice of less effective methods only; or (2) indirectly, by indoctrinating its followers with a moral and social philosophy of marriage and family that emphasizes the virtues of reproduction (Westoff, 1959).

Third, substantial religious differentials in fertility have been empirically documented in a large number of countries even in the early sixties. For example, Yaukey (1961) in Lebanon, Rizk (1963) in Egypt, Matras (1973) in Israel, Mazur (1967) in the Soviet Union, Rizk (1973) in Jordan, Sinha (1957) in India, Caldwell (1968) in tropical Africa, and Kirk (1967) in Malaysia, Albania, and Yugoslavia, all found significantly higher fertility rates for Muslims than for non-Muslims.

In the West, religious affiliation has also been found to have significant effect on fertility. In Europe, Canada, the United States, South Africa, Australia, and New Zealand, studies have shown that Catholics have higher fertility than non-Catholics (Ryder and Westoff, 1971; Chou and Brown, 1968; Glass, 1968; Nixon, 1963). Studies conducted in western societies suggest that Catholics have higher fertility than Jews or Protestants, with Jews having the lowest fertility of the three groups. However, there have been puzzling exceptions to this pattern. For instance, Yaukey noted similar fertility levels for Muslims and Christians in rural areas of Lebanon. Rizk (1963) also found this to be the case in rural Egypt. Busia (1954) noted no differences between Muslim and Christian fertility in Ghana. Driver (1963) discovered no significant differences between Muslim and Hindu fertility in India. A possible explanation for such mixed results is that the effect of religion on fertility is generally complicated by the simultaneous effects of other variables that are difficult to adequately control for. In order to ascertain properly the effect of religious affiliation on fertility behavior, a unique body of data is required.

Studies have summarized several reasons for the high fertility of the Muslims compared to other religious groups. They include, 1) the high degree of tenacity with which old beliefs and practices are maintained by Muslims, 2) the persistent resistance among Muslims against change and modernity, which are identified with Christianity, 3) conformity to religious and social practices, which are so closely interwoven in Muslim life, 4) the strong patrilineal and patrilocal quality of the Muslim family, with male dominance and responsibility prescribed by the Koran, 5) the belief that pleasures of flesh, and especially sexual intercourse, are a God-given virtue to be enjoyed and a conjugal obligation to be fulfilled, and 6) the unusually subordinate place of women in Muslim society. Omran (1973) also suggests that in order to understand the high fertility of the Muslims, greater emphasis should be placed on the existing conditions in their countries rather than on the doctrines of Islam.

Major Gaps in Reproductive Health Literature

Reproductive health is defined as the condition in which the reproductive process is accomplished in a state of complete physical, mental and social well-being and is not merely the absence of disease or disorders of the reproductive process. That is, reproductive health implies that people have the ability to enjoy sexual relationships. It further implies that reproduction is carried to a successful outcome through infant and child survival, growth and healthy development. It finally implies that women can pass safely through pregnancy and childbirth, that fertility regulation can be achieved without health hazards and that people are safe in having sex. In other words, reproductive health implies that people are able to have a satisfying and safe sex life and that they have the

capability to reproduce and the freedom to decide if, when and how often to do so. "Implicit in this last condition are the right of men and women to be informed and to have access to safe, effective, affordable and acceptable methods of family planning of their choice, as well as other methods of their choice for regulation of fertility which are not against the law, and the right of access to appropriate health-care services that will enable women to go safely through pregnancy and childbirth and provide couples with the best chance of having a healthy infant" (United Nations, 1995a, p.15).

One of the most significant changes in current views on population growth as a factor in reproductive health took place at the 1994 International Conference on Population and Development (ICPD). For the last five decades, family planning policies and programs formed the foundation for global control of population growth. The ICPD broadened this narrow view of population control to include individual health and explained that population growth can be controlled by women's advancement socially, politically, and economically. The view was endorsed by some 180 national delegations at the conference regardless of the differences in cultural and religious identities. The Cairo Program of Action (1994) recognizes reproductive rights as human rights, which ensure reproductive and sexual health, bodily integrity, and the security of the person. In this regard, the state is entrusted with the crucial responsibility of bringing about legal reforms in support of rights, which remove gender based barriers.

The emergence of the reproductive health movement has recently met with resistance from population control programs. The proponents of the reproductive health approach support the development of reproductive health programs based on clinic-based which links to primary health care, which is poor in many developing countries. On the

other hand, this approach did not give importance to the existing community programs, which have adequately demonstrated their effectiveness in controlling fertility in developing countries. Thus, several studies present reproductive health more in the line of clinic-based characteristics and fail to incorporate factors that influence fertility control. The difference in strategies for achieving reproductive health and fertility control stem from the view that the two factors, reproductive health and fertility control, are caused by significantly different sets of factors. Given the recent history of the reproductive health movement, there are very few empirical studies which have examined the determinants of reproductive health. The assumption that factors which influence fertility are poor predictors of reproductive health has not been adequately and empirically tested. This shift towards reproductive health is in agreement with the feminist model of reproductive health. An approach to ameliorate reproductive health around the world, particularly in developing countries, from a feminist perspective requires ensuring reproductive rights of women.

Hendriks (1995) identifies the 1980s as the turning point when policy makers, scientists, and women's health and rights activists began to acknowledge the intrinsic relationship between health and human rights. Women's health advocates argue that population control policies and family planning programs should protect personal integrity and provide more holistic approaches to women's health services, particularly in the area of reproductive health (Garcia-Moreno and Claro, 1994) at the expense of the current preoccupation with achieving quantitative goals. A 1991 report by the World Health Organization (WHO) and the International Women's Coalition suggest that improvements in women's reproductive health inevitably involves empowering women

to have control over their own fertility and sexuality under conditions of voluntary choice and minimum health problems. The effect of these policies on reproductive health is often mediated by a set of structural and value-related variables, which create conditions of gender inequality. Feminist demographers have begun to address this issue by asking how a reproductive health approach might be the basis for responsible population policies (Dixon-Mueller and Germain, 1994) and what feminist population policy might look like (Berer, 1993). Literature on the feminist approach on reproductive health is widely scattered with respect to explaining different dimensions of reproductive health and thus is not systematic. The effects of gender-related biases on reproductive health remains under-investigated empirically. In addition, available studies by feminist scholars on reproductive health "have been case studies and have not engaged the conceptual frameworks and empirical finding of the mainstream literature" (Orloff, 1993, p.304).

Another major gap in the literature on reproductive health is the lack of measurement scales for testing and assessing women's reproductive health status. The lack of a standard measurement is problematic for several reasons. First, in the absence of valid measures of reproductive health, existing empirical findings may not be generalizable and reliable. Secondly, development of valid measures paves the way for future theory construction. Finally, the absence of reproductive health indicators may lead to ignoring the problems that need our attention and social actions (Pillai and Wang, 2001). One reason for inadequate attention to reproductive health stems from a lack of a theoretical approach toward selecting indicators of reproductive health.

Research Problem

In sum, the current theoretical approaches toward population control are influenced by the ideological shift towards a broad based approach which involves fertility or family size as one of the components of reproductive health. In this regard, several scholars suggest that the current theoretical approaches to population control are of limited use in understanding reproductive health. However, as mentioned earlier, the assumption that factors which influence fertility are poor predictors of reproductive health has not been adequately empirically tested. Secondly, the feminist scholarship on reproductive health has criticized the current focus on limited availability and accessibility to birth control. Feminist scholars have consistently pointed out the role of political and social constraints on women is reproductive health. However, these suggestions have not been adequately incorporated into an empirical model of reproductive health which pays attention to the process of reproduction involving sexual unions, conception, and gestation. Thirdly, as mentioned earlier, there are several measurement issues with respect to reproductive health which have not been adequately addressed. One reason for inadequate attention to reproductive health stems from a lack of theoretical approach towards selecting indicators of reproductive health. Finally, there is a noticeable lack of studies on reproductive health in Muslim countries. The role that religion place a crucial role in understanding the value basis of reproductive health, Islamic societies provide a rich research site to understand the role of social institutions on reproductive health. It is well known that the Islamic religion has well-defined directives on various aspects of fertility and reproductive health.

Given these shortcomings on reproductive health in the literature, the present study has two major research objectives. First, the present study will develop a theoretical framework to explain the reproductive health situation and will apply this theoretical framework to assess the reproductive health of women in Yemen. Second, following the WHO definition of reproductive health, the present study will derive a measurement scale to test and assess women's reproductive health status in Yemen.

CHAPTER 2

LITERATURE REVIEW

Consistent with the major studies on reproductive health, the related literature is reviewed in four sections. The first section presents a review of the major studies of different measures of fertility decline. This section is followed by the major social and structural theories on fertility. This section describes an overview of studies, which have used major social and structural theories on fertility decline. The major economic theories on fertility decline are reviewed in the third section. The last section includes studies emphasize the non-economic framework to explain fertility change. However, studies seldom referred fertility theories to explain reproductive health, even though reproductive health is considered as an extension of fertility control approach.

Measures of Fertility Decline

There is an enormous amount of literature that use different measures to explain fertility. All of these measures reflect different aspects of the fertility situation of the region explained. Most of these measures are introduced with the limited availability of data and some other measures are used to capture the mechanism involved in fertility decline in a given region. One of the major indicators used in fertility analysis is the total fertility rate (TFR). TFR is defined as the average number of children born to a woman during her reproductive period which is usually referred to as 15-49 years of age. This measure is considered to be a period measure of fertility since it represents a cross section

of the population at one specific time. There is a huge volume of literature available which used TFR as an indicator to measure fertility (Bogue, and Palmore, 1964; Sanderson, 1979; Bongaarts and Greenhalgh, 1985; Ryder, 1990; Golini, 1998). Another indicator commonly seen in the fertility literature is children ever born (CEB). It is the actual number of children ever born to a woman (Myburg, 1956; Gaisie, 1969; Knodel, 1978; Gubhaju et al., 1987). The introduction of the concept of birth interval is a major breakthrough in the measurement of fertility (Potter, 1963; Srinivasan, 1966; Sheps, 1964). Two major types of birth intervals are used to study fertility namely, open birth intervals and closed birth intervals. Open birth intervals are defined as the duration of time between the last live birth and the survey date for any married woman in the reproductive age group at a particular point in time. The duration between consummation of marriage and birth of first child is termed as closed birth interval. The duration between two consecutive births is also termed as closed birth interval. One of the major advantages of using birth interval measures over other measures is that it is relatively more sensitive to capture small changes in the fertility levels and insensitive to factors that are not pertinent to fertility change in a population (Srinivasan, 1966). Several studies used these concepts to see the changes in fertility levels (Srinivasan, 1968, 1970; Koenig et al., 1990; Palloni, 1984; Smith, 1985; Feeney and Ross, 1984; Guilkey, 1988; Trussell et al., 1985).

Several probabilistic and abstract concepts are also used to measure fertility. One of these concepts used to measure fertility is called parity progression ratio (PPR). It is defined as the 'probability that a married woman reaching parity "*i*" will ever progress to parity "*i+1*" in her reproductive span" (Srinivasan, 1970, p.401). Several studies have

adopted this probabilistic concept to measure fertility levels (McClelland, 1979; Sheps and Perrin, 1964; Rodriquez and Trussell, 1981; Feeney, 1983; Feeney and Yu, 1987). One of the advantages of this method is that it measures both the quantum and tempo of fertility in a society. That is, this measure takes into account the proportion of women moving from a lower parity to a higher parity as well as the rate at which women are progressing to a higher parity.

Studies have also used several other fertility indicators such as marital fertility rate (Knodel, 1979; Tolnay, 1981; Cleland and Rodriguez, 1988), which is defined as the number of children born to married women in the age group 15-49 and crude birth rates (Guest, 1974; Nortman, 1978; Yi et al., 1991). Overall, the indicators of fertility discussed above always measured a single outcome of the reproductive process namely, the children ever born. On the other hand, the concept of reproductive health takes into consideration all the aspects of reproductive process. Following section presents the major social and structural theories on fertility.

Major Social and Structural Theories on Fertility

There are several structural theories on fertility. For the present study, I reviewed the three major structural theories in fertility, which are in many ways related to one another. One of the earliest developments in explaining fertility levels was introduced by Kingsley Davis and Judith Blake (1956). These authors first introduced the so-called "intermediate variables" to explain fertility levels in any society. These pioneers set forth and utilized an analytical framework to explain changes in levels of fertility in industrial and non-industrial countries. The intermediate variable framework, for the first time,

provided a systematic approach to organize the causal influences of socio-economic, cultural, and environmental determinants of fertility through well-known biological determinants of fertility. The framework was developed under the basic assumption that the process of human reproduction involves three biological stages, namely, intercourse, conception, and gestation and parturition (Davis and Blake, 1956). These three broad stages are represented by eleven variables often called the intermediate variables. Thus, the basic argument is that any cultural factor that affects fertility only through one or another of these eleven intermediate variables. These eleven intermediate variables as presented in Davis and Blake (1956) are as follows.

I. Factors affecting exposure to intercourse (Intercourse variables).

A. Those governing the formation and dissolution of unions in the reproductive period.

1. Age of entry into sexual unions
2. Permanent celibacy: proportion of women never entering sexual unions
3. Amount of reproductive period spent after or before unions
    a. when unions are broken by divorce, separation, or between unions
    b. when unions are broken by death of husband

B. Those governing the exposure to intercourse within unions

4. Voluntary abstinence
5. Involuntary abstinence (from impotence, illness, unavoidable but temporary separations)

6. Coital frequency (excluding periods of abstinence).

II. Factors affecting exposure to conception (Conception variables).

7. Fecundity or infecundity, as affected by involuntary causes
8. Use or non-use of contraception
    a. by mechanical and chemical means
    b. by other means
9. Fecundity or infecundity, as affected by voluntary causes (sterilization, subincision, medical treatment, etc.)

III. Factors affecting gestation and successful parturition (Gestation variables).

10. Foetal mortality from involuntary causes
11. Foetal mortality from voluntary causes.

Several theoretical developments were introduced by researchers since the introduction of the intermediate factors of fertility. For example, Bongaarts (1978) refined the intermediate variable framework by reducing the number of determinants. The eleven intermediate variables developed by Kingsley Davis and Judith Blake had proved difficult and led to complex fertility models. To overcome this, Bongaarts suggests that variation in human fertility can be accounted for by four proximate determinants of fertility instead of eleven intermediate variables, such as proportion married, use of contraceptives, incidence of abortion, and involuntary infecundity (Bongaarts, 1982). By introducing proximate determinants of fertility, Bongaarts argued that if all women remain married throughout their reproductive period, had no induced abortion, experienced no lactational infecundity, and used no contraception then they would achieve their maximum fertility level (which is approximately 15.3 children). Thus, the

only ways to have fertility levels below the maximum capacity, according to Bongaarts, depends on the extent of lactational infecundity, induced abortion, contraceptive use, and delayed marriage, marital disruption, or long-term spousal separation (Moreno, 1991). Bongaarts, thus, introduced four factors which influence the reduction of fertility namely, index of non-marriage (C_m), index of contraception (C_c), index of lactational infecundity (C_i), and index of induced abortion, (C_a). Thus, the observed total fertility of a population, according to Bongaarts, is the product of all these indices. That is,

$$TF = 15.3 \times C_m \times C_c \times C_a \times C_i$$

A substantial number of demographic studies have used the proximate determinants framework to understand the change in fertility levels in a society (Freedman, et al., 1981; Hugo et al., 1987; Warwick, 1986).

Ansley Coale (1973) suggested three preconditions for a subsequent fertility decline. They are (1) the acceptance of calculated choice as a valid element in marital fertility, (2) the perception of advantages from reduced fertility, and (3) knowledge and mastery of effective techniques of control. According to Coale, although the societal changes that produced mortality decline may directly influence fertility decline, they will do so only if the three preconditions exist. Coale's indices of fertility introduce an advantage of making historical comparisons of fertility levels. According to Coale, the overall index of fertility (I_f) is the product of proportion of married female population (I_m) and the index of marital fertility (I_g) and it is denoted as

$$I_f = I_m \times I_g.$$

The index of marital fertility is calculated as the ratio of marital fertility in a particular population to the marital fertility rates of the Hutterite population.

Although reproductive health is considered as an extension of fertility control approach, the possibility of broadening these theoretical explanations to incorporate reproductive health agenda is seldom attempted. In addition to structural theories on fertility, there are several economic theories to explain fertility. The following section reviewed the major economic theories used to explain fertility change.

Major Economic Theories on Fertility

The economic framework is one of the dominant explanatory paradigms in fertility and family planning studies, originates from the work of Leibenstein and Becker in the late 1950s and early 1960s. The basic argument of economic framework is that fertility is a result of conscious decision and deliberate purposeful action (Robinson, 1997). Under this assumption, Leibenstein (1957) argued that families balance utilities against disutilities ascribed to an *nth* child to determine whether a family wanted an *nth* child. Becker (1960) reformulated this idea by adapting household production function paradigm, thus linking it to other household economic processes, including labor force participation and consumption. This extended model is usually referred to as the household production model (Schultz, 1981) and is basic to contemporary micro-economic theory.

The most widely used and fundamental principle of any economic framework assumes that children are consumer durable, an increase in income is likely to increase fertility. This idea was first introduced by Blake (1968). The theoretical framework, new-home economics approach assumes that the interests and power of the sexes within the family units are identical, even if their roles are not (Schultz, 1974). The new-home

economics model provides a necessary analytical framework to study the non-market allocative decisions, especially those related to the production of children (Nerlove, 1974; Willis, 1973). The theory was first developed in its modern form by Gary Becker (1965) and others, and an extended model was introduced by Schultz (1981). The basic premise of the new-home (or household) economics approach is to explain the way in which investment in human capital increases the value of human time. This increase in the value of human time changes the resource constraints and relative costs and prices which "households" face in their decisions regarding the number and quality of children they attempt to produce (Schultz, 1981).

Household income hypothesis assumes that as income rises, consumption of goods and services increases. Thus, assuming children are consumer durables, an increase in income is likely to increase fertility (Blake, 1968). That is, a rise in average income is said to increase an individual's aspirations for social advancement, their desire for their goods increases, which then competes with the number of children for family resources and eventually reduces the number of children people want. In this situation, according to Becker (1965), individual couples try to balance between "quantity" and "quality" of the children they want. There are several studies, which have empirically tested the new-home economics framework on fertility (Ermisch, 1979; Schultz, 1981). This school of thought, called the Chicago-Columbia, emphasizes that the relationship between true income elasticities for both child quality and child quantity are positive (Becker, 1960, Becker and Lewis, 1973; Willis, 1974). However, several studies have found a negative relationship between income and fertility (Rosenzweig and Schultz, 1985, Shields and

Tracy, 1986). Thus, the “new household economics” theory confined the argument of fertility decline to “demand” for and “supply” of children.

Easterlin (1969) added a supply function to his "synthesis framework" and grouped the explanatory variables into "demand" and "supply" categories. The economic framework was further revised and reformulated by several researchers and economists. Diffusion of innovations theory (Rogers, 1983), Caldwell's (1982) wealth flows theory, and ideational theory enunciated by Cleland and Wilson (1987), and Cleland (1985) are some examples of these modifications.

Easterlin (1975) introduced the supply-demand economic framework for fertility analysis. This explains fertility in terms of three proximate determinants: (1) the supply of children, that is, the number of children the parents would bear in the absence of deliberate fertility limitation; (2) the demand for children, that is, the number of children parents would like to have; and (3) the costs of fertility regulation, that is, the psychic, social and monetary costs. According to Easterlin, the demand for children depends on the choices made by individuals between income, prices and tastes. Variations in income, price and taste, “will cause differences in demand among households at a given time or for a given household over time” (Easterlin, 1975 p. 55). Couples for a balance between the potential supply of children and demand for children. This framework has been tested in several countries by different scholars (McDonald, 1993; Robinson, 1997).

Several studies have adapted these versions or similar versions of economic framework to explain fertility situation. The neo-classical microeconomic theory of fertility (Becker, 1960; Schultz, 1973) emphasizes three proximate determinants of couple's fertility choices, namely, the relative costs of children versus other goods, the

couple's income, and their preferences for children over competing forms of consumption. Studies have also included the exogenous factors that reduce fertility such as women's wages and education (Rosenzweigh and Wolpin, 1980; Montgomery, 1987). Further, economic models incorporated the effects of family planning programs as a way of improving information and reducing the costs of limiting fertility (Rosenzweig and Schultz, 1985; Schultz, 1990).

Caldwell (1982) introduced the wealth flow theory to explain the decline in fertility in Western countries, wealth flow theory. He argued that children are a source of income and support for parents throughout life. The wealth flow, as Caldwell calls it, is the flow of money, goods, services and guarantees that children provide to parents, particularly in traditional societies. The theory argued that, due to modernization, children begin to cost more for parents and the amount of support that parents get from children begins to decline. Thus, the wealth flow reverses and parents begin to spend their income on children, rather than deriving income from, and economic advantage from children. In this situation, considering the economic disadvantage of having more children, parents are forced to opt for fewer children. This leads to higher/lower use of contraceptives in the society. It is true that with development, more and more people will join the ranks of the middle class and therefore will find large family a burden given the reverses in wealth flow. That means the demand for children will go down. With this change in demand for children, the contraceptive use is likely to go up. Thus, Caldwell's theory can be used to argue that as modernization extends globally, socioeconomic development is more likely to increase contraceptive use. Of course it assumes access to free and cheap availability of contraception. The basic premise of Caldwell's argument is

that when the net wealth transfer from children to parents is positive, parents are more likely to have more children because ultimately their income will be increased by having many children. On the other hand, if the children consume more parental wealth than what parents will receive at the end, then parents are more likely to decide to have fewer children. He further argued that prior to modernization children were considered as an asset. However, due to modernization, the cost for rearing children has increased. Several scholars have used this framework to explain fertility change (Handwerker, 1986; Turke, 1989) and were criticized on several grounds (Thorton and Fricke, 1987).

In his "multiphasic response theory," Blake (1968) argued that deliberate use of contraception by married couples was one of many ways for demographic change. He argued that due to economic strain in the household, individuals are forced to change their behavior through postponing marriage, migrating, using abortion, using contraception, practicing infanticide or remaining single. He is also of the opinion that economic strain in the household is increased by modernization and individuals are thus responding to this change in the society by controlling their fertility behavior. This argument is widely cited in the literature and has been modified by several scholars (Friedlander, 1969; Mosher, 1980; Hirschman, 1994). However, this theoretical framework failed to specify the level of modernization required for a specific change in behavior. Also, this explanation did not predict what kind of change would occur in different countries. Further, inconsistent results were shown in different studies. For example, Mosher (1980) reported in his study that the change is predicted when employment in the agricultural sector begins to shrink. Friedlander (1969) showed that the change in marital fertility will be visible only after other responses are tried.

A substantial number of studies have used economic differentials in the household to explain the proximate determinants through declines in fertility (e.g., contraceptive use, marriage, postpartum amehorrhea) have actually occurred (Freedman et al., 1981, Hugo et al., 1987; Warwick, 1986). The relationship between education and exposure to sexual intercourse has been a recurrent theme in the demographic literature (Holsinger and Kasarda, 1976; Cochrane, 1979; 1983; Raff, 1989; Jain, 1981; United Nations, 1987; Cleland and Rodriguez, 1988; Jejeebhoy, 1992). Data from the Demographic Health Survey (DHS) of different countries show that women with at least 10 years of education marry between two and seven years later than those with less than primary education (United Nations, 1996). Later age at marriage among women is also found to be significant in urban areas compared to rural areas.

Studies have also followed the assumption that differentials in men's and women's wages may be expected to have different effects on fertility (Gauthier and Hatzius, 1997). While higher men's wages may be associated with higher family income, and thus higher demand for children, higher women's wages may be associated with a higher opportunity cost and may therefore have the opposite effect on the demand for children. Caldwell (1982) argued that children are a source of income and support for parents throughout life. The wealth flow, as Caldwell calls it, is the flow of money, goods, services and guarantees that children provide to parents, particularly in traditional societies. The theory argue that, due to modernization children begin to cost more to parents and the amount of support that parents get from children begins to decline. Thus, the wealth flow reverses and parents begin to spend their income on children, rather than deriving income from them, the economic advantage from children. In this situation, considering the

economic disadvantage of having more children, parents are forced to opt for fewer children. This leads to high/low use of contraceptives in the society. It is true that with development, more and more people will join the ranks of the middle class and therefore will find large family a burden given the reverses in wealth flow. That means the demand for children will go down. With this change in demand for children, the contraceptive use is likely to go up. Thus, Caldwell's theory can be used to argue that given the modernization extends globally, socioeconomic development is more likely to increase contraceptive use.

Social and economic differentials also influence contraceptive use status. In most developing countries, levels of contraceptive use are substantially higher among urban and well-educated women than among their rural and less educated counterparts (Martin, 1995; United Nations, 1987). Cleland (1985) reports that the only socioeconomic variable that establishes an unmistakable association with contraception is the level of education of the couple. One of the direct consequences of the increase in women's education is the decline in fertility. Women's education is positively related to contraceptive knowledge and use and negatively related to family size in developing countries (Dixon-Mueller, 1993). Both in developing and developed countries, use of modern contraceptive methods increases with the number of years of female education (Lightbourne et al., 1982). On the other hand, fertility differences between rural and urban women are due more to changes in their marital pattern (increase in age at marriage) than to differences in contraceptive practices (Singh, Casterline and Cleland, 1985). Recent statistics show that during the past 10-15 years, the average size of the social differentials in contraceptive practice has changed very little, although this is

partially due to offsetting changes in different countries. Where contraceptive use had been low to start with, differentials usually widened, and the reverse was true in countries where use levels were already high at the earlier date in urban areas or among highly educated women. In addition to factors that may be distorting the income-fertility relationship on the demand side, there are supply factors that may distort the relationship (Borg, 1989). Supply influences on fertility include factors that affect fecundity, such as woman's propensity to have miscarriages or premature births, factors that affect child survival rates, and factors that affect the couple's likelihood of using modern contraceptives. For example, high-income couples are more likely to have higher fecundity and child survival rates due to better access to prenatal and postnatal care (Bongaarts and Menken, 1983; Jacobson, 1991). Also, high-income couples may have better knowledge of and access to effective contraceptives.

Many governments have experienced more problems extending services nationwide due to the public's limited knowledge of and access to family planing than a deliberate policy to restrict access. The situation is more severe in sub-Saharan Africa than in other regions. Though different contraceptives are made available to women, particularly in developing countries through family planning programs, more than 500 million married women now express the desire for access to birth control but cannot obtain methods suitable to their needs (Jacobson, 1991). That is, millions of women are unable to choose contraceptive freely. This leads to women being at a greater risk of unwanted pregnancy, unsafe abortion, or choosing a contraceptive method that does not meet their needs. Thus, in general, the economic explanation on fertility emphasizes

covariates such as women's education, occupation, place of residence, and other household characteristics that influence fertility situation.

Non-economic Explanation on Fertility Decline

There are several non-economic theoretical frameworks used to explain fertility decline. The present section reviews the major explanations in this direction. One of the non-economic explanations of fertility is known as the social justice theory of demographic transition. According to Ratcliffe (1978), the social and economic policies of an egalitarian nature can bring down fertility. He wrote:

> "The social justice theory of demographic transition holds that aggregate demographic behavior, and fertility in particular, is primarily a function of the social, political, and economic context within which the individual (and the individual couple) must live and act. The importance of structural factors is emphasized. For example, the distribution of resources within society will often determine the health levels of different social groups or classes, whether their offspring will survive to maturity or not, and whether they perceive a large or small family to be desirable or necessary. The major theoretical postulate is: to the degrees that all segments of society share in the benefits of the modern, organized sector, mortality and fertility will decline. Those who are denied access to the life-support systems of the modern sector are of necessity forced to view the family as a survival mechanism, and to structure it accordingly. Outside the modern sector, children, and especially sons, are major assets. Without them, children, and especially to survive; with them, there exists at least the chance of prosperity. Given these circumstances, a large family is eminently rational. Within the protective confines of the modern sector, where the nation-state assumes many of the basic welfare and protection functions traditionally fulfilled by children, a large family is unnecessary" (Ratcliffe, 1978, p. 27).

This theory was tested to explain the fertility transition in Kerala State in India. He suggested that high level of education and political consciousness among Keralites was

responsible for the equity in the distribution and consumption of public services. Nag (1982) also used this social justice theoretical framework to understand fertility decline.

The diffusion of innovation approach was another theoretical framework used to explain fertility change (Rogers, 1962). This approach is first used by rural sociologists to study the spread of agricultural innovations. The basic premise of this approach is that human behavior is controlled by innovation of new ideas rather than the rational calculus of costs and benefits. In this respect, diffusion of an idea, such as a small family, would eventually become a norm of the society which would lead to decline in fertility. This approach, like many other approaches, were proved (Brown, 1981; Rogers, 1995) and disproved (Cleland, 1973) by several researchers.

In contrast to economic theories which emphasize costs and benefits (or material conditions) as the basis for fertility change, ideational approaches are more concerned with social transformation through education and exposure to new ideas than with reducing costs (Lesthaeghe and Surkyn, 1988). Fertility behavior, according to Cleland and Wilson (1987), is not only a function of the demand for children but is also determined by a set of ideas regarding "means of control." In other words, the ideational approach implies that programs and policies can influence fertility through the indirect path by affecting the way that parents or other relevant decision making units think about and value children and the moral perspectives they adopt concerning birth control methods. The idea is that a smaller number of children desired may spread as part of the diffusion of western ideas. This is the essence of ideational hypothesis by Caldwell and others (Caldwell, 1980) that regards education as the most powerful underlying force to control fertility.

Although all the above mentioned theoretical developments were used to measure fertility changes, since the inception of Plan of Action promulgated at the 1994 ICPD conference, gender perspective on fertility (or reproductive health) became the central issue, resulting in a paradigm shift. This shift in thinking that emerged since the conference strongly adheres to the view that population growth can be controlled by women's advancement socially, politically, and economically. Thus, the issue of gender differentials in reproductive decision making became one of the most prominent areas for feminist theorizing and research about female empowerment. Feminists and other scholars and researchers argue that power differentials exists in all levels of the reproductive process (that is from marriage to child bearing and child rearing) (McDaniel, 1996; Cleland, 1996; Orloff, 1993; Hartman, 1992; Levine and Scrimshaw, 1983).

The patriarchal family system is one of the widely discussed covariates in the area of gender explanation on fertility (Dixon-Mueller, 1993; Mason, 1987). The essence of the patriarchal family system is that women have little control over making decisions on marriage, the returns of their labor, their sexuality, contraception, the timing and number of their children (Dixon-Mueller, 1993). The reproductive behavior of women and their sexuality are controlled by the older members family members and male family members or the community to meet with the expectations of the family and/or the community rather than the expectation of women themselves. This will have an adverse effect on fertility levels.

Women's economic power or autonomy is another factor that influences fertility. The extent of women's economic dependency on male family members produces strong

son preferences and hence a relatively high and number of children (Mason, 1987). However, women's participation in outside-home employment increases their economic independence and challenges the traditional image of women (Blumberg, 1991). Husband wife educational difference is another leading factor that remains an obstacle to improving gender differentials (Weeks, 1994). Most studies show that the educational level of the wife is more strongly and inversely correlated with family size than is the educational level of the husband after controlling for other influences (Cleland and Rodriguez, 1988). An educated husband and wife are more likely to discuss the timing and number of children and the use of different contraceptive methods. Dixon-Mueller states that education beyond the primary level is often associated with factors such as an openness to new ideas, a higher standard of living, exposure to an urban environment, higher occupational achievement, and a greater range of other options and interests outside the home. Any of these may be responsible for the apparent influence of education on fertility.

The rational process of fertility decision making involves communication between spouses (Hollerbach, 1983). Studies reveal a low level of communication between spouses about family size and family planning (Hull, 1983; Beckman, 1978), and women with low levels of contraceptive the use also report little spousal communication (Mott and Mott, 1985; Lasee and Becker, 1997). Other dimensions of communication include agreement between partners regarding use of contraceptives and fertility preferences and each spouse's perceptions of the attitudes of his or her partner (ref. from Bulatao and Lee, 1987). The husband's disapproval is considered one of the major reasons for nonuse of contraceptives in some countries in sub-Saharan Africa (Ezeh, 1991). In Ghana, the

wife's attitude toward contraception is strongly influenced by her husband's attitudes and background characteristics, especially education, but the husband's views are not similarly influenced by his wife (Ezeh, 1991; Bankole and Singh, 1998). When communication between spouses exists, there is a high demand for contraceptives, duration and effectiveness of use, and a low demand for children and fertility preferences.

The age at entry into sexual union also varies according to the gender differences in the population. That is, it is commonly assumed that in developing countries there exists a wide age difference between the male and female age at marriage. It is often found that female age at marriage is always lower than males. However, this gap is reduced with increase in female education and occupation. The gender gap in age at marriage is obvious in rural areas compared to urban areas. The gender differences in the legal age at marriage is a widely accepted phenomenon in many developing countries (Karkal, 1998). Many developing countries have fixed the legal age at marriage as 18 and 21 for females and males respectively. However, in certain Muslim societies the legal age at marriage is 14 years for girls (Obermeyer, 1994). Many feminists argued that this merely serves to stereotype women into childbearing and unskilled service roles at a lower age while permitting men extra years of education, preparation and experience to be breadwinners, when, in fact, female headed households are on the rise.

Fertility decisions within the family are usually examined by studying the relative influence of each partner in the interaction. The resulting "winning" decision is based upon the hierarchy of status within the relationship (Williams, 1990) and other environmental factors such as the labor value of the children in certain countries (Collins et.al., 1993). Williams (1990), for example, found that women with increased age,

income, and education maintained more power in the relationship and, thus, the planning of births were more likely to be joint decisions. Conversely, she found that women with less than a high school education were more likely to experience disagreements with their husbands over family planning.

Moreover, there is evidence that higher occupational statuses for women tend to facilitate agreement with their husbands to limit fertility or not have children (Dodoo, 1993). As previously discussed, there is also a tendency to agree not to have children among couples where both spouses have higher educational statuses (Ezeh, 1993). As a result of higher occupational status, it has also been shown that women who contribute higher levels of income to the family typically exhibit more control in childbirth decisions (Blumberg and Coleman, 1989).

Therefore, in terms of fertility decisions within the family, it is evident that the relative status of the female compared to the male (or balance of power within the relationship) will significantly effect the outcome in any decision making process. Increased education, income, and economic resources for females provide the opportunity for females to exercise greater influence in family decision making. As the female's economic contribution to the family increases her dependency on the male decreases. This gives her with the ability to control inputs within the family and consequently gives her considerable influence in fertility decisions (Collins et.al.,1993; Williams, 1990; Blumberg and Coleman, 1989).

Although there is considerable support for the associations between an increase in women's economic resources and lower fertility, these variables are dependent upon the socio-economic structure of the country of residence. This necessitates the inclusion of

the economic structure of the society as a variable for analysis, especially labor-force participation and economic opportunity (Handwerker, 1991).

Several researchers have found that increased economic opportunities for women tend to decrease fertility (Young, Fort & Danner, 1994; Handwerker, 1991). Handwerker (1991) argues, by comparing the West Indies (experiencing falling fertility rates) with Africa (experiencing rising fertility rates), that access to economic resources significantly reduces fertility rates. Moreover, he maintains that access to new economic activities outside of agriculture is associated with fertility declines. Conversely, in those societies where traditional agricultural production is predominant, women are dependent on children for labor; thus, fertility tends to increase.

Further evidence suggests that women in higher income countries have greater control over fertility decisions and use contraception more frequently. Women in lower income countries, where they work primarily in agriculture, experience low rates of labor-force participation outside of agriculture and higher rates of fertility. This provides further support for the link between increased economic opportunities for women and their level of fertility (Young, Fort & Danner, 1994).

Additionally, not only are womens' fertility levels linked to labor-force participation, but also to socioeconomic development. More specifically, type of occupation is associated with level of fertility. In more developed countries, with large modern sector employment opportunities for women, there are greater differences in fertility between working and non-working women (Lloyd, 1991).

As societies become more developed, women who work in the modern sector (i.e., professional and clerical positions) tend to have fewer number of children. For these

women, children produce more difficulties in terms of childcare, lost employment, and the achievement of personal goals; thus, there is a tendency for fertility to decline. Conversely, in under-developed societies where children are frequently considered assets (such as in agriculturally based societies where they supply needed labor), children are a means to survival and material security; thus, fertility remains high (Lloyd, 1991; Handwerker, 1991).

In summary, then, the literature indicates that increased levels of education, income, status within the family, labor-force participation, occupational status, and greater societal economic development tend to increase the exposure which then decreases fertility levels. This seems to be a result of increased resource opportunities for women, which provides them with a greater degree of autonomy over reproductive behavior and decreases the attractiveness of large family sizes.

Moreover, it is evident that the factors that promote female autonomy in fertility decisions, (i.e., education, resource opportunities and the ability to contribute higher levels of income to the family) tend to decrease fertility, and are also associated with either individual or family desires to increase their standard of living and material comfort. As stated by Randall Collins et al. (1993), "regarding economic resources...the value of male/female labor is enhanced to the degree that it turns into disposable income and, thence, into property..." (p. 203).

Thus, all of the previously mentioned factors that are associated with declining fertility declines have in one way or another developed with respect to a particular value system produced by a modernizing economy, the impetus of which is the desire for an

increased standard of living. Two questions emerge: what is the new value system produced in modernizing economies, and how does that value system effect fertility?

Talcott Parsons' functional theory of social stratification provides some insight into the process of value formation. Through a long process of socialization and internalization, individual social behavior becomes guided by norms and values that support a common societal value system. This common value system serves to integrate the entire society (Kerbo, 1983). Within this value system, people are evaluated or ranked according to their ability to meet or achieve those values. Thus, differences in status or honor develop based on individual achievement. Symbols of that achievement are an integral part of the system. Frequently, the symbol of achievement is income and the accumulation of material possessions that it affords one. However, Parsons maintains that symbols of achievement need not universally be income and possessions, but rather reflect the primary value system of the society (Kerbo, 1983).

The Western world's value system is dominated by "performance in the occupational structure" (Kerbo, 1983, pp. 137). Persons who meet the performance requirements of this system are rewarded with income and the greater security of an increased standard of living and the ability to accumulate material possessions as evidence of this achievement (Kerbo, 1983). Moreover, in a market system based on and in the business of promoting the consumption of goods and services, the desire to acquire these symbols of achievement and maintain a higher standard of living have become an internalized value system.

The higher the income-level, the greater the investment of money and time in the children by the couple. Those couples in the higher income groups have more opportunity

to accumulate material possessions and more disposable time to dedicate to activities; thus, the number of children is limited so that many valued possessions will not have to be forgone. The opportunities of those in the lower income groups to acquire possessions and engage in activities are already limited because of their economic insecurity and, thus, there is little recognition of lost opportunities by having more children (Weeks, 1994).

In sum, the more one achieves societal values, the more that individual is rewarded by society in status and the outward symbolic indicators of that status. In societies that value occupational performance, income and the resulting possessions and the free time it provides become valued. The more children a couple have, the more the couple must forego the accumulation of possessions and the less the amount of free time the couple has to engage in desired activities. Thus, although children are valued in every society, for those persons in the higher income strata, a child's relative value as a symbolic indicator of achievement is far less than that of the accumulation of material possessions and free time activities. As a consequence, fertility declines.

For those persons in the lower income strata, although they may value the same level of achievement as the higher income groups, the potential to realize these values is limited. Thus, the relative value of goods and free time activities that must be foregone because of their lower position in the status hierarchy has little impact on decisions to have children. The competition between having children and foregoing a higher standard of living among the higher-income strata may be a moot point for the lower income strata in the sense that the stratification system itself limits the opportunities of the lower

income strata. Children may not be viewed as the limiting factor for this income strata and, consequently, fertility rates are higher.

The worldwide transfer of Western values and attitudes has taken place for several decades through multinational corporate capitalism and transnational advertising. While the obvious goal of these activities is to promote the sale of Western goods, covertly there has been a transfer of Western consumer values. The association of Western products with modernity has produced, in varying degrees around the world, value systems where the accumulation of possessions and the consumption of products is an indicator of one's level of achievement (Janus, 1982).

Transnational advertising to broaden consumer markets is abundant throughout the third-world (Barnett and Muller, 1974). Clearly, the message contained in transnational advertising is that "the good life" is acquired through the rewards obtained by occupational performance and the purchase of the symbolic indicators of that performance (Janus,1982; Barnett and Muller, 1974).

There seems little reason to suspect that the process of value formation which has characterized and currently dominates the Western world (i.e., occupational performance, achievement, consumption of goods) has not been introduced to every part of the world. Admittedly, there is considerable international and intra-national variation in the degree to which this value system has been internalized among members of the various populations. However, the fact that this variance of internalization exists does not negate its usefulness in analyses, especially its potential value as a factor in fertility decisions.

In countries where this internalization is higher, one would expect lower fertility rates. In countries where this internalization is lower, more variation in fertility rates

would be expected. For developing countries in transition, fertility rates would be expected to vary by the individual factors of fertility previously identified in this paper (i.e., women's education, resource opportunity and income). Thus, although W. Penn Handwerker (1991) outlines the transitional process from high to low fertility as the result of "...women's ability to pursue life goals independently of their childbearing capacity (pp.76)," it is argued here that the pursuit of "life goals" involves precisely these value changes. Increased resource opportunity is the impetus for societal level value changes.

Thus, although fertility rates remain higher in many developing countries where modernization seemingly has not significantly lowered fertility, the value changes associated with modernization may still be at work. There are at least two possible explanations for this phenomenon. First, as W. Penn Handwerker (1991, pp.70) argues, "Resource access theory suggests that these fertility transitions [from high to low] can be explained by an environment that has offered them [women] a consistently increasing number of channels by which they could secure their material wellbeing." Thus, resource opportunities are arguably necessary conditions for declining fertility rates. The significant associations between women's increased education, income, and financial contributions to the family and lower fertility rates lend support to this conclusion: education, income, and increased household finances obviously expand the family's opportunities for achieving "material wellbeing."

However, acquiring satisfactory levels of material wellbeing may only signify the beginning phase in the transition of a society to a common value system based on materialism and consumption and, consequently, lowered fertility rates. In this case, one

would expect societies to vary both in their level of internalization of these values and in family size norms. Secondly, there is evidence that developing countries do not universally adopt all of the ideals associated with modernization in the west. Modern attitudes frequently coexist with traditional attitudes. Thus, it is observed that gender differentials in decision-making influence fertility. This difference is attributed through the patriarchal family system, husband wife communication, gender difference in education and occupation.

In sum, two major schools of thought have prevailed in the fertility literature namely, economic and non-economic. Thus, I propose a theoretical model which involves two major explanations in regard to women's reproductive health, namely, an economic explanation, and a non-economic or gender explanation. Since studies on reproductive health never adopted any theoretical framework and reproductive health is considered as an extension of the fertility control approach, the following sections used fertility control studies to explain reproductive health.

CHAPTER 3

THEORETICAL DEVELOPMENT ON REPRODUCTIVE HEALTH

According to the United Nations (1995), reproductive health is defined as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity, in all matters relating to the reproductive system and to its functions and processes" (United Nations, 1994, p. 4). This definition implies that people are able to have a satisfying and safe sex life and that they have the capability to reproduce and the freedom to decide if, when and how often to do so. The definition encompasses the rights of both men and women to be informed and to have access to safe, effective, affordable and acceptable methods of family planning of their choice, as well as other methods of their choice for regulation of fertility which are not against the law. In addition, the definition includes the right of access to appropriate healthcare services that will enable women to go safely through pregnancy and childbirth and provide couples with the best chance of having a healthy infant. Thus, the major components of reproductive health include an individual's informed ability to be involved in sexual relationship, to make effective, acceptable, and affordable contraceptive choices, and to avail oneself of safe and appropriate healthcare services during pregnancy. These three major components relate to the three proximate determinants of fertility defined by Davis and Blake (1956), namely, intercourse variables, conception or contraception variables and gestation variables. Thus, in fertility literature, the focus has been mostly on family size. Fertility is seen as an outcome of three independent sets of proximate determinants.

However, the reproductive health orientation implies that these proximate determinants also characterize the state of health, namely reproductive health, rather than a specific outcome such as, fertility.

Thus, following the definition of Davis and Blake (1956), intercourse variables are those governing the formation of sexual unions. For most societies, particularly in developing countries, entry into sexual union is preceded by consummation of marriage. For this reason, "age at marriage" is often used as an indicator of initiation of sexual activity in developing countries. Conception variables are factors related to use or non-use of contraception and gestation variables are related to gestation and successful parturition. These authors present intermediate factors to explain a specific outcome, namely, fertility. I conceptualize reproductive health as a latent outcome indicated by these intermediate variables. The United Nations definition for reproductive health thus provides three major dimensions in reproductive health namely, intercourse, contraception and gestation. The intermediate variables framework suggest that a number of social and economic variables influence fertility through the proximate determinants.

Over the last five decades of fertility research, two schools have prevailed - one economic and the other non-economic. The economic school suggests that a number of economic variables within the household determine fertility variations. On the other hand, the non-economic school proposes a number of social institutional variables. In particular, the social institutional explanation focuses on the constitution of the family institution. The impact of the family structure and norms on fertility has been articulated through the vast literature on gender. The feminist literature on gender underscores the

role of gender-related ideologies and norms in explaining fertility until recently. I use these contentions to suggest that reproductive health is influenced by two significant sources of variations, the household economic class of variables and gender related characteristics. By gender characteristics, I mean, the norms and practices related to the decision making and implementation of reproductive decisions by individual women. The following description presents how these two schools (household economic and gender) influence the latent dimensions of reproductive health.

Among economists, the most widely used theoretical framework for explaining fertility is the so-called new-home economics approach, which normally assumes that the interests and power of the sexes within family units are identical, even if their roles are not (Schultz, 1974). The new-home economics model provides a necessary analytical framework to study the non-market allocative decisions, especially those related to the production of children (Nerlove, 1974; Willis, 1973). The theory was first developed in its modern form by Gary Becker (1965) and others and an extended model was introduced by Schultz (1981). The basic premise of the new home (or household) economics approach explains the way in which investment in human capital increases the value of human time. This increase in the value of human time changes the resource constraints and relative costs and prices which "households" face in their decisions on the number and quality of children they attempt to produce (Schultz, 1981).

The household income hypothesis assumes that as income rises, consumption of goods and services increases. Thus, assuming children are a consumer durable, an increase in income is likely to increase fertility (Blake, 1968). That is, a rise in average income is said to increase an individual's aspirations for social advancement and the

desire for other goods increases, which then competes with the number of children for family resources. This eventually reduces the number of children people want. In this situation, according to Becker (1965), individual couples try to balance between "quantity" and "quality" of number of children they want. There are several studies, which have empirically tested the new-home economics framework on fertility. Studies find that the higher the educational status of the head of the household (or at least one of parents), the higher the age at marriage (Schultz, 1981; Ermisch, 1979).

Feminist literature on fertility suggests that gender differentials can be seen in two domains, the public and the private. Between these two domains, the domestic participation of women is a critical factor in understanding her social position (Rosaldo, 1974). Hence, for the present research I will consider only the influence of the domestic domain on reproductive health. This restriction is introduced because women's participation in the public domain is very much limited in many developing countries, particularly in Middle Eastern countries. On the other hand, within the domestic domain, the variables related to gender power differentials in decision making within the household are easily observed. That is, traditionally, domestic chores of women include early marriage, conception immediately after consummation of marriage, and rearing children and are thus limited within the household domain. Under the private or domestic domain, I am interested in the participation of women in decision making on her entry into sexual union, contraceptive use, and her power in making decisions during pregnancy and gestation. The present study defines gender power as the ability of women to influence decisions related to their exposure to intercourse, use of contraception and decisions during pregnancy and gestation. In this regard, one of the

major elements that defines power is autonomy (Obermeyer, 1994). The amount of autonomy women enjoy is related to the extent to which a woman can make decisions in matters of reproduction and the level of access she enjoys to the information and services received to implement the choices she has made.

In most of the Islamic societies, women have a very restricted and limited role in domestic spheres (Ahmed, 1986; Obermeyer, 1994). Islamic law on women's status is very ambiguous in the sense that although *shari'a* emphasizes the equality of all believers before God, it clearly differentiates between the rights and duties of men and women, as well as Muslims and members of other religious communities in society. Hence, discrimination against women and against religious minorities continues to occur. Traditionally, it is often argued that the Koran, Hadith (the collected sayings of the Prophet Muhammad), and Sunna (biography) accord women a lower status than men. In this context, women in these societies have little choice in their involvement in reproductive decisions and other domestic roles such as matters of marriage, divorce, use of contraception, number of children and so on.

In sum, I assume that there are three components in reproductive health, namely, sexual initiation variables, conception variables, and the gestation variables. That is, these three components explain the reproductive health situation in any country. I propose this model to explain reproductive health in the context of an Islamic society, the Republic of Yemen, where nearly 100 percent of the population follows Islam. As a result, the teachings of Islam are likely to have a profound influence on all the components of reproductive health. Given the effects of Islam on reproductive health, this study examines the validity of three proposed components of reproductive health

namely, the exposure to sexual intercourse, conception and gestation. The analysis of reproductive health in a Muslim country is a complicated task, because of the polarization of views on the relationship between Islam and fertility control. However, studies show that in order to understand the high fertility of the Muslims (Omran, 1992) or the reproductive health situation in Muslim countries (Bielefeldt, 1995), greater emphasis should be placed on the existing conditions in the countries rather than on the doctrines of Islam. Thus, we assume that the level of these components in a society can be explained through the economic characteristics and gender power. The following diagram explains the direction of these the three components of reproductive health.

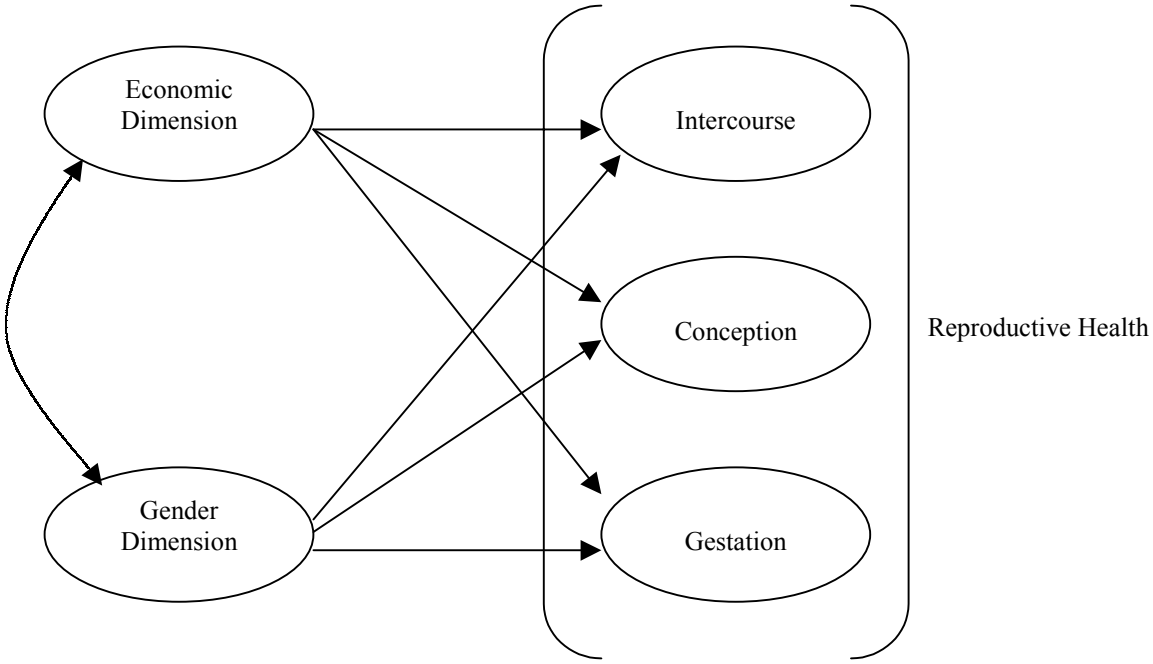

Figure 1: Theoretical framework on the components of reproductive health.

The above diagram is used to explain the influence of economic and gender dimensions on the three components of reproductive health such as, intercourse, conception, and gestation. The following hypotheses are drawn to explain the three components of reproductive health.

H1: The higher the economic dimension, the lower the exposure to intercourse. That is, women who are engaged in economic activities are more likely to postpone their marriage to a later age compared to women who are not engaged in economic activities thus reduces their exposure to sexual union in the reproductive period.

H2: The higher the economic dimension, the lower the exposure to conception. That is, women who are involved in economic activities are more likely to use contraceptives or more likely to have access to contraceptives which, reduces their exposure to conception.

H3: The higher the economic dimension, the higher the exposure to gestation and successful parturition. That is, women who are involved in economic or income generating activities are more likely to have access to abortion and other post-delivery care services compared to women who are involved in non-economic activities.

H4: The higher the gender-dimension, the lower the exposure to sexual union. That is, women who are involved in reproductive decision making process are more likely to have a higher age at marriage compared to women who have not involved in the reproductive decisions.

H5: The higher the gender-dimension, the lower the exposure to conception. That is, women who are involved in reproductive decision making process are more likely to

use contraceptives thus reducing her exposure to being conceived compared to women who are not involved in reproductive decision making.

H6: The higher the gender power or gender dimension, the higher the exposure to gestation and successful parturition. That is, women who participated in the reproductive decision making process are more likely to have access to abortion services and other post-pregnancy care services compared to women who have no power in making reproductive decisions.

There are contradicting interpretations of Islamic laws on women's reproductive choices. Traditional interpretations emphasize that contraceptive use is against Islam and so are other reproductive choices for women. But contemporary interpretation permits contraception as long as it does not entail the radical separation between marriage and its reproductive function. Both natural and modern methods of contraception are acceptable, provided the method is not harmful and does not work as an abortifacient. Family planning should be the choice of the individual family without coercion or pressure. Aside from the controversies prevailing in certain non-Muslim societies on abortion, Islam views abortion very differently from contraception. Islam considers abortion as a violation of human life with some reservations. Most schools of law agree that abortion is acceptable before "ensoulment" and unacceptable afterward. Abortion is permitted if the continuation of pregnancy poses a threat to the mother. On the other hand, the act of sterilization is considered to be against divine will (Omran, 1992). Sterilization is allowed for medical reasons and generally it is not condoned. However, sterilization is permitted in certain situations - for women with a reasonable number of children and who are approaching the end of their reproductive life. Thus, considering the above-

mentioned views on reproductive choices in Islamic countries, the following description gives the relationship between intercourse, contraception and gestation and reproductive health.

Since initiation to sexual activity is strictly guarded and guided through marriage, the contraception variables on reproductive health in Islamic societies are likely to be high. That is, as mostly is seen in many developing countries, entry into sexual union is preceded by consummation of marriage. Also, the strict regulations on abortion considerably reduce the likelihood of the termination of pregnancy by abortion. As mentioned before, Islamic teaching protects the life of the mother in the event of a threat to her life during the period of gestation. Thus, the cultural context of gestation, considerably reduces the negative impact of abortion on the health of the mother. In general then, the cultural context of reproduction, preserves the reproductive health of the woman by preserving the rights of women to practice contraception. In general, then I hypothesize that

a) the effects of the non-economic (gender related) dimension on exposure to intercourse is greater than the effect of the economic dimension on exposure to intercourse.

b) the effects of the non-economic (gender related) dimension on conception is greater than the effect of the economic dimension on exposure to intercourse.

c) the effects of the non-economic (gender related) dimension on gestation is greater than the effect of the economic dimension on exposure to intercourse.

At the second stage of the theoretical framework, I assume that reproductive health is a state of being. That is, it cannot be separated into different components,

because an increase or decrease in any of the components is not a solution to improving the reproductive health of women. Contradictory to the fertility control approach, to improve the reproductive health of women, these components should be considered as an index to reproductive health. On the other hand, fertility control programs are targeted to improve one or more of these components. That is, for example, only improving the level of exposure to sexual union need not necessarily improve the reproductive health of women. This explanation is described in the following diagram.

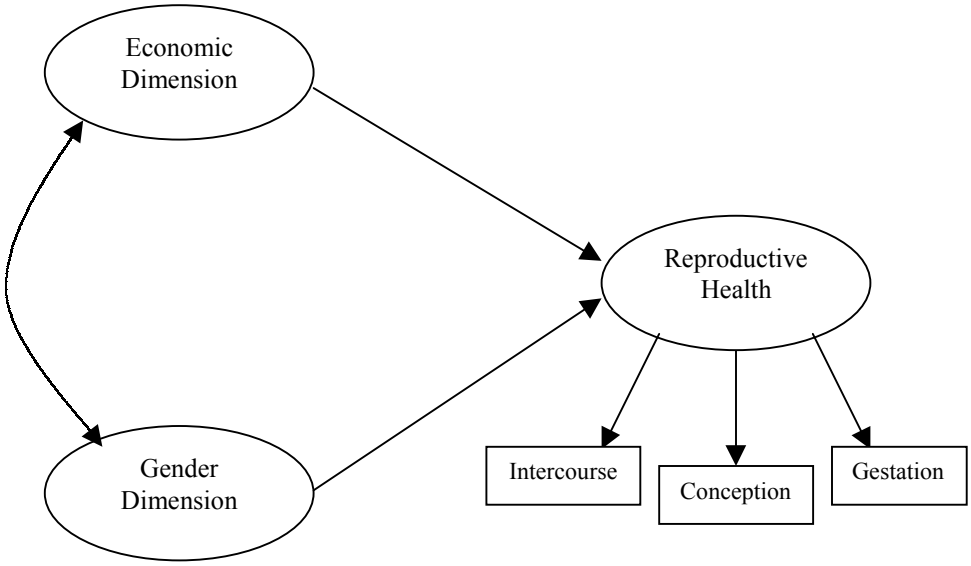

Figure 2: Proposed theoretical framework on reproductive health.

Figure 2 explains how economic and gender variables are used to describe the reproductive health situation in the Republic of Yemen. The following hypotheses are also drawn from the above theoretical framework.

H7: The higher the economic dimension, the better the reproductive health. That is, women who are involved in economic activities are more likely to have better reproductive health as compared to women who are not engaged in economic activities.

H8: The higher the gender dimension, the higher the reproductive health. That is, women who are involved in reproductive decision-making process are more likely have better reproductive health as compared to women who are not involved in the reproductive decision-making process.

CHAPTER 4

DATA, OPERATIONALIZATION AND METHODOLOGY

Data

The data for this study come from the Yemen Demographic and Maternal and Child Health Survey (YDMCHS) conducted in 1997. The YDMCHS is the second national survey conducted in Yemen since unification of the country. The first national survey was conducted in 1992. The YDMCHS-1997 was designed to collect data on households, and ever-married women of reproductive age (15-49). This survey interviewed 10,414 of the 11,158 eligible ever-married women in the age group 15-49 (Central Statistical Organization (CSO)[Yemen] and Pan Arab Project for Child Development (PAPCHILD)[Egypt] and Macro International Inc.(MI), 1994). The subjects covered in the household survey were: characteristics of households, housing and living conditions, school enrollment, labor force participation, general mortality, disability, fertility, and child survival. The areas covered in the survey of women of reproductive age are: demographic and socioeconomic characteristics, marriage and reproductive history, fertility regulation and preferences, antenatal care, breastfeeding, and childcare. The main purpose of the 1997 YDMCHS was to provide detailed information on fertility, family planning, infant and child mortality, maternal and child health, and nutrition. The 1997 YDMCHS included a module to obtain information on female circumcision and information was also collected on height and weight of mothers to measure maternal malnutrition.

Operationalization of Variables

Studies have used different indicators to measure the influence of age at marriage and work participation of women on gender power. Several studies have used educational attainment of women (Caldwell, 1980; Sathar, et al., 1992; Castro Martin and Juarez, 1995) to measure gender power. Although increased female education and work participation has been demonstrably associated with greater knowledge and use of contraceptive methods, it is difficult to measure whether it is also associated with stronger relative position within the household and a greater voice in fertility decision making. However, it can be argued that female education implies greater opportunity to participate in society by allowing greater exposure to and command over resources outside the home. That is, in general, women with higher education and work participation are likely to have a higher age at marriage. Use of contraception usually requires both the husband's and the wife's approval. Male approval can follow rather than precede contraceptive use, however, research around the world supports the conclusion that contraceptive use is more prevalent and continuous when the husband approves of it, particularly among the lower classes (Chamie, 1981; Hollerbach, 1980; Obermeyer, 1994). Lee (1978), in his study on South Korean married women, found that the husband's perceived support for family planning was significantly related to the wife's contraceptive practices. Less educated women depended more on their husband's support for use of family planning than women with more education. Abortion decisions are also influenced by men's desires, although sometimes indirectly. Studies have also shown that the role of employment empowers women and lowers fertility. That is, paid work increases women's opportunity costs of having children, as well as women's value and

power in the family, giving them greater incentive and ability to practice fertility control (Oppong, 1983; Safilios-Rothschild, 1990; Dharmalingam and Morgan, 1996).

Family type is another characteristic considered for explaining gender power (Caldwell, 1982). Studies have shown that in certain societies, decisions made on women's age at marriage, use of contraception, and demand of children are not made by the biological parents. According to Caldwell, in these societies, biological parents have little to say, whereas the older generation, controls the patterns of reproduction and also makes decisions for fertility. In extended families, for example, the elders in the family play an important role in fertility decisions, including fixing the age at marriage, contraceptive use, abortion and parturition (Cain, 1984; Caldwell, 1982; Sathar, et al., 1992). Davis (1955) identified four aspects of gender stratification that contributed to continued high fertility in less developed countries. These were the domestic seclusion of women, the patrilineal focus of the family unit, the segregation of sexes, and women's lack of autonomy. Among the specific hypotheses Davis set forth was the idea that in patrilineal, patrilocal joint family systems, women need to have children as soon as they marry because they are without status, security, and have no claim to family resources until they bear sons. In Caldwell's theory of wealth flows (1982), the patriarchy family is identified as an inherently pronatalist institution and such families encourage high fertility. In these types of families, the older men control the means whereby they enjoy the fruits of both women's and children's labor, and are able to delegate to women and children most of the work. Thus, Caldwell's argues that an increase in women's domestic power is likely to encourage the limitation of fertility by giving women more power in fertility decisions and thus permitting women to act in accordance with their supposedly

relatively low fertility desires. Several studies made similar arguments (Wolf, 1988; Safilios-Rothschild, 1982; Cain, 1984). Thus, while patriarchal family structures tend to inhibit the decline of fertility, more egalitarian family structures tend to facilitate that decline.

Thus, I present the theoretical framework, which incorporates both economic and non-economic factors that influence reproductive health. While the economic model assumes that the interests and power of the sexes within family units are identical whereas the non-economic factors brought power differences into the model. The following variables are considered for the operationalization of latent dimensions.

Economic variables

PLACE - Place of residence

P_OCCUPN – Partner's occupation

V119 - Has electricity

WATER – Source of drinking water

R_EDUCN – Respondent's education

Gender variables

S628 – Best educational level for daughter

DAU_WORK – Respondent approves daughter working

V610 - Husband approves family planning

V611 - Discussed family planning with partner

V612 – Respondent approves family planning

Intercourse variables

V511 - Age at first marriage

S235 - Age at first menstruation

Conception variables

EVERUSE - Ever used any contraception

V404 - Currently breastfeeding

Gestation variables

MISCARRY - Had abortion/miscarriages

Methodology

Both univariate and multivariate analyses will be used in the present study. The first part of the analysis is operationalization of the latent variables as discussed in the model (see Figure 1). On the basis of the definition of these latent variables, I will select the related variables from the YDMCHS - 1997 data set. Frequency distribution of all the selected variables will be presented as part of the univariate analysis. Using a culturally sensitive definition of reproductive health, following the WHO's definition on reproductive health, measuring reproductive health in Yemen will be the second part of the analysis. The clustering of the variables under each of the three dimensions, economic, gender, and reproductive health, will be examined using exploratory factor analysis. The third part of the analysis includes testing the reproductive model proposed in Figure 2 using structural equation analysis.

CHAPTER 5

ANALYSIS AND RESULTS

The data for the study come from the Yemen Demographic and Maternal and Child Health Survey (YDMCHS) conducted in 1997. For the present study, 10,414 ever-married women in the age group 15-49 are considered for the analysis. This chapter is divided into six sections. The first section presents the distributional properties of the variables considered in the model. Levels of measurement of variables, descriptive statistics, and frequency distribution of variables are included in this section. Measures of association among variables are presented in the second section. The third section presents the gross and net effects of the variables in the model. Factor analysis results are presented in the fourth section. The net effect of latent variables on reproductive health is presented in the fifth section. The last section presents the estimates from the latent class analysis, and evaluates the status of the proposed hypotheses.

Several analytical strategies are carried out to test the hypotheses. First, the distributional properties of the variables are studied using univariate statistics such as frequency distribution, measures of central tendency, and measures of dispersion. This analysis provides the background information of all the observed variables used in the model in terms of its distribution, and identifying the number of cases, and so on. The next step is to understand the simple bivariate relationship between the variables in the model. To achieve this, measures of association between variables are calculated. These measures are phi coefficient, eta-squared, and correlation coefficient. Phi coefficient is a

symmetric measure of association between categorical variables, eta-square is a measure of between nominal and continuous variables and correlation coefficient is a measure of association between two continuous variables. The next step is to examine the influence of independent variables on the dependent variables. Gross and net effects of independent variables are calculated using linear and logistic regression techniques. Since the hypotheses in this study are defined using latent variables, the next step is to create the latent variables such as economic dimension, gender dimension and reproductive dimension. In order to achieve this, exploratory factor analysis is carried out to examine how the observed variables load on economic, gender and reproductive health factor dimensions. The final step in the analytical strategy is to assess the overall fit of the proposed model for reproductive health. This is carried out using the structural equation technique. Following section describes the distributional characteristics of the variables considered in the model.

Distributional Characteristics of Variables

The selected variables in the theoretical model fall in five major categories namely, economic dimension, gender dimension, exposure to intercourse, exposure to conception and exposure to gestation. Table 1 presents the distributional characteristics of the variables in the model. The variables considered under economic dimension are place of residence of the respondent (PLACE), partners occupation (P_OCCUPN), whether respondent's house has electricity (V119), source of drinking water (WATER), and education of the respondent (R_EDUCN). The variable PLACE was originally coded 1 for urban and 2 for rural area. However, for the present analysis it is recoded as a dummy

variable with rural is coded as 0 and urban is coded as 1. In the present sample, 71.7 percent of the respondents are from rural area and 28.3 percent of the respondents are from urban area. All the respondents answered this question.

P_OCCUPN is a categorical variable. Originally there were nine categories for this variable namely, did not work (0), professional, technical/managerial (1), clerical (3), agriculture-self employed (4), services (7), skilled manual (8), unskilled manual (9), don't know (98), and missing cases (99). These categories are regrouped on basis of levels of skills required (ranging from no skills to highly skilled jobs) and coded into four namely, did not work (0), manual labor (1), agricultural self-employed (2), services (3), and professional (4). The largest percentage of respondents are observed in the services sector (31.7 percent), followed by agriculture self-employed (25.2 percent), manual labor (21.9 percent) and professional group (13.6 percent). About 7.5 percent of the respondents reported that they did not work. There are 728 respondents coded as missing.

The variable V119 presents whether the respondent's house is electrified or not. It is recoded as 0 if the house does not have electricity and 1 if the house had electricity. Approximately 50.0 percent of the respondents reported that the houses are electrified.

Source of drinking water (WATER) is another economic dummy variable considered in the model with 0 indicating water from non-pipe source (e.g. well, or pond, etc.) and 1 if respondent gets water from pipe. About 58.0 percent of the respondents reported getting drinking water from sources other than pipe whereas 42.4 percent of the respondents are getting drinking water from pipes.

The women's educational level (R_EDUCN) is a categorical variable. It is coded 0 for no education, 1 for primary education, and 2 if the women have secondary or higher

level of education. All the women in the sample reported their education (no missing cases). Approximately 79.0 percent of the respondents have no education, 12.4 percent of women are primary educated and 8.7 percent of the women have secondary or higher education.

Gender dimension variables include the highest level of education aspired for daughter (S628), whether women approve their daughter working (DAU_WORK), whether husband approve family planning (V610), whether women discuss family planning with their partner (V611), and whether women approve family planning (V612). Women are asked the highest level of education aspired for their daughter. This variable is a categorical variable with 0 indicating no education, 1 indicating read and write, 2 indicating basic education, 3 indicating secondary, and 4 indicating higher secondary or more. The frequency distribution suggests that 48.6 percent of women aspiring higher secondary or more education for their daughters followed by 15.2 percent aspiring for basic literacy (read and write), 14.4 percent aspiring secondary education for their daughters, 13.6 percent of women aspiring basic education, and 8.3 percent suggests no education for their daughters. There are 12 missing cases.

The variable whether women approve their daughter working, DAU_WORK, is a dummy variable with 0 indicating disapproval and 1 indicating approval of daughter working. A majority of women (73.5 percent) approve their daughter working and 26.5 percent disapproves. There are 17 missing cases which include women reporting not sure and “don’t know.”

Women are also asked to respond if their husband approves use of family planning (V610). This variable, V610, is a dummy variable with values 0 if husband

disapproves of family planning and 1 if husband approves of family planning. About 47.0 percent of women reported that their husband disapproves of family planning and 53.4 percent said that their husband approves of family planning. There are 2,881 missing cases.

Whether women discuss family planning with the partner (v611) is a categorical gender variable considered in the model. The categories of this variable are as follows: 0 if never discussed family planning with partner; 1 if discussed once or twice; and 2 if discussed more often. The frequency distribution shows that 47.6 percent of the women never discussed family planning with their partner, 23.6 percent discussed once or twice and 28.7 percent discussed family planning more often with their partner. There are 978 cases are missing.

Another variable under gender dimension is the response to the question of whether women approve of family planning (V612). The dummy variable is coded 0 if women disapprove of family planning and 1 if women approve of family planning. The frequency distribution shows that 62.2 percent of women approve of family planning and 37.8 percent of women disapprove of family planning. There are 1,433 women who either did not give a valid response to this question or were not eligible to answer to this question. These cases are coded as missing.

There are two intercourse variables in the model. They are age at first marriage of the respondent (V511) and age at first menstruation (S235). The age at first marriage of women is a continuous variable with the mean age at marriage of 16.2 years, median age at marriage of 16.0 years and standard deviation of 3.21. Extreme values of age at marriage (5 cases) are defined as missing. The positive skewness (1.186) of age at

marriage indicates that a large proportion of women tend to marry at an early age. The average age at marriage in Yemen is the lowest among all the Middle Eastern countries. For example, the average age at marriage for Jordan is 22 years and Turkey is 24 years (Population Reference Bureau [PRB], 2001).

The variable age at first menstruation is also considered as a continuous variable with 1,287 missing cases. The missing cases include outliers and women who are unaware of their age at first menstruation and women who refused to report. The mean age at first menstruation is 13.9 years, the median age at first menstruation is 14.0 years and the standard deviation is 1.36. The negative skewness (-0.421) of age at first menstruation indicates a large proportion of women tend to have their first menstruation at a later age.

The conception variables are: ever use of contraception (EVERUSE), and current breastfeeding status (V404). The variable EVERUSE, originally had four categories namely, never used (0), used only folkloric methods (1), used only traditional methods (2), and used modern method (3). For the analysis, never used is coded 0, if used folkloric or traditional methods is coded 1 and used modern method is coded 2. About 60.0 percent of the women reported to have never using any contraceptives, followed by 24.5 percent who reported to have used modern methods and 15.0 percent who reported to have used folkloric or traditional methods. There are no missing cases in this variable.

The variable V404, whether the woman is currently breastfeeding, V404, is a dummy variable and is coded 0 if woman is not currently breastfeeding and coded 1 if woman is currently breastfeeding. About 63.0 percent of women are not breastfeeding and 36.7 percent are currently breastfeeding.

The only gestation variable considered in the model is whether a woman had any miscarriages or abortions woman in her lifetime (MISCARRY). Originally, women were asked to report the number of miscarriages or abortions they had in their lifetime. For the present study, the responses to this question are recoded into a dummy variable with 0 indicating that if a woman had no miscarriages or abortions and 1 if she had at least one miscarriage or abortion. The frequency distribution indicates that 69.6 percent of the women did not have any miscarriages or abortions and 30.4 percent reported having at least one miscarriage or abortion. There are 4 missing cases which includes two outliers from the original variable. The positive skewness (0.854) of MISCARRY suggests that a large proportion of women tend not to have miscarriages or abortion.

In general, the economic and demographic characteristics of Yemen are very similar to those of any developing country. However, the economic and demographic indicators are comparatively lower for Yemen among all the Middle Eastern countries. In Yemen, a greater proportion (71.7 percent) of people are living in rural areas as compared to 21.0 percent in Jordan and 34.0 percent in Turkey (Population Reference Bureau, 2001). The majority of the population the engaged in non-skilled and agricultural activities (54.6 percent) and the majority of the population depends on non-pipe water sources (57.6 percent). The proportion of females who are illiterate is highest in Yemen (78.9 percent) compared to other countries in the region such as Jordan (3 percent) and Turkey (10.0 percent) (PRB, 2001). A greater proportion of women in Yemen want higher education for their daughters (63.0 percent) and approve of their daughter working (73.5 percent). About 62.0 percent of women approve of the use of family planning compared to 53.4 percent of men who approve of family planning. Though a greater

proportion of women approve family planning (62.2 percent), 60.4 percent of women reported that they never used any contraceptives. In neighboring countries such as, Jordan and Turkey, the level of non-use of contraceptives among married women in the age group 15-49 is found to be 46.0 percent and 36.0 percent respectively. About 37.0 percent of the women are currently breastfeeding and 30.4 percent of women have at least one miscarriage or abortion. The average age at marriage is found to be low in Yemen compared to other countries in the region. Thus, the social, economic, and demographic characteristics of people in Yemen are lower compared to neighboring countries such as Jordan or Turkey.

Measures of Association

This section presents the association between variables used in the model. Three measures of association are used to understand the magnitude and direction of variables taking into consideration of their measurement levels. These measures are eta square, correlation coefficient and phi coefficient. Eta-squared (η^2) is always a positive number ranging between 0 and 1.00. It measures the proportion of the variance in the dependent variable which is explained by the independent variable. This measure of association is generally used to measure the association between nominal and continuous variables. Correlation coefficient is a measure of association between two continuous variables that estimates the magnitude and direction of variables. Correlation coefficient varies between –1.0 to +1.0. Phi coefficient is a symmetric measure of association between categorical variables and varies between –1.0 to +1.0. Table 2 to Table 7 presents the different

measures of association between variables. Correlation coefficient is calculated for all the variables.

Table 2 presents the measure of association between economic variables and intercourse variables. Place of residence (PLACE) is positively associated with age at marriage (V511). This suggests that women living in urban areas have a higher age at marriage than women living in rural areas. Partner's occupation is positively associated (0.067) with age at marriage. That is, partner's employed in higher occupational categories such as, services and professional, have a higher age at marriage. Women living in electrified houses have a higher (0.091) age at marriage compared to women who are living in non-electrified houses. Positive relationship (0.086) with age at marriage is also found if the source of drinking water is from a pipe. The correlation coefficient between women's education and age at marriage is positive (0.243). That is, the higher the education of women, higher the age at marriage. The association between age at marriage and all the economic variables are statistically significant at 0.001 level. Thus, the higher the levels of economic variables, the higher the age at marriage.

Another indicator of intercourse variable is age at first menstruation. The correlation coefficient between place of residence and age at first menstruation is negative (-0.202). Women from urban areas have lower age at first menstruation compared to women from rural areas. Partner's occupation is negatively associated (-0.036) with age at first menstruation. Women from electrified households have lower (-0.117) age at first menstruation compared to women from non-electrified households. This is also true if the source of drinking water is from pipe (-0.068). The correlation between women's education and age at first menstruation is negative (-0.133). The higher

the education, the lower the age at menstruation. The association between all the economic variables and age at first menstruation is statistically significant. In general, it appears that the higher the economic variables the lower the age at first menstruation.

The association between economic variables and conception variables is presented in Table 3. The relationship between all the economic variables and ever use of contraceptives (EVERUSE) is statistically significant. The correlation coefficient between place of residence (PLACE) and ever use of contraception is positive (0.355). That is, women from urban areas are more likely to use contraceptives compared to women from rural areas. Partner's occupation (P_OCCUPN) is positively correlated (0.124) with ever use of contraception. That is, partners working in higher categories of occupation such as, services or professional are more likely to use contraceptive compared to partners working in other categories of occupation. Women from electrified households are more likely (0.344) to use contraceptives as compared to women from non-electrified households. There is a positive association (0.244) between source of drinking water and use of contraceptives. The higher the women's education, the higher the use of contraception (0.220). In general, the higher the levels of economic variables, the higher the use of contraceptives.

Current breastfeeding status (V404) is another conception variable in the model. In general, all the economic variables are negatively associated with current breastfeeding status, except the variable partner's occupation. There is a negative association (-0.081) between place of residence (PLACE) and current breastfeeding status. That is, women from urban areas are less likely to be breastfeeding as compared to women from rural areas. Partner's occupation (P_OCCUPN) is positively associated with breastfeeding, but

it is not statistically significant. However the phi-coefficient is significant. Women from electrified households are less likely to be breastfeeding as compared to women from non-electrified households. There is a negative association (-0.078) between source of drinking water and current breastfeeding status of women. Negative association exists between women's education and current breastfeeding status. That is, the higher the level of education of the woman, the lower the chances of breastfeeding at the time of survey. In general, all the economic variables are in the expected direction, except the variable partner's occupation. Overall, the higher the levels of economic variables, the lower the chances of breastfeeding at the time of survey.

The gestation variable in the model is measured by whether the women had any miscarriages or abortions (MISCARRY). Both phi-coefficient and correlation coefficient are same in strength in explaining the association between economic variables and MISCARRY (see Table 4). Place of residence (PLACE) is positively associated (0.052) with the miscarriage or abortion status of women. That is, women from urban areas have higher chances of having miscarriages or abortion compared to women from rural areas. Partner's occupation is negatively associated with miscarriage or abortion status of women. However, phi coefficient shows a positive association between partner's occupation and miscarriage or abortion status of women. Women from electrified households are more likely (0.037) to have miscarriage or abortion as compared to women from non-electrified households. Similar association is found between source of drinking water (WATER) and miscarriage or abortion status of women. There is a negative association between women's education and miscarriage or abortion status of women. That is, the higher the level of education of women (R_EDUCN), the lower the

odds (-0.063) of having a miscarriage or an abortion. The associations of the economic variables with MISCARRY are in the expected direction.

Table 5 presents the association between gender variables and intercourse variables. All the gender variables are positively associated with age at marriage, except discussed family planning with partner (V611). The variable, best educational level for daughter (S628) is positively associated (0.086) with age at marriage. That means, the higher educational level for daughters, the higher the age at marriage. Women who approve of (DAU_WORK) their daughter working are likely to have a higher (0.013) age at marriage compared to women who did not approve of their daughter working. Age at marriage is also higher (0.028) for women from households if their husband approves family planning (V610). A negative association (-0.010) is found between age at marriage and "discussed family planning with partner (V611). The correlation coefficient between age at marriage (V511) and whether the women approve of family planning (V612) is positive (0.039).

There is a negative association between best educational level for daughter (S628) and age at first menstruation (S235). The higher the expectation for higher educational level for daughters, the lower (-0.112) the age at first menstruation. Women who approve (DAU_WORK) their daughter working are likely to have a lower (-0.043) age at first menstruation compared with women who did not approve their daughter working. Age at first menstruation is also lower (-0.099) for woman from households where their husband approves family planning (V610). A negative association (-0.096) is found between age at first menstruation and "discussed family planning with partner (V611). The correlation

coefficient between age at first menstruation (V511) and whether the women approve of family planning (V612) is negative (-0.075).

The association between gender variables and conception variables is presented in Table 6. The highest level of education aspired for daughters (S628) is positively (0.195) associated with contraceptive use status of women. That means, women who wanted to have higher educational level for their daughter are likely to use contraceptives as compared to women who wanted lower educational level for their daughters. A positive association (0.090) is also found between woman approve their daughter working (DAU_WORK) and women's use of contraceptives. Husband's approval of family planning (V610) is positively associated (0.523) with the status of using contraceptives. Women who discussed family planning with partner are more likely (0.382) to use contraceptives as compared to women who did not discuss family planning with their partner (V611). This association holds true if women approve of family planning (V612). There is a positive association between whether women approve of family planning and the status of using contraceptives.

The second part of Table 6 presents the association between the current status of breastfeeding and gender variables. Women who want their daughters to have a higher education are less likely (-0.034) to be breastfeeding (V404) at the time of survey. Also, women who approve of their daughter working are more likely (0.008) to be breastfeeding as compared to women who did not approve of their daughter working (DAU_WORK). There is a negative association (-0.021) between whether the husband approves of family planning (V610) and current status of breastfeeding (V404). The correlation between whether women discuss family planning with partner (V611) is

positively associated (0.041) with the current breastfeeding status of women. A positive association (0.011) is also found between whether women approve family planning (V612) and her current status of breastfeeding.

Table 7 presents the association between gender variables and gestation variable (MISCARRY). This table shows that all the gender variables are positively associated with whether women had a miscarriage or abortion (MISCARRY). However, only two variables, whether women discuss family planning with partner (V611) and whether women approve of family planning (V612), are significantly associated with MISCARRY. Also, as mentioned before these results should be interpreted cautiously as the occurrence of some these events may be conceptually invalid. The variable, S628 is positively associated (0.001) with MISCARRY. Women who want higher education for of their daughters are more likely to have had a miscarriage or an abortion. Also, women who approve their daughter working (DAU_WORK) is positively associated (0.013) with MISCARRY. A positive association is also found between whether the husband approves of family planning (0.020), whether women discuss family planning with their partner (0.062), whether women of approve family planning (0.021) and MISCARRY.

Overall, the majority of the variables are associated in the expected direction with the respective dependent variables. In Table 2, all the economic variables are positively associated with age at marriage and negatively associated with age at first menstruation. A similar trend is observed in the association between gender variables and intercourse variables (see Table 5). Table 3 shows that economic variables are positively associated with the status of using contraceptive and negatively associated with the current breastfeeding status of women. Generally all the variables are positively associated with

MISCARRY (Table 4). Thus, the above analysis gives a basic understanding of the variables. In the following section, the gross and net effects of the explanatory variables are ascertained.

Gross and Net Effects of Variables

This section presents the gross and net effects of variables in the model. Table 8 through Table 13 shows the gross effects and Table 14 through Table 19 shows the net effect of variables. Both linear regression and logistic regression techniques are used to understand the gross and net effect of the variables depending on the level of measurement of the dependent variables. Logistic regression is used when the dependent variable is categorical.

Table 8 presents the gross effect of economic variables on intercourse variables. All the economic variables (PLACE, P_OCCUPN, V119, WATER, and R_EDUCN) have a positive effect on age at marriage (V511). It is observed that place of residence is positively associated with age at marriage. The regression coefficient is 0.059 with standard error being 0.070. That is, for every unit change in PLACE, the change in age at marriage is 0.059 units. Partner's occupation has a positive effect on age at marriage. For every unit change in partner's occupation the age at marriage is changed by 0.185 units (years) with standard error being 0.028. Whether the household is electrified or not has a positive effect (0.582) on age at marriage with standard error being 0.063. The variable, WATER has a positive effect (0.556) on age at first marriage with standard error being 0.063 and this is true in the case of women's education (1.261 with standard error 0.049).

All the gross effects of economic variables are positive and statistically significant on age at first marriage.

The last two columns of Table 8 present the gross effect of economic variables on age at first menstruation. The direction of variables is similar to the correlation coefficient presented in Table 2. Place of residence has a negative effect on age at first menstruation of women. This means, for every unit change in place of residence, age at first menstruation is changed by -0.610 units with standard error being 0.031. The unit change in partner's occupation will change age at first menstruation by -0.042 units with standard error being 0.013. Having or not having electricity at home has a negative effect (-0.318) on age at first menstruation with standard error being 0.028. The variable, WATER has a negative effect (-0.188) on age at first menstruation with standard error being 0.063. This is also true in the case of women's education (1.261 with standard error 0.049). All the gross effects of the economic variables on the age at first menstruation are positive and statistically significant.

Logistic regression technique is applied to examine the gross effect of economic variables on conception variables (see Table 9). The odds of using contraceptives are 3.7 times more for women living in urban areas as compared to women from rural areas with standard error being 0.046. Women whose partner's working in service sector or professional jobs have higher odds (1.726) of using contraceptives as compared to partner's working in other occupations. Those having electricity at home have higher odds of (3.376) of using contraceptives as compared to women from non-electrified households. The odds of using contraceptives are 2.24 times more for women from households with piped drinking water as compared to women from households with a

non-pipe source of drinking water. The odds of using contraceptives are also higher (2.249) for women with higher education as compared to women with no education.

Current breastfeeding status is another dependent variable under conception variables. All the economic variables have negative effect on current breastfeeding status of women. The odds of the status of current breastfeeding are 0.32 times less for women living in urban areas as compared to women living in rural areas. Women whose partner's work in service sector or professional jobs have lower odds (0.948) of breastfeeding at the time of survey as compared to partner's working in other occupations. Having electricity at home lowers the odds (0.732) of breastfeeding as compared to women from non-electrified households. The odds of breastfeeding at the time of survey are 0.28 times less for women from households with a pipe source of drinking water as compared to women from households with a non-pipe source of drinking water. The odds for breastfeeding are also lower (0.906) for women with higher education as compared to women with no education.

Table 10 presents the gross effect of economic variables on MISCARRY. Again, logistic regression technique is applied since the dependent variable (MISCARRY) is a dichotomous variable. The odds of whether women had a miscarriage or abortion are 1.278 times higher for women living in urban areas as compared to women living in rural areas. Women whose partner's work in service sector or professional jobs have lower odds (0.956) of having miscarriage or abortion as compared to partner's working in other occupations. Having electricity at home increases the odds by 1.176 times as compared to women from non-electrified households. The odds of having miscarriage or abortion are 0.28 times less for women from households with a pipe as source of drinking water as

compared to women from households with a non-pipe source of drinking water. Odds are also lower (0.906) for women with higher education as compared to women with no education with respect to having miscarriage or abortion.

Table 11 presents the gross effect of gender variables on intercourse variables. Linear regression technique is used to understand the gross effect of these variables. It is observed that best educational level for daughters is positively associated with age at marriage. The regression coefficient is 0.199 with standard error being 0.023. That is, for every unit change in the level of education, the change in age at marriage is 0.199 units. Approval of daughter working (DAU_WORK) has a positive effect on age at marriage, that is, for every unit change in DAU_WORK the age at marriage is changed by 0.096 units with standard error being 0.071. However, this effect is not statistically significant. Whether husband approves of family planning has a positive effect (0.177) on age at first marriage with standard error being 0.074. The variable, V611, whether woman discuss family planning with her partner, has a negative effect (-0.039) on age at first marriage with standard error being 0.038 but not statistically significant. Positive effect is also observed between women's education (0.260 with standard error 0.070) and age at first marriage. All the gross effects of economic variables are positive and statistically significant on age at first marriage except the gross effect of V611, whether discuss family planning with partner.

Second part of Table 11 presents the gross effect of economic variables on age at first menstruation. As mentioned before, theoretically the gross effect of the gender variables on age at first menstruation may not be valid due to the differences in the occurrence of these events. These analyses are carried out in order to have a better

understanding of the association among variables in the model. The gross effects of gender variables and age at first menstruation should be cautiously interpreted. The educational level aspired for daughters (S628) has a negative effect on age at first menstruation of women. For every unit change in the level of education preferred, age at first menstruation is changed by -0.109 units with standard error being 0.010. The unit change in the approval of daughter working (DAU_WORK) changes age at first menstruation by -0.133 units with standard error being 0.032. Husband's approval of family planning has negative effect (-0.268) on age at first menstruation with standard error being 0.033. Whether women discuss family planning with their partner (V611) has a negative effect on age at first menstruation of women. Whether women approve of family planning or not has a negative effect (-0.209). All the gross effects of gender variables on age at first menstruation are negative and statistically significant.

Logistic regression technique is applied to understand the gross effect of gender variables on conception variables (see Table 12). The odds of using contraceptives are 1.758 times higher for women preferring high levels of education (S628) for their daughters as compared to women preferring no/reading and writing/basic education for their daughters. Women who approve of their daughter working (DAU_WORK) have higher odds (1.985) of using contraceptives as compared to women who do not approve of their daughter working. Husband's approval of family planning (V610) is likely to increase the odds (7.659) of using contraceptives as compared to husband's disapproval. The odds of using contraceptives are 4.362 times more for women if they discuss family planning with their partner as compared to women who do not discuss family planning with their partner. Odds are also higher (5.565) for women who approve of family

planning (V612) as compared to women who do not approve of family planning. All the gross effects are statistically significant.

The odds of the status of current breastfeeding are 0.15 times less for women who prefer high levels of education for their daughters as compared to women who prefer no/reading and writing/basic education for their daughters. Women who approve of their daughter working have higher odds (1.037) of breastfeeding as compared to women who disapprove their daughter working. The odds is not statistically significant. Husband's approval of family planning (V610) reduces the odds of the status of breastfeeding. Women who discuss family planning with partners have higher odds (1.240) of breastfeeding as compared to women who do not discuss family planning with their partners. Odds for breastfeeding are also higher (1.050) for women who approve of family planning as compared to women who do not approve of family planning. However, this effect is not statistically significant.

Table 13 presents the gross effect of gender variables on MISCARRY. The odds of whether women had a miscarriage or abortion are 1.023 times higher for women who prefer higher levels of education for their daughters as compared to women who prefer "no/reading and writing/basic" education for their daughters. However, the effect is not statistically significant. Women who approve of their daughter working are likely to have an increase in the odds (1.064) of having a miscarriage or abortion as compared to women who do approve of their daughter working. Husband's approval of family planning also increases the odds (1.088) of having miscarriage or abortion. The odds are not statistically significant. Women who discuss family planning with their partner increases the odds (1.230) of having a miscarriage or abortion as compared to women

who do not discuss family planning with their partners. The odds of having miscarriage or abortion are 1.097 times more for women who approve of family planning as compared to women who do not approve of family planning.

Multiple Regression Analysis

In order to assess the net effects of the selected variables, multiple regression technique is performed. Table 14 through Table 19 provides the net effect of economic and gender variables on intercourse, conception and gestation variables.

Table 14 shows the net effect of economic variables on intercourse variables. The first part of the table presents the net effect of economic variables on age at first marriage (V511). It is observed that all the economic variables have a positive effect on age at marriage (V511) except the variable, place of residence (PLACE). It is observed that place of residence is negatively associated with age at marriage. The regression coefficient is -0.181 with standard error being 0.089 after controlling for P_OCCUPN, V119, WATER, and R_EDUCN. That is, for every unit change in PLACE, the change in age at marriage is –0.181 units. Partner's occupation has a positive effect on age at marriage, that is, for every unit change in partner's occupation the age at marriage is changed by 0.041 units with standard error being 0.028, but this is not statistically significant. Whether the household is electrified or not has a positive effect (0.099) on age at marriage with standard error being 0.081. However, this variable is not statistically significant. The variable, WATER has a positive effect (0.208) on age at first marriage with standard error being 0.072 and this is also true in the case of women's education

(1.228 with standard error 0.056). Among all the economic variables, respondent's education (R_EDUCN) has the most significant effect on age at first marriage.

Second part of Table 14 presents the net effect of economic variables on age at first menstruation (S235). Place of residence has a significant negative effect on age at first menstruation of women with coefficient –0.558 and standard error being 0.041. The unit change in partner's occupation will change age at first menstruation by 0.010 units with standard error being 0.013 after controlling for V119, WATER, and R_EDUCN. However, this variable is not significant. Having or not having electricity at home has a positive effect (0.007) on age at first menstruation with standard error being 0.037. The variable, WATER has a positive effect (0.045) on age at first menstruation with standard error being 0.033. However, this effect is not statistically significant. Women's education is another variable that has a negative effect on age at first menstruation. Women's education is again the most significant variable in describing age at first marriage after controlling for other variables.

Table 15 presents the net effect of economic variables on conception variables. Logistic regression technique is used to understand the net effect of economic variables on conception variables. All the economic variables are statistically significant and have positive odds with respect to use of contraceptives. The odds of using contraceptives are 2.077 times more for women living in urban areas as compared to women from rural areas with standard error being 0.059. Women whose partner's work in service sector or professional jobs have higher odds (1.191) of using contraceptives as compared to women whose partner's work in other occupations. Those having electricity at home have higher odds of (1.970) of using contraceptives as compared to women from non-

electrified households. The odds of using contraceptives are 1.287 times more for women from households with piped drinking water as compared to women from households with a non-pipe source of drinking water. Odds for using contraceptives are also higher (1.266) for women with higher education as compared to women with no education.

The odds of current breastfeeding status is about 0.216 times less for women living in urban areas as compared to women living in rural areas. Women whose partner's work in service sector or professional jobs have higher odds (1.048) of breastfeeding at the time of survey as compared to partner's working (not working/ manual work) in agricultural jobs. Having electricity at home lowers the odds (0.883) of breastfeeding as compared to women from non-electrified households. The odds of breastfeeding at the time of survey are 0.171 times less for women from households with a piped as source of drinking water as compared to women from households with a non-pipe source of drinking water. Women with higher education are likely to have higher odds (1.077) for breastfeeding as compared to women with no education.

Table 16 presents the net effect of economic variables on gestation (MISCARRY). The odds of whether women had a miscarriage or abortion are 1.401 times higher for women living in urban areas as compared to women living in rural areas. Women whose partner's work in service sector or professional jobs have lower odds (0.947) of having miscarriage or abortion as compared to partner's work in other occupations. Having electricity at home increases the odds of having a miscarriage or abortion by 1.182 times as compared to women from non-electrified households. The odds of having miscarriage or abortion are 0.062 times less for women from households with a piped source of drinking water as compared to women from households with a

non-piped source of drinking water. Odds are also lower (0.572) for women with higher education as compared to women with no education with respect to having miscarriage or abortion.

The net effect of gender variables on intercourse variables is presented in Table 17. It is observed that the variable best educational level for daughters (S628) is positively associated with age at marriage. The regression coefficient is 0.224 with standard error being 0.031. Approval for daughter working (DAU_WORK) has a negative effect on age at marriage, that is, for every unit change in DAU_WORK, the age at marriage is changed by –0.226 units with standard error being 0.096. Whether husband approves of family planning has a negative effect (-0.004) on age at first marriage with standard error being 0.100, but not significant. The variable, V611, whether discusses family planning with partner, also has a negative effect (-0.124) on age at first marriage with standard error being 0.049. A unit change in women's approval of family planning changes the age at marriage by 0.225 units with standard error being 0.103. All the gross effects of economic variables are statistically significant on age at first marriage except the variable V610, whether husband approves of family planning or not.

The aspired educational level for daughters (S628) has a negative effect on age at first menstruation of women. This means, for every unit change in the level of education preferred, age at first menstruation is changed by -0.095 units with standard error being 0.013. The unit change in the approval of daughter working (DAU_WORK) changes age at first menstruation by 0.058 units with standard error being 0.042. Husband's approval of family planning has negative effect (-0.160) on age at first menstruation with standard error being 0.034. Whether women discuss family planning with their partner (V611) has

a negative effect (-0.103) on age at first menstruation of women. The unit change is positive (0.019) for the variable, whether women approve of family planning or not, but not statistically significant.

The net effect of gender variables on conception variables is presented in Table 18. The odds of using contraceptives are 1.291 times higher for women preferring high levels of education (S628) for their daughters as compared to women preferring no/reading and writing/basic education for their daughters. Women who approves their daughter working (DAU_WORK) have lower odds (0.679) of using contraceptives as compared to women who does not approve their daughter working. Husband's approval of family planning (V610) is likely to increase the odds (4.209) of using contraceptives as compared to husband's disapproval. The odds of using contraceptives are 1.593 times more for women if they discuss family planning with their partner as compared to women who do not discuss family planning with their partner. Odds are also higher (2.311) for women who approve of family planning (V612) as compared to women who do not approve of family planning. All the independent variables are statistically significant.

The odds of the status of current breastfeeding are 0.129 times less for women who prefer high levels of education for their daughters as compared to women who prefer no/read and write/basic education for their daughters. Women who approve their daughter working have higher odds (1.138) of breastfeeding as compared to women who disapprove their daughter working. The relationship is not statistically significant. Husband's approval of family planning (V610) reduces the odds of breastfeeding status. Women who discuss family planning with partners likely to increase the odds (1.374) of the status of breastfeeding as compared to women who do not discuss family planning

with their partners. Odds for breastfeeding are also higher (1.096) for women who approve family planning as compared to women who do not approve family planning. However, this effect is not statistically significant.

Table 19 presents the gross effect of gender variables on MISCARRY. The odds of whether women had a miscarriage or abortion are 1.030 times higher for women who prefer higher levels of education for their daughters as compared to women who prefer "no/read and write/basic" education for their daughters. Women who approve of their daughter working are likely to increase the odds (1.054) of having a miscarriage or abortion as compared to women who do approve their daughter working. Husband's approval of family planning also increases the odds (1.022) of having miscarriage or abortion. Women who discuss family planning with their partner increases the odds (1.075) of having miscarriage or abortion as compared to women who do not discuss family planning with their partners. The odds of having miscarriage or abortion are 1.036 times more for women who approve of family planning as compared to women who do not approve of family planning. All the independent variables in model are not statistically significant.

The preliminary analysis described above draws three points. First, it provides the association between variables in the model in terms of magnitude and direction. Second, it provides the gross effect of variables in the model and finally, the net effect of variables. Table 20 through Table 25 gives the summary of expected and obtained direction of variables on the basis of the net effect of variables.

Table 20 provides the expected and obtained direction of economic variables on intercourse variables. All the economic variables are in the expected direction except

place of residence. It is widely known that the timing of first menstruation varies from individual to individual and is considered as a nutritional phenomenon, thus the expected direction of economic variables did not have a strong explanatory power in explaining the variation in age at first menstruation. All the economic variables are in the expected direction in explaining the variation in ever use of contraceptives. The expected and obtained direction of economic variables on current breastfeeding status is the same except for R_EDUCN (see Table 21). Variables such as PLACE and V119 are not in the expected direction, while explaining effect of economic variables on gestation (see Table 22).

Table 23 provides the expected and obtained direction of gestation variables on intercourse variables. Variables such as S628 and V612 are in the expected direction. The expected and obtained direction of variables such as, DAU_WORK, V610 and V611, on age at first marriage are dissimilar. The expected and obtained direction of gender variables on the use of contraceptives is in the same direction except for DAU_WORK (see Table 24). The direction of the variables such as DAU_WORK, V611, and V612 on current breastfeeding status is not in the expected direction. Though the effects of all the gender variables on MISCARRY are not in the expected direction, they are not statistically significant.

Above analysis suggests how the proposed independent variables in the model influence the dependent variables at the gross level and at the net level. The dependent variables related to intercourse, conception, and gestation are seen as indicators of underlying dimensions of reproductive health. In addition, it was suggested that two sources of societal influences, economic and gender dimension determine the level of

reproductive health. Prior analysis focussed on the independent effects of each of the several indicators related to economic dimension and gender dimension on the proximate determinants namely, intercourse, conception, and gestation. In this regard, focus was on the direction and level of significance of several expected relationships. These expected relationships in general were derived from the overall latent structural model of reproductive health proposed in this study. For example, if economic dimension is expected to have a positive relationship with reproductive health, then it was shown in the prior analysis that indicators related to economic dimension had a positive effect on each of the three components of reproductive health – intercourse, conception, and gestation. Similar analyses were carried out to show the effect of the indicators of gender dimension on each of the three components of reproductive health. The belief that the chosen indicators of economic, gender, and reproductive health adequately measure the underlying traits of economic, gender, and reproductive health may be evaluated using factor analysis. The purpose is to evaluate the association between the selected economic variables with an underlying economic dimension; selected gender variables with an underlying gender dimension; and selected reproductive health variables with an underlying reproductive health dimension. This preliminary evaluation of the presence of three dimensions in the economic, gender and reproductive health variables may be evaluated using exploratory factory analysis (EFA).

Exploratory Factor Analysis of Economic and Gender Dimensions

It is important to remember that the hypotheses in this study are not between observed variables rather between latent variables. Thus, creating latent variables and

understanding the relationship between them is the next step. Table 26 and Table 27 present the factor analysis output for economic and gender dimensions. The options used while running factor analysis are maximum likelihood method for extraction and VARIMAX method for rotation. While applying this technique it is assumed that all the variables are continuous.

Table 26 shows the factor loading for economic dimension. All the economic variables loaded in one factor. The variables such as PLACE and V119 have high factor loading of more than 0.7, followed by WATER (0.529), R_EDUCN (0.457). The variable, partner's occupation, P_OCCUPN, has the smallest factor loading of 0.219. The goodness-of-fit test shows that chi-square value is 286.26 with degrees of freedom 5 and is statistically significant. The factor scores for economic variables are called ECONFACT.

Factor loading on gender dimension is presented in Table 27. The gender variables are loaded on two factors. The variables such as, women's perception on their daughter's education (S628) and her approval of daughter working (DAU_WORK) are highly loaded on one factor. The family planning variables such as husband's approval of family planning (V610), discussed family planning with partner (V611), and women's approval of family planning (V612) loaded strongly on another factor. The first factor is named as perception on daughter variables (DAUFACT) and second factor is called family planning variables (FPFACT). However, the correlation coefficient between these two factors (DAUFACT and FPFACT) is 0.537 and is statistically significant. Thus, even though two factors are found in place of an hypothesis of unidimensional factor of gender, the correlation between the two factors are high and statistically significant.

It is hypothesized that economic dimension and gender dimension influence reproductive health. This expectation also suggests that these two dimensions, economic and gender, influence each one of the three components of reproductive health. In order to test this, I perform a number of regressions. In the next step, the gross and net effects of economic and gender factors on intercourse, conception, and gestation variables are obtained.

Gross Effects of Economic and Gender Dimensions on the Components of Reproductive Health

Table 28 through Table 30 presents the gross effects of economic dimension on intercourse, conception and gestation variables. The effect of economic dimension (ECONFACT) on V511 and S235 is presented in Table 28. This table shows that ECONFACT has a positive effect on age at first marriage (V511) (beta coefficient = 0.531, $p < 0.05$; and standard error being 0.037) and a negative effect on age at first menstruation (S235) with coefficient -0.278 and standard error being 0.017. The effects are statistically significant. Overall, this implies that the higher the economic dimension, the higher the age at first marriage and the lower the age at first menstruation. The likelihood of ever using contraceptives is high for women at high level of economic dimension (see Table 29). That is, women at the higher levels of economic dimension have 2.297 times higher odds of ever using contraceptives as compared to women who are at the low level of lower economic dimension. On the other hand, women at higher economic dimension have 0.813 times lower odds of currently breastfeeding compared to women who rank low in the economic dimension. Economic dimension has statistically

significant association with conception variables. Also, women at higher levels of economic dimension are more likely to have miscarriages or abortion as compared to women who rank low in the economic dimension (see Table 30). That is, women at higher economic dimension have 1.079 higher odds of having miscarriages or abortion as compared to women who rank low in the economic dimension.

Table 31 through Table 33 presents the gross effect of gender dimension on intercourse, conception, and gestation variables. As mentioned before, gender dimension has two factors namely, perception on daughter variables (DAUFACT) and family planning variables (FPFACT). Each one of the variables related to intercourse, conception and gestation are regressed on the economic and gender factors. Table 31 presents the association between gender factors and intercourse variables. Daughter factor (DAUFACT) and family planning factor (FPFACT) are positively associated with age at marriage and are statistically significant. That is, the higher the aspiration for education of daughters and approval for daughter working, the higher the age at marriage. Also, the higher the communication between women and their partners, the higher the age at marriage. On the other hand, DAUFACT and FPFACT are negatively associated with age at first menstruation.

Table 32 presents gross effect of DAUFACT and FPFACT on EVERUSE and V404. Women with higher perception on their daughters are more likely to use contraceptives as compared to women with lower aspirations for education for daughters and their working status. That is, women with high DAUFACT have 3.638 times higher odds of using contraceptives as compared to women with lower DAUFACT. Also, women with high factor scores for FPFACT have higher odds (1.066) of using

contraceptives as compared to women with low factor scores for FPFACT. The odds of breastfeeding are 0.985 times lower for women with high factor scores for DAUFACT and 1.040 times higher for women with higher FPFACT. However these effects are not statistically significant.

Logistic regression of gender dimension on gestation is presented in Table 33. This table presents the gross effect of gender factor on gestation. The table shows that women with high factor scores for DAUFACT have higher odds of having miscarriages or abortion as compared to women with low DAUFACT. This is also true for women with high factor scores for FPFACT but not statistically significant. This means that women with high factor scores for FPFACT have higher odds of having miscarriages or abortion as compared to women with low factor scores for FPFACT. In general, the expectations with respect to the effects of economic and gender dimensions on each of the variables related to intercourse, conception and gestation appear to support the proposed model for reproductive health.

Exploratory Factor Analysis on Reproductive Health Dimension

Factor analysis technique is also applied to classify intercourse, conception, and gestation variables. The results are presented in Table 34. This table presents the factor loading on reproductive health dimension. The variables used in this dimension are intercourse variables (V511 and S235), conception variables (EVERUSE and V404), and gestation variable (MISCARRY). The reproductive health variables load on two factors (EXPOSURE and GESTATION). The factor EXPOSURE represents women's exposure to intercourse whereas the factor GESTATION represents exposure to gestation. The

variable, age at first menstruation (S235) loads on the first factor (EXPOSURE) with a factor loading of 0.996 and MISCARRY loads on the second factor (GESTATION) with a factor loading of 0.995. The factor loading of remaining indicators of reproductive health is very low. One of the possible reasons for low factor loading is that some of the reproductive health indicators are categorical. Factor analysis assumes that variables are measured at interval/ordinal level. In spite of this shortcoming, it is to be noted that factor analysis provides evidence for three sub dimensions with in reproductive health, namely, intercourse, conception, and gestation. The results of factor analysis, in general, support the presence of three hypothesized dimensions in the model.

In sum, the above analyses examined the empirical support for the hypothesized relations among the dimensions of economic, gender and reproductive health. This empirical support is drawn from results presented in several tables mentioned above. Recalling the first hypothesis (H1), the higher the economic dimension, the lower the exposure to intercourse. This relationship is presented in Table 28, the regression coefficient of ECONFACT on V511 (age at marriage) is 0.531 with standard error being 0.037 and the regression coefficient of ECONFACT on S235 (age at first menstruation) is –0.278 with standard error being 0.017. The relationships are significant at 0.01 level.

The second hypothesis (H2) states that the higher the economic dimension, the lower the exposure to conception. The results from Table 29 show that the regression coefficient of ECONFACT on EVERUSE is 0.832 with standard error being 0.026 and the regression coefficient of ECONFACT on V404 (breastfeeding status) is –0.204 with standard error being 0.024. That is, the higher the economic dimension, the higher the odds of using contraceptives, which lowers the exposure to conception. Also, the higher

the economic dimension, the lower the odds of breastfeeding. This relationship is statistically significant at 0.01 level.

Table 30 shows the relationship between economic dimension and gestation. The regression coefficient of ECONFACT on MISCARRY (ever had a miscarriage or abortion) is 0.076 with standard error being 0.025. This supports the third hypothesis (H3) that the higher the economic dimension, the higher the exposure to gestation and successful parturition.

The higher the gender dimension, that is, the higher the expectation on daughters education and approval of daughter working and approval of family planning, the lower the exposure to sexual union is the fourth hypothesis (H4). This hypothesis is partially supported by the data (see Table 31). Both gender dimensions (DAUFACT and FPFACT) are positively associated with V511 (age at marriage) which lowers the exposure to sexual union. On the other hand, DAUFACT and FPFACT are negatively associated with S235 (age at first menstruation) thus lowers the exposure to sexual union. Both gender dimensions are statistically significant at 0.01 level and thus supports the hypothesis.

The fifth hypothesis (H5) states that higher the gender dimension, lower the exposure to conception. The results related to this hypothesis are presented in Table 32. Both the gender factors (DAUFACT and FPFACT) have hypothesized effects on exposure to conception and are statistically significant at 0.01 level. But the relationship between DAUFACT on V404 (current status of breastfeeding) is in reverse direction and is not statistically significant. The odds of FPFACT on V404 is positive (1.040) and supports the hypothesis.

The higher the gender power, the higher the exposure to gestation is the sixth hypothesis (H6). Table 33 shows that the odds of having abortions or miscarriages are 1.062 times higher for women who have higher expectations for their daughter in terms of their education and job and is statistically significant. This is also true for those women who approve family planning and discuss family planning with their partners. This effect is not statistically significant. Hypotheses H7 and H8 are tested in the following section.

Overall, the regression of economic and gender dimensions on the components of reproductive health dimension further substantiates the results obtained in the net effects of variables presented in the previous section. That is, in Table 14 it is shown that all the economic variables except PLACE have a positive and significant effect on intercourse variables. These variables indicate the underlying dimension, ECONFACT. The higher the levels of economic dimension, the higher the age at marriage. The regression of S235 (age at first menstruation) on economic variables also remained the same in both the regression analyses. Similarly, the economic variables have positive and significant effect on EVERUSE and positive and negative effect on V404 (see Table 15). This effect is further reestablished when the economic variables replaced by ECONFACT (see Table 29). In general, the net effect of MISCARRY on economic variables is negative (see Table 16). The effect of economic variables on MISCARRY, and the effect of the underlying dimension, ECONFACT, are similar and in hypothesized directions. Net effects of gender variables on intercourse, conception and gestation variables are also supported at the latent dimensional level. In general, the regression results showed similar results.

Confirmatory Factor Analysis

To test the hypotheses that economic and gender dimensions influence reproductive health, structural equation methods are used. The results from exploratory factor analysis provided general support for the presence of the three factors, economic, gender and reproductive health dimensions. The gender dimension, however, had two factors. But it was observed that these two factors were strongly correlated. The validity of the measures of these three dimensions can easily be further assessed using confirmatory factor analysis (CFA) method. Once the measures of the three dimensions are established using CFA approach, it is feasible to assess the effect of the gender and economic dimensions on reproductive health. In this respect, the reminder of the analysis proceed through stages of analysis, namely, confirmatory factor analysis to assess the presence of the three dimensions, followed by and evaluation of the hypothesized causal structures. It is hypothesized that economic and gender dimensions influence reproductive health.

A statistical program called Mplus is used to carry out CFA as well as the structural equation analysis of the proposed causal structures. This program has several advantages over other similar programs such as LISREL, AMOS, etc. One of the advantages of this program, over other programs is the use of latent class variables in the model. Another feature of this program is its use of categorical or dummy variables as input variables. Several estimation methods such as, maximum likelihood (ML), maximum likelihood with robust standard errors and chi-square (MLM, MLMV), generalized least square (GLS), weighted least square (WLS), robust weighted least squares (WLSM, WLSMV), and unweighted least squares (ULS) are available in this

program. This program also features several model fit indexes such as, chi-square, comparative fit index (CFI), Tucker-Lewis index (TLI), root mean square error of approximation (RMSEA), standardized root mean square residual (SRMR), and weighted root mean square residual (WRMR). The following results explain the output for CFA.

Table 35 presents the CFA outcome for economic dimension. The first column represents the variables in the model, unstandardized coefficients (estimates) are in the second column, the third column gives the standard error (S.E.), and the last column gives the ratio of estimate to standard error. The estimate divided by the standard error tests the null hypothesis that the parameter estimate is zero in the population from which the sample is drawn. An unstandardized estimate divided by its standard error is usually considered as Z-statistic, so values that exceed +1.96 or fall below –1.96 are significant below $p = 0.05$.

In Table 35, each of the estimated parameters has an estimate to standard error ratio greater than +1.96, so each factor loading is statistically significant. Also, each unstandardized estimate represents the amount of change in the outcome variable as a function of a single unit change in the causal variable. That is, for each single unit change in the economic factor, P_OCCUPN scores increase by 0.296 units. Also, the chi-square test is statistically significant. The null hypothesis that there are as many factors as there are variables is rejected. The chi-square for the alternative single factor model is approximately 386.00. Since chi-square test is sensitive to sample size such that large samples often return to statistically significant chi-square values and non-normality in the input variables, RMSEA is more appropriate. This statistic (RMSEA) is not sensitive to large sample sizes. According to Browne and Cudeck (1993), RMSEA values between

0.05 and 0.09 reflect a statistically fitting model. The value of RMSEA in the current model is 0.089, which suggests that one factor model does fit the data adequately. Also, indexes such as CFI and TLI are greater 0.9 indicate an acceptable fit.

The results of CFA for gender dimension are presented in Table 36. Since for each estimate to standard error ratio is greater than +1.96, the parameters are statistically significant. The RMSEA value is 0.215 which is not in the accepted range (0.05 to 0.09) suggests that one factor model is not statistically appropriate. Also, indexes such as CFI and TLI, are 0.892 and 0.837 respectively, are close to the accepted upper bound (0.9), may be considered an acceptable fit.

Table 37 presents the CFA output for the reproductive health dimension. The variable V511 (age at first marriage) is dropped to have accepted levels of CFI and TLI indexes. The estimate to standard error ratio is less than +1.96 for all the variables except for MISCARRY. This suggests that only the variable, MISCARRY is loaded significantly. The value of RMSEA is 0.061 is within the accepted (0.05 to 0.09) range suggests that the variables does fit the model. The value of CFI is 0.912 which is greater than 0.9 yield to an acceptable fit. However, the value of TLI is less than the accepted lower bound.

The CFA approach provided strong support to the presence of the three proposed dimensions. Next step then is to examine whether these dimensions can be used to explain reproductive health of women in Yemen. That is, the final analysis is to test the overall model fit of the proposed model presented in Figure 2 in Chapter 3. In order to understand the influence of economic and gender dimensions on reproductive health, structural equation technique is applied. This is a statistical method that includes the

estimation of models with regressions among continuous latent variables or factors. The latent variables in the present model are economic dimension, gender dimension and reproductive health dimension. These dimensions are characterized by combination of categorical and continuous variables. The statistical program that I used, called Mplus, accommodates a combination of both continuous and categorical variables in the model.

Structural Equation Model Analysis

The overall model fit of the structural equation is presented in Table 38. All the factor loadings are statistically significant. That is, since the ratio of estimates to standard error fall below –1.96 and above +1.96, it is established that all the parameters are loaded significantly. The measurement model index (RMSEA) is 0.083 which is within the accepted range of values (0.05 to 0.09) indicates a satisfactory fit. The other measurements for model fit are CFI and TLI, since both the indexes are above 0.9 (CFI = 0.912 and TLI = 0.929) indicate a satisfactory fit. This clearly indicates that the proposed model can be used to measure reproductive health in Yemen.

The effect of economic dimension on reproductive health is positive and significant. In addition, the effect of gender dimension on reproductive health is positive and significant. The ratio of estimate to standard error, values of CFI, TLI, and RMSEA, considered together, indicate that the overall fit of the model to the data is satisfactory. Both CFI value and TLI value are above the acceptable value of 0.9. These results provide adequate support to the hypotheses (a) the higher the economic dimension, the higher the reproductive health (H7) and (b) the higher the gender status of women, the higher the reproductive health (H8). It is also observed in the table that estimate of

reproductive health dimension on gender dimension is greater than the estimate of reproductive health dimension on economic dimension. This supports the hypothesis that gender dimension has greater influence on reproductive health than economic dimension on reproductive health.

CHAPTER 6

CONCLUSION AND DISCUSSION

Although the issue of women's reproductive health has aroused international concern in recent years, particularly in developing countries, the theoretical approaches used to explain levels of reproductive health remains highly unorganized. The current theoretical approaches toward population control are influenced by the ideological shift towards a broad-based approach which involves fertility or family size as one of the components of reproductive health. In this regard, several scholars suggest that the current theoretical approaches to population control are of limited use in understanding reproductive health. However, the assumption that factors which influence fertility are poor predictors of reproductive health has not been adequately tested. Secondly, feminist scholars on reproductive health have criticized the current exclusive focus on limited availability and accessibility to birth control. Feminist scholars have consistently pointed out the role of political and social constraints on women's reproductive health. However, these suggestions have not been adequately incorporated into an empirical model of reproductive health which pays attention to the process of reproduction involving sexual unions, conception, and gestation. Thirdly, there are several measurement issues with respect to reproductive health, which have not been adequately addressed. For example, measurement of reproductive health is hampered by a lack of development of scales. One reason for inadequate attention on reproductive health stems from a lack of theoretical approach toward selecting indicators of reproductive health. Finally, there is a noticeable

lack of studies on reproductive health in Muslim countries. The role of religion is crucial in understanding the value basis of reproductive health. Islamic societies provide a rich research site to understand the role of social institutions on reproductive health. This is because it is well known that the Islamic religion has well-defined directives on various aspects of fertility and reproductive health.

Given these shortcomings in the literature on reproductive health, the present study proposes a theoretical model of reproductive health and applies this framework to assess the reproductive health of women in Yemen. The data for the study come from the Yemen Demographic and Maternal and Child Health Survey (YDMCHS) conducted in 1997. The results of the study provide complete support for the proposed model and implications for social policy making.

The empirical findings support the hypothesis that the higher the economic dimension, the lower the exposure to intercourse. That is, women who are engaged in economic activities are more likely to postpone their marriage to a later age than women who are not engaged in economic activities. Thus postponement of marriage reduces their exposure to sexual union in the reproductive period. Similar relationship is observed between the economic dimension and exposure to conception. That is, women who are involved in economic activities are more likely either to use contraceptives or likely to have access to contraceptives. This reduces their exposure to conception. Women who are either engaged in economic activities or are educated have better knowledge of, access to and practice of modern contraceptives.

Having higher economic status also increases women's control over conception and successful parturition. The empirical findings also support this hypothesis. That is,

women who are involved in economic or income generating activities are more likely to have access to abortion and other post-delivery care services compared to women who are involved in non-economic activities. Evidence of a significant relationship among exposure to intercourse, exposure to conception, exposure to gestation and the economic condition of women imply that empowerment of women through their participation in social and economic activities will increase the reproductive health of women. Thus, to improve reproductive health in a country, government policies should encourage women to have higher education and encourage participation in economic activities.

The empirical findings also supported the hypothesis that the higher the gender dimension the lower the exposure to conception. That is, women who are involved in the reproductive decision making process are more likely to use contraceptives. This reduces her exposure to conception compared to women who do not have power or a role to participate in the reproductive decision-making process. Fertility decisions within the family are usually examined by studying the relative influence of each partner in the interaction. The resulting decision is based upon the hierarchy of status within the relationship and other environmental factors such as the labor value of the children in certain countries. The results of the present study indicate that husband-wife communication on use of contraceptives and their perception of their daughter's education and work participation influence the exposure to intercourse, conception and gestation variables. That is, women who rank high on gender dimension in terms of participation in the decision making process have lower exposure to intercourse and likelihood of conception and higher exposure to gestation. The results indicate that female participation in the reproductive decision making process is an important factor in

lowering her exposure to intercourse and conception and increasing her control over gestation outcomes.

The results provide important insights into the relationship between women's position and reproductive health in Yemen. It was observed that gender power or empowerment of women is more influential than economic status in determining reproductive health. This has wide policy implications similar to the other findings of the study. That is, women's empowerment characteristics such as, approval of their daughter working, high expectation on daughter's education, approval of family planning, and participation in family planning matters with partner have greater impact in determining reproductive health of women in Yemen. This clearly suggests the importance of introducing community level programs to create awareness among married men and women to have a positive environment to discuss family planning activities. Women's approval of their daughter working and aspirations for high education for daughters show room for bringing a better future empowered generation in a male dominated society such as Yemen. This implies that programs should not only concentrate on empowering women but also include men as well.

Although the concept of reproductive health is naturally complex, the proposed framework includes all the components of reproductive process. Considering the components of reproductive health as exposure to intercourse, exposure to conception and gestation, provides a useful framework for examining reproductive health. The economic and gender dimensions are related to reproductive health as hypothesized. The influence of the economic dimension and gender dimension on the components of variables remained in the expected direction. These results suggest that in order to

understand the reproductive health of women, one should consider all the three components together in the model as an index to reproductive health.

It is observed that empowerment of women through female education and involvement of women in economic activities and female autonomy should improve reproductive health of women. Concerns with improvement of reproductive health should be addressed through policies and measures to reduce the emphasis on women's role in motherhood and to improve the resources and opportunities available to women.

Though the proposed model clearly established the components of reproductive health and the relationship between economic factors and gender factors and reproductive health factors, there are several limitations to this study. The first and foremost limitation of this study is the non-availability of several theoretically important variables in the Yemen data set. The present study is restricted to available variables in the data set to measure the components of reproductive health. For example, gender dimension was originally designed to measure the gender inequality in the population. However, variables such as gender differences in decision-making on various activities and gender differences in money spending were either not collected or missing from the data set. A similar situation was faced while selecting variables for intercourse, conception and gestation. In addition certain key demographic variables such as religion and ethnicity were also reported "N/A" in the data set.

Given the limitations in the study, there is great potential for future research. The theoretical framework can be modified on several grounds. First, the components of reproductive health, namely, intercourse, conception and gestation, may be broadened to include intercourse health, conception health and gestational health. Thus, it gives a

broader perspective to the reproductive process. Further, the economic dimension and gender dimension must include more variables that respectively capture economic status and gender inequality in the society.

Future studies may attempt to replicate the proposed model for developed countries. Such studies are likely to improve the empirical validity of the proposed model. The focus of this study was on the utility of the intermediate variables on reproductive health. Consequently, very little attention was given to the role of background factors which influence reproductive health through intermediate variables. In developing countries, in particular, these background factors should include appropriate cultural factors.

APPENDIX

Table 1. Distributional characteristics of variables in the model.

Variable name	Variable label	Levels of measurement	Percent	Valid cases (n)	Number of cases missing
Economic dimension					
Place of residence	PLACE	Dummy		10414	0
Rural = 0			71.7		
Urban = 1			28.3		
Partners occupation	P_OCCUPN	Categorical		9686	728
Did not work = 0			7.5		
Manual labor = 1			21.9		
Agri. self employed = 2			25.2		
Services = 3			31.7		
Professional = 4			13.6		
Has electricity at home	V119	Dummy		10413	1
No = 0			50.4		
Yes = 1			49.6		
Source of drinking water	WATER	Dummy		10411	3
Non-pipe = 0			57.6		
Pipe = 1			42.4		
Respondents education	R_EDUCN	Categorical		10414	0
No education = 0			78.9		
Primary = 1			12.4		
Secondary or higher = 2			8.7		
Gender Dimension					
Best educational level for Daughter	S628	Categorical		10402	12
No education = 1			8.3		
Read and write = 2			15.2		
Basic = 3			13.6		
Secondary = 4			14.4		
Higher and more = 5			48.6		
Approves daughter working	DAU_WORK	Dummy		10397	17
Disapproves = 0			26.5		
Approves = 1			73.5		
Husband approves FP	V610	Dummy		7533	2881
Disapproves = 0			46.6		
Approves = 1			53.4		
Discussed FP with partner	V611	Categorical		9736	678
Never = 0			47.6		
Once or twice = 1			23.6		
More often = 2			28.7		

Table 1. Distributional characteristics of variables in the model (contd.).

Variable name	Variable label	Levels of measurement	Percent	Valid cases (n)	Number of cases missing
Respondent approves FP	V612	Dummy		8981	1433
Disapproves = 0			37.8		
Approves = 1			62.2		
Intercourse variables					
Age at first marriage [a]	V511	Continuous		10414	0
Age at first menstruated [b]	S235	Continuous		9127	1287
Conception variables					
Ever used contraceptives	EVERUSE	Categorical		10414	0
Never used = 0			60.4		
Used traditional = 1			15.0		
Used modern = 2			24.5		
Currently breastfeeding	V404	Dummy		10414	0
No = 0			63.3		
Yes = 1			36.7		
Gestation variables					
Had miscarriages or abortion	MISCARRY	Dummy		10410	4
No = 0			69.6		
Yes = 1			30.4		

a- mean age at marriage is 16.2 years, median age at marriage is 16.0 years, standard deviation is 3.21 and skewness is 1.186.
b- mean age at first menstruation is 13.9 years, median age at first menstruation is 14.0 years, standard deviation is 1.36, and skewness is –0.421.

Table 2. Association between economic variables and intercourse variables.

Variables	Intercourse variables			
	V511		S235	
	Eta	Correlation coefficient	Eta	Correlation coefficient
PLACE	0.084	0.084*	0.202	-0.202*
P_OCCUPN	0.145	0.067*	0.070	-0.036*
V119	0.091	0.091*	0.117	-0.117*
WATER	0.086	0.086*	0.068	-0.068*
R_EDUCN	0.258	0.243*	0.134	-0.133*

*$p < 0.001$

Table 3. Association between economic variables and conception variables.

Variables	Conception variables			
	EVERUSE		V404	
	Phi	Correlation coefficient	Phi	Correlation coefficient
PLACE	0.374*	0.355*	-0.081*	-0.081*
P_OCCUPN	0.210*	0.124*	0.058*	0.006
V119	0.356*	0.344*	-0.075*	-0.075
WATER	0.261*	0.244*	-0.078*	-0.078*
R_EDUCN	0.237*	0.220*	0.042*	-0.031*

*$p < 0.001$

Table 4. Association between economic variables and gestation variable.

Variables	MISCARRY	
	Phi	Correlation coefficient
PLACE	0.052*	0.052*
P_OCCUPN	0.015	-0.007
V119	0.037*	0.037*
WATER	0.004	0.004
R_EDUCN	0.069*	-0.063*

*$p < 0.001$

Table 5. Association between gender variables and intercourse variables.

Variables	Intercourse variables			
	V511		S235	
	Eta[a]	Correlation coefficient	Eta	Correlation coefficient
S628	0.087	0.086*	0.130	-0.112*
DAU_WORK	0.013	0.013*	0.043	-0.043*
V610	0.028	0.028**	0.099	-0.099*
V611	0.018	-0.010	0.096	-0.096*
V612	0.039	0.039*	0.075	-0.075*

*p < 0.001; **p < 0.05; a: significant is not shown in the output.

Table 6. Association between gender variables and conception variables.

Variables	Conception variables			
	EVERUSE		V404	
	Phi	Correlation coefficient	Phi	Correlation coefficient
S628	0.214*	0.195*	0.036**	-0.034*
DAU_WORK	0.100	0.090*	0.008	0.008
V610	0.527*	0.523*	-0.021	-0.021
V611	0.386*	0.382*	0.054*	0.041*
V612	0.413*	0.412*	0.011	0.011

*$p < 0.001$; **$p < 0.05$.

Table 7. Association between gender variables and gestation variable.

Variables	MISCARRY	
	Phi	Correlation coefficient
S628	0.017	0.001
DAU_WORK	0.013	0.013
V610	0.020	0.020
V611	0.065*	0.062*
V612	0.021*	0.021*

*$p < 0.001$

Table 8. Gross effect of economic variables on intercourse variables.

Variables	Intercourse variables			
	V511		S235	
	β (S.E.)	Significance	β (S.E.)	Significance
Constant	16.067 (0.037)		14.150 (0.016)	
PLACE	0.059 (0.070)	0.000	-0.610 (0.031)	0.000
Constant	15.825 (0.070)		14.070 (0.032)	
P_OCCUPN	0.185 (0.028)	0.000	-0.042 (0.013)	0.001
Constant	15.947 (0.044)		14.135 (0.020)	
V119	0.582 (0.063)	0.000	-0.318 (0.028)	0.000
Constant	16.000 (0.041)		14.057 (0.019)	
WATER	0.556 (0.063)	0.000	-0.188 (0.029)	0.000
Constant	15.861 (0.034)		14.064 (0.016)	
R_EDUCN	1.261 (0.049)	0.000	-0.292 (0.023)	0.000

Table 9. Gross effect of economic variables on conception variables.

Variables	Conception variables					
	EVERUSE			V404		
	β (S.E.)	e^{β}	Sig.	β (S.E.)	e^{β}	Sig.
Constant	-0.815 (0.025)	0.442	0.000	-0.439 (0.024)	0.645	0.000
PLACE [a]	1.309 (0.046)	3.704	0.000	-0.383 (0.047)	0.682	0.000
Constant	-0.637 (0.029)	0.529	0.000	-0.434 (0.028)	0.648	0.000
P_OCCUPN [b]	0.546 (0.042)	1.726	0.000	-0.053 (0.042)	0.948	0.203
Constant	-1.066 (0.032)	0.344	0.000	-0.392 (0.028)	0.676	0.000
V119 [c]	1.217 (0.042)	3.376	0.000	-0.313 (0.041)	0.732	0.000
Constant	-0.782 (0.028)	0.458	0.000	-0.407 (0.026)	0.665	0.000
WATER [d]	0.808 (0.041)	2.243	0.000	-0.329 (0.042)	0.720	0.000
Constant	-0.602 (0.023)	0.548	0.000	-0.523 (0.023)	0.593	0.000
R_EDUCN [e]	0.811 (0.049)	2.249	0.000	-0.098 (0.050)	0.906	0.050

Note: Reference categories are: a – rural; b – No work/Manual work/Agricultural work; c - No electricity; d – No pipe water; e – No education.

Table 10. Gross effect of economic variables on gestation variable.

Variables	MISCARRY		
	β (S.E.)	e^{β}	Sig.
Constant	-0.902 (0.026)	0.406	0.000
PLACE [a]	0.246 (0.046)	1.278	0.000
Constant	-0.786 (0.030)	0.456	0.000
P_OCCUPN [b]	-0.045 (0.044)	0.956	0.307
Constant	-0.912 (0.031)	0.402	0.000
V119 [c]	0.162 (0.043)	1.176	0.000
Constant	-0.837 (0.028)	0.433	0.000
WATER [d]	0.015 (0.043)	1.016	0.719
Constant	-0.754 (0.024)	0.470	0.000
R_EDUCN [e]	-0.385 (0.055)	0.681	0.000

Note: Reference categories are: a – rural; b – No work/Manual work/Agricultural work; c - No electricity; d – No pipe water; e – No education.

Table 11. Gross effect of gender variables on intercourse variables.

Variables	Intercourse variables			
	V511		S235	
	β (S.E.)	Significance	β (S.E.)	Significance
Constant	15.480 (0.091)		14.393 (0.041)	
S628 [a]	0.199 (0.023)	0.000	-0.109 (0.010)	0.000
Constant	16.165 (0.061)		14.075 (0.028)	
DAU_WORK [b]	0.096 (0.071)	0.180	-0.133 (0.032)	0.000
Constant	16.141 (0.054)		14.120 (0.024)	
V610 [c]	0.177 (0.074)	0.017	-0.268 (0.033)	0.000
Constant	16.267 (0.045)		14.101 (0.020)	
V611 [d]	-0.039 (0.038)	0.303	-0.152 (0.017)	0.000
Constant	16.074 (0.055)		14.107 (0.025)	
V612 [e]	0.260 (0.070)	0.000	-0.209 (0.031)	0.000

Note: Reference categories are: a – No education/Read and write/Basic; b – Disapproves daughter working; c – Partner disapproves FP; d – Never discussed FP; e – Respondent disapproves FP.

Table 12. Gross effect of gender variables on conception variables.

Variables	Conception variables					
	EVERUSE			V404		
	β (S.E.)	e^{β}	Sig.	β (S.E.)	e^{β}	Sig.
Constant	-0.787 (0.035)	0.455	0.000	-0.447 (0.033)	0.639	0.000
S628 [a]	0.564 (0.043)	1.758	0.000	-0.153 (0.042)	0.858	0.000
Constant	-0.663 (0.040)	0.515	0.000	-0.568 (0.040)	0.567	0.000
DAU_WORK [b]	0.325 (0.046)	1.385	0.000	0.036 (0.046)	1.037	0.433
Constant	-1.208 (0.040)	0.299	0.000	-0.393 (0.034)	0.675	0.000
V610 [c]	2.036 (0.053)	7.659	0.000	-0.088 (0.047)	0.916	0.063
Constant	-1.212 (0.035)	0.298	0.000	-0.576 (0.031)	0.562	0.000
V611 [d]	1.473 (0.045)	4.362	0.000	0.215 (0.042)	1.240	0.000
Constant	-1.404 (0.043)	0.246	0.000	-0.546 (0.036)	0.579	0.000
V612 [e]	1.716 (0.051)	5.565	0.000	0.048 (0.045)	1.050	0.283

Note: Reference categories are: a – No education/Read and write/Basic; b – Disapproves daughter working; c – Partner disapproves FP; d – Never discussed FP; e – Respondent disapproves FP.

Table 13. Gross effect of gender variables on gestation variable.

Variables	MISCARRY		
	β (S.E.)	e^{β}	Sig.
Constant	-0.843 (0.035)	0.430	0.000
S628 [a]	0.023 (0.044)	1.023	0.609
Constant	-0.875 (0.042)	0.417	0.000
DAU_WORK [b]	0.062 (0.049)	1.064	0.199
Constant	-0.808 (0.037)	0.446	0.000
V610 [c]	0.084 (0.050)	1.088	0.089
Constant	-0.921 (0.033)	0.398	0.000
V611 [d]	0.207 (0.044)	1.230	0.000
Constant	-0.853 (0.038)	0.426	0.000
V612 [e]	0.092 (0.047)	1.097	0.051

Note: Reference categories are: a – No education/Read and write/Basic; b – Disapproves daughter working; c – Partner disapproves FP; d – Never discussed FP; e – Respondent disapproves FP.

Table 14. Net effect of economic variables on intercourse variables.

Variables	Intercourse variables			
	V511		S235	
	β (S.E.)	Significance	β (S.E.)	Significance
Constant	15.963 (0.073)	0.000	14.137 (0.033)	0.000
PLACE	-0.181 (0.089)	0.042	-0.558 (0.041)	0.000
P_OCCUPN	0.041 (0.028)	0.142	0.010 (0.013)	0.431
V119	0.099 (0.081)	0.220	0.007(0.037)	0.860
WATER	0.208 (0.072)	0.004	0.045 (0.033)	0.174
R_EDUCN	1.228 (0.056)	0.000	-0.158 (0.026)	0.000

Table 15. Net effect of economic variables on conception variables.

Variables	Conception variables					
	EVERUSE			V404		
	β (S.E.)	e^{β}	Sig.	β (S.E.)	e^{β}	Sig.
Constant	-1.191 (0.038)	0.304	0.000	-0.292 (0.034)	0.746	0.000
PLACE [a]	0.731 (0.059)	2.077	0.000	-0.243 (0.044)	0.784	0.000
P_OCCUPN [b]	0.175 (0.046)	1.191	0.000	0.047 (0.044)	1.048	0.286
V119 [c]	0.678 (0.054)	1.970	0.000	-0.125 (0.053)	0.883	0.019
WATER [d]	0.252 (0.049)	1.287	0.000	-0.187 (0.048)	0.829	0.000
R_EDUCN [e]	0.236 (0.057)	1.266	0.000	0.074 (0.056)	1.077	0.188

Note: Reference categories are: a – rural; b – No work/Manual work/Agricultural work; c - No electricity; d – No pipe water; e – No education.

Table 16. Net effect of economic variables on gestation variable.

Variables	MISCARRY		
	β (S.E.)	e^{β}	Sig.
Constant	-0.826 (0.036)	0.438	0.000
PLACE	0.337 (0.062)	1.401	0.000
P_OCCUPN	-0.054 (0.047)	0.947	0.244
V119	0.167 (0.057)	1.182	0.003
WATER	-0.064 (0.051)	0.938	0.210
R_EDUCN	-0.558 (0.062)	0.572	0.000

Table 17. Net effect of gender variables on intercourse variables.

Variables	Intercourse variables			
	V511		S235	
	β (S.E.)	Significance	β (S.E.)	Significance
Constant	15.513 (0.112)	0.000	14.454 (0.048)	0.000
S628	0.224 (0.031)	0.000	-0.095 (0.013)	0.000
DAU_WORK	-0.226 (0.096)	0.019	0.058 (0.042)	0.164
V610	-0.004 (0.100)	0.971	-0.160 (0.043)	0.000
V611	-0.124 (0.049)	0.010	-0.103 (0.021)	0.000
V612	0.225 (0.103)	0.029	0.019 (0.045)	0.670

Table 18. Net effect of gender variables on conception variables.

Variables	Conception variables					
	EVERUSE			V404		
	β (S.E.)	e^{β}	Sig.	β (S.E.)	e^{β}	Sig.
Constant	-1.596 (0.072)	0.203	0.000	-0.578 (0.061)	0.561	0.000
S628 [a]	0.255 (0.064)	1.291	0.000	-0.138 (0.057)	0.871	0.016
DAU_WORK [b]	-0.387 (0.073)	0.679	0.000	0.129 (0.064)	1.138	0.043
V610 [c]	1.437 (0.066)	4.209	0.000	-0.247 (0.064)	0.781	0.000
V611 [d]	0.466 (0.062)	1.593	0.000	0.317 (0.057)	1.374	0.000
V612 [e]	0.838 (0.072)	2.311	0.000	0.092 (0.068)	1.096	0.173

Note: Reference categories are: a – No education/Read and write/Basic; b – Disapproves daughter working; c – Partner disapproves FP; d – Never discussed FP; e – Respondent disapproves FP.

Table 19. Net effect of gender variables on gestation variable.

Variables	MISCARRY		
	β (S.E.)	e^{β}	Sig.
Constant	-0.900 (0.064)	0.406	0.000
S628 [a]	0.030 (0.060)	1.030	0.622
DAU_WORK [b]	0.055 (0.067)	1.057	0.408
V610 [c]	0.022 (0.067)	1.022	0.743
V611 [d]	0.072 (0.059)	1.075	0.222
V612 [e]	0.035 (0.071)	1.036	0.618

Note: Reference categories are: a – No education/Read and write/Basic; b – Disapproves daughter working; c – Partner disapproves FP; d – Never discussed FP; e – Respondent disapproves FP.

Table 20. Expected and obtained direction of economic variables on intercourse variables.

Variables	Intercourse variables			
	V511		S235	
	Expected	Obtained	Expected	Obtained
PLACE	+	-	+/-	-
P_OCCUPN	+	+	+/-	+
V119	+	+	+/-	+
WATER	+	+	+/-	+
R_EDUCN	+	+	+/-	-

Table 21. Expected and obtained direction of economic variables on conception variables.

Variables	Conception variables			
	EVERUSE		V404	
	Expected	Obtained	Expected	Obtained
PLACE	+	+	-	-
P_OCCUPN	+	+	+	+
V119	+	+	-	-
WATER	+	+	-	-
R_EDUCN	+	+	-	+

Table 22. Expected and obtained direction of economic variables on gestation variable.

Variables	MISCARRY	
	Expected	Obtained
PLACE	-	+
P_OCCUPN	-	-
V119	-	+
WATER	-	-
R_EDUCN	-	-

Table 23. Expected and obtained direction of gender variables on intercourse variables.

Variables	Intercourse variables			
	V511		S235	
	Expected	Obtained	Expected	Obtained
S628	+	+	+/-	-
DAU_WORK	+	-	+/-	+
V610	+	-	+/-	-
V611	+	-	+/-	-
V612	+	+	+/-	+

Table 24. Expected and obtained direction of gender variables on conception variables.

Variables	Conception variables			
	EVERUSE		V404	
	Expected	Obtained	Expected	Obtained
S628	+	+	-	-
DAU_WORK	+	-	-	+
V610	+	+	-	-
V611	+	+	-	+
V612	+	+	-	+

Table 25. Expected and obtained direction of gender variables on gestation variable.

Variables	MISCARRY	
	Expected	Obtained
S628	-	+
DAU_WORK	-	+
V610	-	+
V611	-	+
V612	-	+

Table 26 Factor loadings on economic dimension.

Variables	ECONFACT
PLACE	0.750
P_OCCUPN	0.219
V119	0.756
WATER	0.529
R_EDUCN	0.457

Chi-square = 286.26, df = 5, significant at $p < 0.001$.

Table 27 Factor loadings on gender dimension.

Variables	DAUFACT	FPFACT
S628	0.236	0.438
DAU_WORK	0.061	0.981
V610	0.788	0.111
V611	0.443	0.141
V612	0.782	0.150

Table 28. Gross effect of economic dimension on intercourse variables.

Variables	Intercourse variables			
	V511		S235	
	β (S.E.)	Significance	β (S.E.)	Significance
Constant	16.240 (0.032)	0.000	13.975 (0.015)	0.000
ECONFACT	0.531 (0.037)	0.000	-0.278 (0.017)	0.000

Table 29. Gross effect of economic dimension on conception variables.

Variables	Conception variables					
	EVERUSE			V404		
	β (S.E.)	e^{β}	Sig.	β (S.E.)	e^{β}	Sig.
Constant	-0.411 (0.022)	0.663	0.000	-0.464 (0.021)	0.629	0.000
ECONFACT	0.832 (0.026)	2.297	0.000	-0.207 (0.024)	0.813	0.000

Table 30. Gross effect of economic dimension on gestation variable.

Variables	MISCARRY		
	β (S.E.)	e^{β}	Sig.
Constant	-0.807 (0.022)	0.446	0.000
ECONFACT	0.076 (0.025)	1.079	0.003

Table 31. Correlation between intercourse variables and gender dimensions.

Gender factors	Intercourse variables	
	V511	S235
DAUFACT	0.036*	-0.103*
FPFACT	0.033*	-0.047*

*p< 0.01

Table 32. Gross effect of gender dimensions on conception variables.

Variables	Conception variables					
	EVERUSE			V404		
	β (S.E.)	e^{β}	Sig.	β (S.E.)	e^{β}	Sig.
Constant	-0.173 (0.028)	0.841	0.000	-0.430 (0.024)	0.650	0.000
DAUFACT	1.291 (0.034)	3.638	0.000	-0.015 (0.027)	0.985	0.582
Constant	-0.048 (0.024)	0.953	0.041	-0.434 (0.024)	0.648	0.000
FPFACT	0.064 (0.025)	1.066	0.011	0.039 (0.026)	1.040	0.126

Table 33. Gross effect of gender dimensions on gestation.

Variables	MISCARRY		
	β (S.E.)	e^{β}	Sig.
Constant	-0.759 (0.025)	0.468	0.000
DAUFACT	0.060 (0.029)	1.062	0.038
Constant	-0.758 (0.025)	0.469	0.000
FPFACT	0.039 (0.027)	1.040	0.148

Table 34. Factor loadings on reproductive health dimension.

Variables	Factor 1 (EXPOSURE)	Factor 2 (GESTATION)
V511	0.146	-0.085
S235	0.996	0.079
EVERUSE	-0.125	0.081
V404	0.013	-0.047
MISCARRY	-0.099	0.995

Chi-square = 2 with d.f = 1.

Table 35. CFA Model for economic dimension.

Variables	Estimates	S.E.	Estimate/S.E.
PLACE	1.000	0.000	0.000
P_OCCUPN	0.296	0.012	25.194
V119	1.021	0.016	65.157
WATER	0.701	0.013	53.916
R_EDUCN	0.685	0.014	47.390
Chi-square Model Fit Value = 386.609, df = 5; P-Value = 0.000 CFI = 0.979 TLI = 0.970 RMSEA = 0.089			

Table 36. CFA Model for gender dimension.

Variables	Estimates	S.E.	Estimate/S.E.
S628	1.000	0.000	0.000
DAU_WORK	1.060	0.037	28.715
V610	1.739	0.046	37.472
V611	1.079	0.035	30.617
V612	1.880	0.051	37.171
Chi-square Model Fit Value = 1333.029, df = 4; P-Value = 0.000 CFI = 0.892 TLI = 0.837 RMSEA = 0.215			

Table 37. CFA Model for reproductive health dimension.

Variables	Estimates	S.E.	Estimate/S.E.
S235	1.000	0.000	0.000
V404	0.055	0.096	0.571
EVERUSE	7.146	6.454	1.107
MISCARRY	0.813	0.121	6.711
Chi-square Model Fit Value = 20.012, df = 2; P-Value = 0.000 CFI = 0.912 TLI = 0.736 RMSEA = 0.031			

Table 38. Overall model fit.

Variables	Estimates	S.E.	Estimate/S.E.
Economic (F1)			
PLACE	1.000	0.000	0.000
P_OCCUPN	0.306	0.015	20.973
V119	0.937	0.016	59.872
WATER	0.651	0.016	41.465
R_EDUCN	0.706	0.016	43.176
Gender (F2)			
S628	1.000	0.000	0.000
DAU_WORK	0.787	0.028	28.099
V610	1.529	0.033	46.117
V611	0.861	0.028	31.121
V612	1.518	0.033	46.338
Reproductive Health (F3)			
S235	1.000	0.000	0.000
V404	2.938	0.219	13.397
EVERUSE	-0.252	0.075	-3.361
MISCARRY	0.192	0.076	2.525
F3 on F1	0.066	0.009	7.504
F3 on F2	0.328	0.027	12.118
F1 with F2	0.359	0.011	33.344
Chi-square Model Fit Value = 2562.164, df = 57, P-Value = 0.000 CFI = 0.912 TLI = 0.929 RMSEA = 0.083			

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