

Women's Autonomy and Utilization of Prenatal Services in  
Armenia and Azerbaijan: Analysis

of Demographic and Health Surveys 2005-2006

by

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## ABSTRACT

Social determinants of health present significant barriers to utilization of maternal health services in transitional countries. This dissertation study examined associations between household autonomy and utilization of prenatal services among women of reproductive age in Armenia and Azerbaijan. Using nationally representative survey data, this study explored if household autonomy of women positively influenced the timing of the first prenatal visit, the number of prenatal care visits, and the content of care during visits. Results showed that household autonomy was positively associated with the timing of the first visit for prenatal care, but the number of prenatal care visits and the content of care were negatively associated with the autonomy of women. Findings also pointed to an endogenous influence of a woman's position in the household structure. Additionally, this study analyzed associations between women's reproductive history and utilization, and economic disparities in utilization of prenatal care. The findings demonstrated that a history of complications during pregnancy and stillbirths were positively associated with utilization of prenatal care. Economic disparities in utilization of care were identified. Future interventions to increase utilization of maternal health services should account for traditional household structures in transitional countries. Women from poor families should receive support from social assistance and the health sector in accessing services pertaining to their health and well-being.

Keywords: prenatal care, household autonomy, reproductive history, economic disparities, Armenia, Azerbaijan

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## TABLE OF CONTENTS

	Page
LIST OF TABLES .....	vi
LIST OF FIGURES .....	viii
CHAPTER	
1 INTRODUCTION .....	1
Statement of the Problem.....	2
Purpose of the Study .....	4
Research Questions and Hypotheses .....	5
Health in Transitional Countries.....	6
Welfare Systems in Armenia and Azerbaijan.....	7
Limitations of the Study.....	11
Relevance of this Study to Social Work .....	12
2 LITERATURE REVIEW .....	13
Importance of Prenatal Care.....	13
Definitions for Autonomy of Women .....	15
Operationalization of Autonomy.....	16
Autonomy and Utilization of Maternal Services .....	21
Other Determinants of Utilization of Prenatal Care.....	25
Interventions for Increasing Utilization.....	28
3 THEORY REVIEW .....	30
Social Determinants of Health.....	30
Feminist Theory .....	33

CHAPTER	Page
Thaddeus and Maine’s Framework: The Three Phases of Delay.....	34
Andersen’s Behavioral Model of Health Services Use.....	36
4 METHODOLOGY .....	42
Description of Data Sources .....	42
Armenia Demographic and Health Survey 2005 .....	43
Azerbaijan Demographic and Health Survey 2006 .....	44
Selection Criteria for the Analytic Sample.....	45
Measures for Prenatal Care Outcomes .....	48
Measures for Autonomy of Women .....	51
Independent Variables .....	56
Research Question I: Associations between Household Autonomy and Utilization of Prenatal Care.....	69
Hypotheses .....	69
Plan for Analysis .....	69
Research Question Section II: Determinants of Utilization of Prenatal Care.....	70
Hypotheses .....	71
Plan for Analysis .....	72
Research Question III: The Social Gradient and Utilization of Prenatal Care.....	80
Hypotheses .....	80
Plan for Analysis .....	80

CHAPTER	Page
5 ANALYSIS AND RESULTS .....	82
Research Question I: Associations between Household Autonomy on Utilization of Prenatal Care .....	82
Research Question II: Determinants of Utilization of Prenatal Care.....	92
Research Question III: The Social Gradient and Utilization of Prenatal Care.....	112
6 DISCUSSION .....	116
Associations between Autonomy and Utilization.....	116
Reproductive History of Women.....	120
The Social Gradient of Health .....	122
Findings Related to Theory.....	123
Directions for Future Research.....	125
Implications for Social Welfare.....	127
Implications for Social Work Interventions .....	130
Directions for Social Work Education .....	133
Limitations.....	136
REFERENCES.....	138

## LIST OF TABLES

Table	Page
1. International Research on Women’s Autonomy and Maternal Health .....	13
2. International Research on Women’s Empowerment and Maternal Health .....	15
3. International Research on Women’s Participation and Maternal Health .....	16
4. Sample Size per Country and for the Pooled Sample .....	49
5. Frequencies and Means for Prenatal Care Outcomes .....	49
6. Factor Loadings and Unique Variances for Household Autonomy Index .....	56
7. Factor Loadings and Unique Variances for Sex Refusal Index .....	58
8. Indices of Household Autonomy and Sex Refusal, Unstandardized and Standardized Values.....	59
9. Means and Standard Deviations of Independent Variables.....	66
10. Frequencies and Percentages of Independent Variables.....	68
11. Correlations between Variables .....	69
12. Coding for Independent Variables for Research Questions 1 and 3 .....	72
13. Independent Variables for the Research Question 2.....	73
14. Statistical Models for Research Question 2 .....	87
15. The Regression of Women’s Autonomy on Timing of the First Visit .....	94

Table	Page
16. A Poisson Regression of the Number of Visits on the Household Autonomy.....	96
17. The Association of Autonomy and Content of Care .....	98
18. Fixed and Random Effects for Utilization of Prenatal Care.....	102
19. Fixed and Random Effects for Timing of the First Prenatal Care Visit .....	107
20. Fixed and Random Effects for the Number of Prenatal Visits .....	112
21. Fixed and Random Effects for the Content of Care .....	116
22. Margins for Economic Status and Timing of the First Prenatal Care Visit .....	118
23. Margins for Economic Status and Number of Prenatal Care Visits .....	120
24. Margins for Economic Status and Content of Care .....	121



## LIST OF FIGURES

Figure	Page
1. The Three Delays Model .....	38
2. The Andersen's Behavioral Model of Health Services Use .....	40
3. Predicted Probabilities for the First Visit .....	119
4. Predicted Probabilities for the Number of Visits ..	120
5. Predicted Probabilities for the Content of Care .....	121

## CHAPTER 1

### INTRODUCTION

Many women in developing countries continue to suffer from the lack of access to adequate prenatal care services. This lack of access is evident in low utilization of prenatal services in many countries (Bulatao & Ross, 2003; Gill, Pande, & Malhotra, 2007; Vadnais, Kols, & Abderrahim, 2006; World Health Organization, 2008). In settings with limited resources, women and their families are confronted with the need to make decisions about the relevance of using services (Mamdani & Bangster, 2004). In communities with strong patriarchal traditions women have limited autonomy for seeing a doctor, making household purchases, and visiting relatives. Before seeking services, women are expected to negotiate or receive permission from their spouses and other family members (Allendorf, 2007; Fotso, Ezeh, & Essendi, 2009; Kamiya, 2011; Hou & Ma, 2012). In these contexts, policies and interventions relying on medical and social assistance may achieve limited results because they do not address significant socio-cultural determinants of human behavior. These determinants include hierarchies and relations within households, norms and expectations for women's roles in the family, and macro level environments.

Previous studies have established positive associations between autonomy of women and utilization of prenatal services (Allendorf, 2007; Mistry, Galal, & Lu, 2009; Hou & Ma, 2012; Beegle, Frankenberg, & Thomas, 2003; Bloom, Wypij, & Das Gupta, 2001; Ahmed, Creanga, Gillespie, & Tsui, 2010). However, do we have theoretical and empirical reasons to believe that autonomy has a positive influence on utilization of prenatal services? To answer this question, this dissertation study tested hypotheses

concerning whether household autonomy of women was positively associated with utilization of prenatal services in Armenia and Azerbaijan, two countries with transitional economies.

### **Statement of the Problem**

There are significant disparities in maternal health outcomes between economically advanced countries and developing countries. Nearly all maternal deaths occur in developing countries, according to the World Health Organization (WHO) (World Health Organization, 2010), with complications during pregnancy and childbirth being the leading causes of mortality among women of reproductive age (Simkhada, B., Teijlnger, Porter, & Simkhada, P., 2008). For example, the risk of maternal death in northern Europe is 1:30,000, as compared to 1:61 in developing countries (WHO, 2010) and 1:6 in the poorest countries (Ronsmans & Graham, 2006). Statistics from 2008 reveal that countries in economically advanced regions, such as North America and Europe, had an estimated maternal mortality rate of 14 per 100,000, compared to the overall mortality ratio of 290 per 100,000 in developing regions (World Health Organization, 2010).

Utilization of prenatal care is a key strategy for reducing maternal mortality in developing countries (Simkhada B., van Teijlingen, Porter, & Simkhada P., 2008). A comparison of prenatal care utilization across world regions showed that in developed countries 98% of women receive some form of prenatal care, in developing countries 68% of women receive care, and in newly independent states of the former Soviet Union 84% of women receive prenatal care (AbouZahr & Wardlaw, 2003). Frequency of prenatal visits in developed countries varies, ranging from six visits in Netherlands

(Beeckman, Louckx, & Putman, 2010), eleven visits in the US and Canada (Kirkham, Harris, & Grzybowski, 2005) to as many as seventeen visits in Finland (Raatikainen, Heiskanen, Heinonen, 2007).

Improvement of maternal health is one of the global development priorities outlined in the United Nations' Millennium Development Goals (MDGs). As we are approaching the 2015 deadline for achieving the MDGs, it is clear that the target indicators for improving maternal health will not be met on time in all regions of the world. Before the adoption of MDGs, approximately half a million women died every year from complications related to pregnancy and birth (Abou & Royston, 1991). Ten years after the adoption of the MDG agenda, the same number of women died every year from the same causes (Kvåle, Olsen, Hinderaker, Ulstein, & Bergsjø, 2005; Say & Raine, 2007; Gollogly, 2009; Falconer, 2010). At the same time, many women who survived childbirth in unfavorable conditions developed complications related to pregnancy and childbirth. Estimates suggest that every year between 10-20 million women develop physical and mental disabilities due to complications related to pregnancy and childbirth (Gill, Pande, & Malhotra, 2007).

Improving maternal health is achievable, as inexpensive and effective interventions exist, such as prenatal care and birth attendance by skilled personnel (Say & Raine, 2007). It has been estimated that up to 90% of maternal deaths in developing countries could be prevented with increasing utilization of services, medical interventions delivered by trained personnel, and setting up health care infrastructures in communities (Falconer, 2010).

Empirical and development literatures illustrate that that interventions for increasing utilization of maternal services most often apply biomedical or social assistance approaches. Biomedical approaches involve organizing referral chains, improving quality of care, and deploying midwives in population units (Pathmanathan, 2003; Anwar, Killewo, Chowdhury, & Dasgupta, 2004). Social assistance approaches are based on educating women, removing user fees and providing conditional cash transfers to women (Lim et al., 2010; Paruzzolo & Deliver, 2010).

### **Purpose of the Study**

This dissertation study examined associations between women's autonomy and utilization of prenatal care among women of reproductive age in Armenia and Azerbaijan. Autonomy of women was defined as the decision-making power of women in their families. An index measure of autonomy consisting of three variables was constructed: decisions on everyday household purchases, decisions on major household purchases, and decisions about visits to relatives. A detailed description of the index is provided in Chapter 4. Relying on the Andersen's model of health services use, utilization of care was predicted in relation to three outcomes: timing of the first visit for prenatal care, frequency of prenatal care visits, and content of prenatal care during visits. Examining associations between the household autonomy and utilization of prenatal services contributes to literature on predisposing and enabling factors in utilization of prenatal care among women in developing countries. Additionally, differences in prenatal care outcomes were analyzed across economic levels of households. Implications for research, social work practice, and policy were discussed as well.

Data from the cross-sectional Demographic and Health Surveys (DHS) conducted in Armenia in 2005 and Azerbaijan in 2006 were used for analysis. DHS surveys provided representative data with large samples. The overall sample size, including women who have given birth in the last five years, was 2,722 women. Surveys were implemented by the national statistical services of the two countries and were conducted with technical assistance of ICF International, John Hopkins University, and other partners.

### **Research Questions and Hypotheses**

This dissertation study investigated the following research questions:

1. Does household autonomy of women have positive association with utilization of prenatal care services?
2. What are the determinants of prenatal care outcomes? (Questions for specific outcomes are described in Chapter 4).
3. What are the differences in utilization of care across economic levels?

To answer these questions, the following hypotheses were tested:

1. Household autonomy of women is associated with an earlier timing of the first prenatal care visit.
2. Household autonomy of women is associated with a higher number of prenatal care visits.
3. Household autonomy of women is associated with higher content of care during prenatal care visits.
4. Utilization of care is associated with reproductive history of women (sub-hypotheses for reproductive determinants are described in Chapter 4).

5. Utilization of care is associated with economic level of women's households (sub-hypotheses for three outcomes are described in Chapter 4).

### **Health in Transitional Countries**

Armenia and Azerbaijan are transitional economies moving from planned economic systems to market economies. Populations of these countries, along with other newly independent states, experienced profound declines in economic and social well-being during the first years of the transition to market economies (Falkingham, 2005; Habibov, 2010). There were negative changes in the health status of the population and access to health services. In Russia, male life expectancy declined by seven years during the 1990s (Cutler, Deaton, & Lleras-Muney, 2006). There were similar declines in life expectancy among men in other transitional countries (Falkingham, 2005). There were negative trends in women's health as well, such as reductions in life expectancy, higher rates of abortions, and higher incidences of sexually transmitted infections (Danilovich, 2010).

There was universal access to health care and education under the Soviet system. However, transition created inequalities in access and care within countries (Balabanova, McKee, Pomerleau, Rose, & Haerpfer, 2004; Habibov, 2010). By the end of 1990s, transitional countries saw economic growth, but inequalities created the need for new policies to improve access to education and health (Habibov, 2010). Utilization of health services increasingly was influenced by their cost (Danilovich, 2010) and the need to provide out-of-pocket payments for services (Habibov, 2009).

With the start of transition, women in Azerbaijan saw higher levels of unemployment, fewer opportunities for job training compared to men, and elimination of

extensive child and family assistance services that existed within the Soviet system (Asian Development Bank, 2005). In addition, women experienced disparities in health outcomes and revival of traditional gender beliefs about women's role within society and the family (Asian Development Bank, 2005). According to UN data, families had to make informal payments for reproductive health services in Azerbaijan (Cosby, Mustafayev, & Vazirova, 2007).

In Armenia, women experienced poverty, lack of economic opportunities, and high rates of reproductive morbidity. Implementation of the national obstetric program faced numerous challenges, such as lack of transparency and accountability by health providers (Truzyan, Grigoryan, Avetisyan, Crape, & Petrosyan, 2010). Data from qualitative research showed socioeconomic challenges that women and their families encountered in the process of childbirth (Amoros, Callister, & Sarkisyan, 2010). Quality of maternal health care, including prenatal care, was found to be substandard in a study conducted in two regions of Armenia (Fort & Voltero, 2004). Empirical evidence also identified significant challenges in primary health care, including the underutilization of services and low service quality (Harutyunyan, Demirchyan, Thompson, & Petrosyan, 2010).

### **Welfare Systems in Armenia and Azerbaijan**

Armenia and Azerbaijan experienced high rates of poverty with the beginning of the transition (World Bank, 1999; International Monetary Fund, 2003). In Armenia, poverty affected unemployed population, families with several children, and landless families in rural areas (Government of the Republic of Armenia, 2001). High levels of poverty also resulted in economic inequalities within the population. In Azerbaijan,



almost half of the population was poor in 2003 (IMF, 2003). Families with several children, the elderly, and internally displaced persons were at higher risks of poverty. High rates of unemployment in urban areas resulted in poverty, creating regional variations in poverty patterns in the country (IMF, 2003).

Both countries inherited Soviet welfare systems, which had a strong focus on women's participation in labor markets. A study using statistical and qualitative data analyzed a gender aspect of social welfare systems in post-Soviet Central and Eastern European countries (Pascall & Manning, 2000). In post-Soviet countries, employment was an entry point for receiving welfare benefits in these countries. Employer organizations mostly represented by state enterprises, provided access to state-funded housing, paid maternity and holiday leaves, and holiday food rations. Even more, healthcare and childcare were often provided on premises of state-run enterprises (Pascall & Manning, 2000). The authors argued that employment and access to social services gave advantages to women in negotiating their family relationships and challenging unequal gender norms within the family.

During the transition to market economies, newly independent countries faced the need to quickly develop welfare systems that would be able to respond to the needs of their populations. However, it was a difficult task for the newly independent states, which were struggling to ensure macroeconomic stability and economic growth at the same time, and had extremely limited resources for buffering the shocks of transition through social assistance and social insurance programs. A study conducted with data from 1998-2003 assessed whether post-communist countries could be classified according to the well-known Esping-Andersen's typology for welfare states (Fenger, 2007). The study

used indicators for government programs and social indicators for the assessment. Indicators for government programs included expenditures and revenues, and social indicators included inequality, female participations, GDP, fertility rate, life expectancy, infant mortality, and unemployment.

Post-Soviet countries included in the analysis were Belarus, Estonia, Latvia, Lithuania, Russia, Ukraine, Georgia, and Moldova (Fenger, 2007). In the result of the analysis, a group of post-Soviet countries was broadly classified as conservative-corporatist welfare states, limited to state interference only when family resources are exhausted, through provision of income maintenance benefits. The group included economically advanced countries, such as Belarus, Estonia, Latvia, Lithuania, Russia, and Ukraine. Another group of countries, including two post-Soviet states of Georgia and Moldova, was classified as developing welfare states, with many indicators lagging behind other countries. The author concluded that post-communist states could not be classified according to the Esping-Andersen's typology (Fenger, 2007). More importantly, the analysis did not reveal a distinct type of welfare state in these countries, concluding that welfare states were in developing stages in many post-communist countries (Fenger, 2007).

Findings from studies conducted in Armenia and Azerbaijan confirmed analysis from other post-Soviet countries, revealing that their welfare systems were unprepared to support the poor during the transitional period. Habibov and Fan conducted two empirical studies on social assistance to the poor in Azerbaijan using data from national surveys of household budgets (Habibov & Fan, 2006; Habibov & Fan, 2007). The first study using data from 2003 revealed that the social assistance has decreased poverty and inequality in

Azerbaijan during the transitional period. However, levels of poverty remained high, due to low amounts of benefits transferred to the poor. The quality of social assistance programs was also affected by low capacity of state services to identify the poor families and high administrative costs of program implementation.

The second study examined implementation of the social protection system using data from the national household budget survey from 2004 (Habibov & Fan, 2007). The results revealed that a significant proportion of the poor (19%) did not receive transfers from social protection programs. Another program, which provided benefits to families with several children, reached only 46% of the poor families. The authors concluded that the state social protection policies were not tailored to reduce poverty among the population. The authors recommended development of a state program with a poverty reduction mandate. Additional recommendations were to develop proxy-mean targeting of the poor and use decentralized community-level mechanisms for social assistance (Habibov & Fan, 2007).

Findings of a World Bank study on improving social assistance in Armenia were congruent with findings from studies conducted in Azerbaijan (World Bank, 1999). At the beginning of the transition, there was no clear delineation between social assistance and social insurance systems. Because poverty and unemployment were marginal in the Soviet system, existing social assistance policies were not designed to support the vulnerable and poor population. Therefore, the social assistance system was lacking clear objectives and approaches, funding, and institutional capacity to implement social assistance policies. As a result, after transition to market economy, state transfers failed to target the neediest of the state assistance (World Bank, 1999). Additionally, the

benefits for the poor were too small to have a protective effect against poverty, as government and non-government organizations had very limited resources to implement social programs (World Bank, 1999).

Economic growth and employment were viewed as key mechanisms for poverty reduction in Armenia and Azerbaijan. However, temporary employment and periods of unemployment for the employed population were prevalent on labor markets in both countries. International financial institutions, such as World Bank, recommended the state to refrain from job training and subsidies for the population, in order to prevent the state interference in the development of free market mechanisms in transitional countries (World Bank, 1999). In both countries women were affected by unemployment more than men, resulting in higher proportions of women among the poor (IMF, 2003; Government of the Republic of Armenia, 2001). This trend was in congruence with empirical evidence from post-communist countries, which revealed that women's ability to participate in labor markets reduced markedly due to the lack of welfare functions in commercial firms that replaced state enterprises (Pascall & Manning, 2000). Reduced participation in labor markets negatively influenced women's abilities to support themselves and their children, with many women having to rely on their families for social safety (Pascall & Manning, 2000).

### **Limitations of the Study**

Several limitations pertain to this study. First of all, the data used for analysis were collected in 2005 and 2006. Since then, changes in prenatal care outcomes may have occurred in both countries; therefore, study findings should be applied to the specific timeframe when the data were collected. Second, the findings related to the main

argument - that autonomy of women is associated with utilization - should be interpreted cautiously, due to the cross-sectional nature of the data. Finally, it was impossible to control for the quality of interactions of women with their spouses and other members of their households, due to absence of relevant variables in datasets. Information of this kind would increase our understanding of family dynamics in these countries.

### **Relevance of the Study to Social Work**

Providing access to services for vulnerable individuals and communities is a core principle of the social work profession. On a macro level, the results of this study increase our understanding of utilization behaviors of women in transitional countries. The findings of this study are relevant for direct social work practice as well. Understanding family dynamics and autonomy of women in making decisions pertaining to their own well-being and health are necessary for effective family-centered practice. Knowledge about these factors can help to develop effective interventions aiming to help women and their families, and also can suggest strategies for improving access to prenatal services for women. Implications for policy and interventions will be discussed in the context of Andersen's model of health services use.

## CHAPTER 2

### LITERATURE REVIEW

#### **Importance of Prenatal Care**

Prenatal care starts from planning for pregnancy and continues until the first few weeks after delivery (Banta, 2003). According recommendation from the World Health Organization (WHO), prenatal care should be provided to women in order to identify risk factors during pregnancy, screen for health and socioeconomic conditions that may influence pregnancy outcomes, provide medical interventions, and plan for safe childbirth and emergencies during pregnancy (Banta, 2003). Recommendations for routine procedures include abdominal palpation, blood pressure measurement, measurement of weight, fetal heart tones, blood typing, and ultrasoundography (Kirkham, Harris, & Grzybowski, 2005). Prenatal care also covers vaccination, treatment of sexually-transmitted diseases (STD) and urinary tract infections (Shah & Say, 2007; Carroli, Rooney, & Villar, 2001). Pregnant women are educated about breastfeeding, exercise, nutrition, medication, labor and delivery, use of substances, workplace, hot tubs, and air travel (Kirkham, Harris, & Grzybowski, 2005, p. 1308). Some recommendations include screening for domestic violence and genetic screening for families with history of genetic disorders (Kirkham, Harris, & Grzybowski, 2005).

Systematic review of literature demonstrated that prenatal care is an important determinant of safe delivery (Simkhada B., van Teijlingen, Porter, & Simkhada P., 2008). During prenatal care visits women are educated to recognize and act upon complications during pregnancy (Simkhada B., van Teijlingen, Porter, & Simkhada P., 2008). In addition to maternal health outcomes, prenatal care is important for the health of newborn

infants. Studies demonstrated that women who did not receive prenatal care had higher rates of low birth weight and infant mortality (Goldenberg, Patterson, & Freese, 1992). Even in countries with high standards of care, such as Finland, it was found that complications during pregnancies, fetal and neonatal deaths, and low birth weight were more common among women who avoided or underutilized prenatal care (Raatikainen, Heiskanen, Heinonen, 2007).

Studies conducted in developing countries revealed positive associations between utilization of prenatal care and maternal mortality. In India high quality of prenatal care increased the odds of facility-based delivery (Bloom, Lippeveld, & Wypij, 1999). In Bangladesh women who did not receive prenatal care or received it only once during pregnancy had odds of maternal mortality two times higher compared to women who received three or more prenatal care visits (Pervin et al., 2012). In Indonesia delay of the first visit for prenatal care until the second trimester of pregnancy or later increased odds ratio for maternal mortality three times, and women who reported fewer than 4 prenatal visits had odds ratio for maternal mortality two times higher (Taguchi et al., 2003).

In the US prenatal care is assessed against these criteria: timing of the first visit, number and spacing of visits, content of medical care (risk factors, testing for and treatment of diseases, referral to specialized care), characteristics of providers, and quality and accessibility of services (Alexander & Kotelchuck, 2001). As for developing countries, WHO published guidelines for a more efficient model of prenatal care for generally healthy women (Villar et al., 2001). The model recommends four prenatal visits, specific timing of visits, examination of blood pressure, urine testing for bacteriuria and preteinueia, and blood tests to detect syphilis and severe anemia

(AbouZahr & Wardlaw, 2003, p.3). The WHO model was tested in a multi-country cluster randomized trial and proved to be a robust model for settings with limited resource.

### **Definitions for Autonomy of Women**

The literature conceptualizes autonomy from several perspectives. Deci and Ryan define autonomy as a behavior that is willingly enacted; people are autonomous if they are able to behave according to their interests, values, and wishes (Deci & Ryan, 1985). Studies about women's autonomy have defined it as the ability to decide and act upon decisions regarding personal matters (Fotso, Ezeh, & Essendi, 2009). Women's autonomy is considered to be an extension of agency and capacity to act (Mistry, Galal, & Lu, 2009). In relation to agency, Sen defines it as "What a person is free to do and achieve in pursuit of whatever goals or values he or she regards as important" (Sen, 1999, as cited in Samman & Santos, 2009, p. 4). The definition and interpretation of autonomy also has been found to be dependent on context (Gabrysch & Campbell, 2009).

This dissertation study was guided by two perspectives on women's autonomy. The first, Schlegel's theory of sexual stratification, defined autonomy as freedom from control. Freedom from control of other people is separate from the concept of power as ability to control others, and from authority as a socially recognized right to make decisions for others (Schlegel, 1977). Typically, a definition of women's autonomy does not imply high social status or prestige for the agent (Gupta and Yesudian, 2006; Mistry, Galal, & Lu, 2009). Browner and Perdue argue that autonomy as freedom from control of other people could be highly valued by women in societies with strong patriarchal traditions (Browner & Perdue, 2009).



The second perspective that guided this study was the life course perspective. It posits that levels of women's status and autonomy fluctuate over their lifetime (Gupta, 1996). In some societies, women have higher status and autonomy when they are young, and in other societies women gain more power and control during later stages of life (Gupta, 1996). For example, a comparative study of women's autonomy in northern rural India and North Europe showed how low levels of women's autonomy during their active reproductive years carried implications related to health, such as poorer reproductive health, lower rates of child survival, and less control of fertility by women (Gupta, 1996). In rural India, young couples live in the same household with their husband's family, with strong kinship bonds and weak conjugal bonds, thereby undermining young women's autonomy. Women's autonomy rises with birth of sons, age, and shifting from the role of mother to mother-in-law (Gupta, 1996). The findings of this study are congruent with other literature on maternal health indicating that levels of women's autonomy rise and fall with age, marital status, and economic status of women (Gabrysch & Campbell, 2009).

### **Operationalization of Autonomy**

Because autonomy is a highly contextual and multidimensional concept, studies have applied various measures to operationalize this concept (Agarwala & Lynch, 2006). While there is no equivalency of the measures of autonomy, the following comparison illustrates similarities of definitions and measures across studies conducted in different countries.

Studies on reproductive health have operationalized the concept of autonomy as an ability to make independent decisions about the number of children women want to have

(Obermeyer, 1995, as cited in Woldemicael, 2009, p. 162). Some studies operationalized autonomy as women’s control over resources and information, and decision-making about their own well-being and well-being of other members of their families (Basu, 1992; Dyson & Moore, 1983; Miles-Done & Bisharat, 1990, as cited in Bloom, Wypij, & Das Gupta, 2001, p. 68).

Examples of measures operationalizing the concept of autonomy of women in a majority of empirical studies included women’s decision-making power, women’s control over finances, freedom of movement, and attitudes towards husband’s wife beating (see Table 1). Some studies have included proxy measures for autonomy, such as educational status of women, employment, and household wealth (Woldemichael, 2008; Hogan, Berhanu, & Hailemariam, 2008). Table 1 presents examples of operationalization of autonomy in international research on maternal health.

Table 1

*International Research on Women’s Autonomy and Maternal Health*

Country	Authors	Operationalization
Mexico	Browner and Perdue (2009)	<ul style="list-style-type: none"> <li>• Reproductive autonomy: Women were asked if they had ever used any means to prevent pregnancy.</li> <li>• Women’s fertility history</li> <li>• Social autonomy: Extent to which women controlled economic resources; extent to which they controlled their own activities</li> </ul>
Ethiopia	Hogan, Berhanu, and Hailemariam, 2008	<ul style="list-style-type: none"> <li>• Women’s status within household (literacy, paid employment, age difference between spouses)</li> <li>• Women’s involvement in domestic decision-making</li> </ul>
India	Bloom, Wypij, and Das Gupta, 2001	<ul style="list-style-type: none"> <li>• Women’s control over finances (2 items)</li> <li>• Decision-making power (3 items)</li> <li>• Freedom of movement (4 items)</li> </ul>

Table 1

*International Research on Women's Autonomy and Maternal Health (Continued)*

Country	Authors	Operationalization
Nepal	Allendorf, 2007	<ul style="list-style-type: none"> <li>• Women's participation in decision-making regarding: wife's health care, large household purchases, daily household purchases, visits to friends/family, choice of food</li> </ul>
Eritrea	Woldemicael, 2008	<ul style="list-style-type: none"> <li>• Women's domestic decision-making regarding: large purchases, daily purchases, freedom of movement to visits relatives/friends</li> <li>• Women's ability to communicate about family planning</li> <li>• Women's attitudes toward husband's wife beating</li> </ul>
Bangladesh	Anderson and Eswaran, 2009	<ul style="list-style-type: none"> <li>• Female decision-making power within household to make purchases</li> </ul>
Kenya	Fotso, Ezeh, and Essendi, 2009	<ul style="list-style-type: none"> <li>• Women's freedom of movement, decision-making autonomy</li> </ul>
India	Mistry, Galal, and Lu, 2009	<ul style="list-style-type: none"> <li>• Decision-making autonomy, permission to go out, financial autonomy</li> </ul>
Nepal, Bangladesh, India	Senarath, Gunawardena, 2009	<ul style="list-style-type: none"> <li>• Who has the final say on decisions regarding women's health care</li> </ul>
Tajikistan	Kamiya, 2011	<ul style="list-style-type: none"> <li>• Women's decision-making within household regarding: child well-being, buying major items, borrowing money</li> </ul>

Many studies on utilization of maternal health services have used the term “empowerment”, and the literature provides several definitions for this concept. In a paper discussing links between gender, health, and empowerment, it is defined as progress toward gaining control over one's life and capacity to act upon important issues (Ehrhardt, Sawires, McGovern, Peacock, & Weston, 2009). Development literature defines empowerment as a process of change toward ability to make important life

choices (Grabe, 2012, p. 234). A study on women’s empowerment and reproductive health defined empowerment as “expansion in women’s ability and freedom to make strategic life choices, a process that occurs over time and involves women as agents (Lee-Rife, 2010).

The main difference between autonomy and empowerment is the characterization of both concepts in terms of static or dynamic forms. Autonomy typically is considered as a static individual characteristic of women (Agarwala & Lynch, 2006) related to agency. Empowerment is a dynamic process of change and progression and implies collective action (Agarwala & Lynch, 2006). It has been established that in many societies empowerment of women is related to their reproductive capacity, specifically in relation to an ability to bear children and sons. The more children women have, the more empowered they become in their households and community (Lee-Rife, 2010). No studies were identified that considered how women’s position within family and community was affected by the lack of reproductive ability. Measures of empowerment used in empirical studies have included decision-making power, mobility, land ownership, organizational participation, employment and use of earnings, and educational level of family members (see Table 2).

Table 2

*International Research on Women’s Empowerment and Maternal Health*

Country	Authors	Operationalization
India	Gupta and Yesudian, 2006	<ul style="list-style-type: none"> <li>• Decision-making</li> <li>• Mobility</li> <li>• Women’s attitudes about education of their male and female children, preference for sons over daughters</li> <li>• Women’s attitudes toward wife-beating</li> </ul>

Table 2

*International Research on Women's Empowerment and Maternal Health (Continued)*

Country	Authors	Operationalization
Middle East and North Africa	Ehrhardt et al., 2012	<ul style="list-style-type: none"> <li>Economic empowerment, educational empowerment, social empowerment, political empowerment</li> </ul>
Thirty-three developing countries	Ahmed, Creanga, Gillespie, & Tsui, 2010	<ul style="list-style-type: none"> <li>Decision-making about purchases, health care, visits to family/friends, and meal preparation</li> </ul>
Nicaragua	Grabe, 2012	<ul style="list-style-type: none"> <li>Organizational participation, land ownership, gender ideology, decision-making, relationship power, partner control, agency, self-esteem, depression, intimate partner psychological violence</li> </ul>

Some studies on women's use of reproductive health services have other terms, such as "women's position within the household", "women's input into household decisions", "decision-making power", "bargaining power", and "power relations" (Furuta & Salway, 2006; Hindin, 2006; Hou & Ma, 2012; Beegle, Frankenberg, & Thomas, 2003; Chapagain, 2006), but their operationalization generally was very similar to studies related to women's empowerment and autonomy (see Table 3).

Table 3

*International Research on Women's Participation and Maternal Health*

Country	Authors	Term and its operationalization
Pakistan	Hou & Ma, 2012	<ul style="list-style-type: none"> <li>Decision-making power regarding household expenditures in food, clothing, medical treatment and recreation</li> </ul>
Nepal	Furuta & Salway, 2006	<ul style="list-style-type: none"> <li>Women's position within household: participation in decision-making, employment and use of earnings, discussion of family planning with husbands</li> </ul>

Table 3

*International Research on Women’s Participation and Maternal Health (Continued)*

Country	Authors	Term and its operationalization
Nepal	Chapagain, 2006	<ul style="list-style-type: none"> <li>• Conjugal power bargaining: participation in contraceptive decision-making, participation in decision-making for utilization of prenatal healthcare</li> </ul>

**Autonomy and Utilization of Maternal Services**

Due to the lack of studies on autonomy and prenatal care utilization, this review included studies on autonomy and utilization of other maternal health services as well.

In a study conducted in Nepal with a nationally representative sample of 1,043 couples, autonomy of women was measured as having a final say in decision-making about having a delivery with professional attendance (Allendorf, 2007). The association between autonomy of women and delivery with professional attendance was not significant, a husband and a wife’s responses as to who had the final say were controlled. When responses from other household members were included in the analysis, the association between the outcome variable and women’s autonomy became significant (p. 42). Concerning the use of prenatal care, if a wife alone said she was autonomous, the odds of using prenatal care were 95% higher and the odds were three times higher if both husband and wife agreed that wife had final say (p. 41).

Another study using data from the National Family Health Survey in India investigated if women’s autonomy influenced the delivery by a trained person (Mistry, Galal, & Lu, 2009). In this study, when measured as decision-making autonomy, women’s autonomy was not associated with delivery in a health setting (p. 930).

However, women's autonomy measured as financial autonomy was positively associated with delivery by a trained person and in institutional settings. Autonomy measured as permission to go out also positively influenced institutional delivery (p. 930). Decision-making autonomy and permission to go out likewise had a positive association with the use of prenatal care (p. 928).

In a study with a nationally representative sample of women in Tajikistan, autonomy was measured as women's decision-making within the household regarding child well-being, buying major items, and borrowing money (Kamiya, 2011). The use of a skilled attendant at birth was among the outcome variables and the results were mixed (Kamiya, 2011). Women's decision-making regarding children's well-being did not affect utilization of skilled attendance at birth, while decision-making for buying major items and borrowing money positively affected utilization (p. 311). For prenatal care decisions, decision-making autonomy to buy major items and in borrowing money had a positive effect on the probability of at least one prenatal visit.

In Pakistan, a study using a nationally representative sample assessed the impact of decision-making power on institutional birth and skilled birth attendance (Hou & Ma, 2012). Women's decision-making power was positively associated with both utilization of prenatal care and skilled birth attendance (p. 6).

A study on women's position's within the household was conducted with a nationally representative sample in Nepal, where maternal mortality rate is as high as 540 per 100,000 (Furuta & Salway, 2006). In the sample, only 13% of women used delivery care (p. 21). Women's decision-making power was not associated with use of skilled attendance at birth, but a discussion of family planning with their husband was positively

associated with the use of skilled delivery at birth. Women's involvement in decision-making was not associated with utilization of prenatal care, but employment and influence over earnings were positively associated with utilization of prenatal care.

A study with a large sample of 1,927 women in urban slums of Nairobi, Kenya investigated influence of autonomy on choice of a delivery setting (Fotso, Ezeh, & Essendi, 2009). The study used three autonomy measures: overall autonomy, decision-making autonomy, and freedom of movement. The results of the study indicated that high level of autonomy was not associated with utilization of maternal services. However, when an interaction of autonomy and household wealth was tested, autonomy had a significant and positive association with utilization.

A study conducted in Indonesia examined associations between women's bargaining power and their choice of place of and assistance at delivery (Beegle, Frankenberg, & Thomas, 2003). The results showed that women who owned some part of household assets were more likely to deliver in a hospital or a private doctor's office, or to receive trained assistance if delivery was done at home (p. 141). Similar results were found for prenatal care. Women owning at least 25% of household assets had higher likelihood of using prenatal care (p.139).

In a study with a sample of 300 women in a large urban area in North India, women's autonomy was measured as control over finances, decision-making, and freedom of movement. Autonomy was a significant predictor of the safe delivery, reflected in the presence of a trained attendant (Bloom, Wypij, & Das Gupta, 2001). Freedom of movement was a significant determinant for utilization of prenatal services.



Studies conducted in Ethiopia and Eritrea identified strong associations between reproductive behaviors of women and their status in the family. In Ethiopia, a country with a fertility rate of seven children per woman and where polygamy is common, women depended on their children in later years of life because husbands were likely to marry a young woman; therefore there was less incentive for women to control their fertility (Hogan, Berhanu, & Hailemariam, 2008, p. 304). Women in rural areas who were highly involved in household decision-making were more likely to discuss family planning with their husbands, and more likely to use a contraceptive.

It was expected that in Eritrea, which suffered from devastation caused by a long-time conflict with Ethiopia, women would be more inclined to control their fertility due to economic hardships, displacement, and other issues (Woldemicael, 2008). A study from a nationally representative sample showed that Eritrean women had low levels of desire to limit childbirth, but they were more likely to do so if they had autonomy in decision-making (Woldemicael, 2008).

A study exploring couple's participation in reproductive decision-making in Nepal identified that women with secondary or higher education, as well as women with personal incomes were more involved in a joint decision-making with their husbands about use of contraception (Chapagain, 2006). Women who experienced psychological or physical assault had significantly lower levels of participation in a joint decision-making about contraception (p. 178).

A meta-analysis of studies from 33 developing countries used a measure of empowerment along with measures of economic and educational status to predict utilization of maternal health services (Ahmed, Creanga, Gillespie, & Tsui, 2010).

Economic status and education had stronger associations with utilization of maternal health services compared to autonomy. The measure of empowerment had a positive association with the number of prenatal care visits. The odds to have skilled attendance at delivery were 94% lower for the poorest women compared to the richest women. For the use of modern contraceptives, the odds of using were 74% lower for the poorest women (p. 3).

### **Other Determinants of Utilization of Prenatal Care**

**Age.** Many studies have found age to be a significant determinant for utilization of prenatal care. Studies show that older women are more likely to seek maternal healthcare services because, compared to young women, they have higher levels of autonomy and access to resources in their families (Abor P.A., Abekah-Nkrumah, Sakyi, Adjasi, & Abor J., 2011). For example, age was found to have a significant positive association with utilization of maternal services in Ghana (Abor P.A., Abekah-Nkrumah, Sakyi, Adjasi, & Abor J., 2011).

**Education and employment.** Educational attainment has been emphasized in a number of studies as a factor that explains women's knowledge of pregnancy-related matters and their understanding of the importance of health care (Fan & Habibov, 2009). The importance of women's education has been confirmed in studies, in that educated women are more likely to implement activities that benefit the health of their children (Cutler, Deaton, & Lleras-Muney, 2006; Paruzzolo & Deliver, 2010). Education was an important predictor of the utilization of maternal health services in Ghana in a study using nationally representative data (Abor P.A., Abekah-Nkrumah, Sakyi, Adjasi, & Abor J., 2010).

**Distance, transport, and location of services.** A study on utilization in rural Mali showed associations between physical accessibility of the health facility and utilization. If a woman lived in an area within fifteen minutes of public transportation, the odds of delivery with the assistance of trained medical personnel increased significantly (Gage, 2007). In a study conducted with a nationally representative sample in Turkey, it was found that owning a car was positively associated with prenatal care use (Celik & Hotchkiss, 2000). Residence in a capital city or other urban areas was positively associated with utilization in Jordan (Obermeyer & Potter, 1991). In India, women were more likely to use maternal services if there were doctors and secondary level facilities in the community where they lived (Stephenson & Tsui, 2002). In Nigeria, the ratio of primary health care facilities per population was a significant predictor of use of skilled assistance for delivery (Babalola & Fatusi, 2009). Geographical access to healthcare more generally was found to be an obstacle to access healthcare for women in eight countries (Vadnais, Kols, & Abderrahim, 2006).

**Cost of health services.** Affordability of care can be a significant barrier for utilization, and may delay the decision to seek care. In communities where government facilities are understaffed and provide low quality care, patients have to turn to the private sector for services; however, poor segments of the population often cannot afford such care. For example, in India, where maternal services are provided free of cost through the public health system, utilization of maternal services declined during 1998-2005 because of the high cost of services in the private sector coupled with low service quality in public sector (Mohanty & Pathak, 2009). At the same time, it was found that a small increase in fees by non-profit private providers did not significantly reduce

utilization of family planning and reproductive health services in Ecuador (Bratt, Weaver, Foreit, de Vargas, & Janowits, 2002). In Tanzania, ambulance costs were prohibitive for the majority of women, and it was cited that when women faced obstetric emergency, all they did was “pray to God” (Mamdani & Bangser, 2004). In addition, poor people encountered the issue of needing to bribe health personnel in a corrupt health system (Mamdani & Bangser, 2004), which increased the financial burden on families already struggling with poverty.

**Quality of services.** Studies have included several factors to describe the perception of quality care by women: presence of skilled birth attendants in facilities (Parkhurst et al., 2005); availability of postpartum care (Fikree, Ali, Durocher, Rahbar, 2004); clinical and diagnostic skills, equipment, attitudes of personnel, outcomes of the treatment (Duong, Binns, & Lee, 2004); and drug availability, laboratory services, and availability and cleanliness of beddings (Mamdani & Bangser, 2004). Many patients have a perception that private health care offers higher quality of services. In India, women increasingly choose private health care providers, and they believe that fees are worth paying for higher service quality in contrast with low quality of services within public sector facilities (Stephenson & Tsui, 2002). In Tanzania, the majority of poor people were willing to pay for better quality of services (Mamdani & Bangser, 2004). In the same study, people did not utilize primary healthcare facilities due to low quality of services, and instead sought higher quality of care in hospitals (Mamdani & Bangser, 2004). In Uganda and Bangladesh, women chose to deliver at home if they believed the quality of care was poor in health facilities (Parkhurst et al., 2005). Women in Vietnam who had less positive perceptions about the quality of prenatal care provided at health

facilities were more likely to give birth at home (Duong, Binns, & Lee, 2004). In rural China, women revealed that they perceived the quality of village health services to be poor; if they could afford to do so, they would have gone to a town hospital for delivery, but if they could not, they delivered at home (Kaufman & Jing, 2002).

### **Interventions for Increasing Utilization**

This section provides a brief overview of interventions and programs conducted in different countries to increase utilization of maternal services. Because activities to increase utilization of prenatal services are typically included with other maternal services, the overview includes programs designed to increase the utilization of different types of maternal services.

Interventions to increase utilization of prenatal services have been used as strategies to reduce maternal and infant mortality in many developing countries. In Bangladesh, a country with high maternal mortality rates, the Maternal and Child Health Project has been implemented in 79 villages in the Matlab district. The interventions included home visitation of pregnant women twice a month by female health workers, placement of midwives, and access to qualified assistance during birth (Nasreen, 2007). The results demonstrated a reduction in maternal mortality and increase of utilization rates in project areas. However, disparities in utilization of services between the poorest and more well-to-do women were reported in project areas.

In India, the Social Mobilization Program implemented by government aimed to increase utilization of maternal services through community-level activities (Rottach, Schuler, & Hardee, 2009). Group meetings for young married women and their husbands, as well as advocacy for health-seeking behaviors with mothers-in-law, led to utilization

increases among women (Rottach, Schuler, & Hardee, 2009). As women received support from their families, they were better able to seek maternal health services and improve health outcomes.

Another program implemented in India was the cash transfer program “Janani Suraksha Yojana” (Lim et al., 2010). The program encouraged women to utilize prenatal services and give birth in health facilities. It was found that cash transfers helped in states with poor health indicators, but did not have much effect in states with better health indicators. Among women who received cash assistance, poor and uneducated women were less likely to seek and receive assistance.

A randomized control trial was conducted in 42 villages in Nepal to improve neonatal mortality outcomes (Manandhar et al., 2004). Women in an intervention group participated in group meetings, where they learned about strategies to ensure better survival of newborns. The results of the intervention showed that women increased utilization of prenatal services and assisted deliveries.

## CHAPTER 3

### THEORY REVIEW

#### **Social Determinants of Health**

Social determinants of health is a perspective based on principles of social and economic justice. According to the WHO's Commission on Social Determinants of Health, reducing social inequalities in health is a social justice issue (Marmot, 2005). This perspective asserts that health inequalities due to social conditions are unfair and unjust (Marmot, 2005), and that social conditions and hierarchies have significant effects on the health of populations (Marmot, 2007). Social inequalities are seen as being among the most important factors affecting the health of individuals and communities (Kawachi & Kennedy, 1999).

Social determinants of health include but are not limited to the social gradient, stress, conditions during early life, social exclusion, work conditions, social support, addiction, food access, and transport (Wilkinson & Marmot, 2003, as cited in Marmot, 2005). Analysis of data from 207 countries has demonstrated that countries with high levels of child and adult mortality had low incomes, high poverty rates, and poor investments in human capital (Ruger & Kim, 2006). Even in industrialized countries, equitable distribution of primary health care resulted in better health outcomes (Starfield & Shi, 2001). Scholars have consequently argued that access to and utilization of health services should be supplemented by investments in education, income, and affordable housing (Kawachi & Kennedy, 1999).

Women are especially vulnerable to health inequalities. Many gains were achieved in reducing gender-related inequities during the twentieth century (WHO,

2008). Women received access to modern contraceptives, and also gained more control over their bodies and reproductive behaviors (Martin, 1995). The fertility of women in many countries was reduced due to increases in the educational attainment of women (Martin, 1995). However, women's health in many communities is still compromised due to violence and rape, lack of access to resources, and lack of autonomy over their health-related behaviors (WHO, 2008). Compared to men, women are more vulnerable to health-related risks, and their exposure to risk factors remains high. For instance, in countries with high prevalence of HIV/AIDS, married women are at the highest risk of contracting HIV infection due to risky behaviors of their spouses (Sen, Östlin, & George, 2007).

Social epidemiology differentiates between gender and sex categories, with both categories having different predictive powers regarding exposures to risk factors and outcomes related to disease and treatment (Krieger, 2003). For example, women experiencing acute coronary symptoms have lower rates of referral for interventions compared to men (Feldman & Silver, 2000, as cited in Krieger, 2003). In this situation, a biological factor - sex, is a determinant for men being more susceptible to coronary disease, and the social construct of gender is a determinant for low rates of referral of women with acute coronary symptoms.

There is international commitment to addressing social determinants of health. UN member states endorsed the Rio Political Declaration on Social Determinants of Health (WHO, 2012). The Declaration states that the member states, under the leadership of the WHO's Commission of Social Determinants of Health, will reduce health inequities through improving daily living conditions, tackling inequitable distribution of



power, money and resources, and monitoring progress and assessing the impact of actions. Empowering women in different arenas is a key strategy for addressing health inequities facing women.

Research on health differentiates between health inequalities and health inequities. The term *health inequality* is used to denote a difference in health status and progress in areas of health of individuals and populations (Kawachi, Subramanian, & Almeida-Filho, 2002). Health inequalities within populations are not necessarily unfair. For example, young adults are healthier than the older population; it is a disparity in health status due to biological reasons (Braveman and Gruskin, 2003). However, differences in nutritional status between boys and girls or racial and ethnic differences in receiving quality health care reflect inequitable, unjust health outcomes (Braveman and Gruskin, 2003, p. 255). It is understood that many health inequalities are inequitable. Kawachi, Subramanian, and Almeida-Filho (2002) provide a succinct explanation of the differences between the two concepts:

The crux of the distinction between equality and equity is that the identification of health inequities entails normative judgment premised upon (a) one's theories of justice; (b) one's theories of society; and (c) one's reasoning underlying the genesis of health inequalities. (p. 648)

This definition of the equity implies that people should receive health care based on their medical needs. At the same time, unequal delivery of services on the basis of race, socio-economic status, and place of residence suggests inequity in health care (Aday & Andersen, 1981). The science alone cannot decide what a just or equitable healthcare is; therefore, healthcare providers and policy makers should be concerned with developing

criteria for just and equitable approaches when designing health interventions (Kawachi, Subramanian, & Almeida-Filho, 2002).

### **Feminist Theory**

Feminist theory compares gender relations to political economy in that a struggle between sexes is similar to a class struggle (MacKinnon, 1982). Both feminist and Marxist theories are concerned with unequal distribution of power within society, and strive to raise awareness about the existing conditions of oppressed groups and use this awareness for individual and social changes (MacKinnon, 1982). Marx did not include sex and gender differences in his theory of capitalism (MacKinnon, 1982), but Engels mentions reproduction of human beings as an important characteristic of the social world of capitalism in his work *The Origin of the Family, Private Property and the State*. He writes:

According to the materialistic conception, the decisive element of history is preeminently the production and reproduction of life and its material requirements. This implies, on the one hand, the production of the means of existence (food, clothing, shelter and the necessary tools); on the other hand, the generation of children, the propagation of the species. (Engels, 1902, p. 9)

Rubin's work expanded a discourse on the social roles that gender and sex place upon women and men (1975). According to Rubin, it is the gender system in society that produces women's oppressive status. Oppression of women is realized through social arrangements, gender division of work and roles, patriarchy, kinship, and the traditional heterosexual marriage (Rubin, 1975). Within these systems of human interactions,

women's status is defined within the conventional norms accepted by society (Rubin, 1975).

Hartmann (1981) contributes to analysis and notes that the patriarchal and capitalist nature of the modern family represents the point of struggle between the sexes and gender roles, and results in the oppressed status of women. She argues that "because of class and gender division of labor not everyone has direct access to the economic means of survival" (p. 373). The family gender and power struggles are manifested through conflicted interests of family members and unequal access to modes of production. In line with Marxist theory, which posits that production practices and redistribution are consequences of the capitalist system, in feminist theory the household is a locus of redistribution of means and reproduction of human beings. Actions of women are "sensitive to changes in domestic economies, and therefore always an aspect of the distribution of power in any society" (Ginsburg & Rapp, 1991).

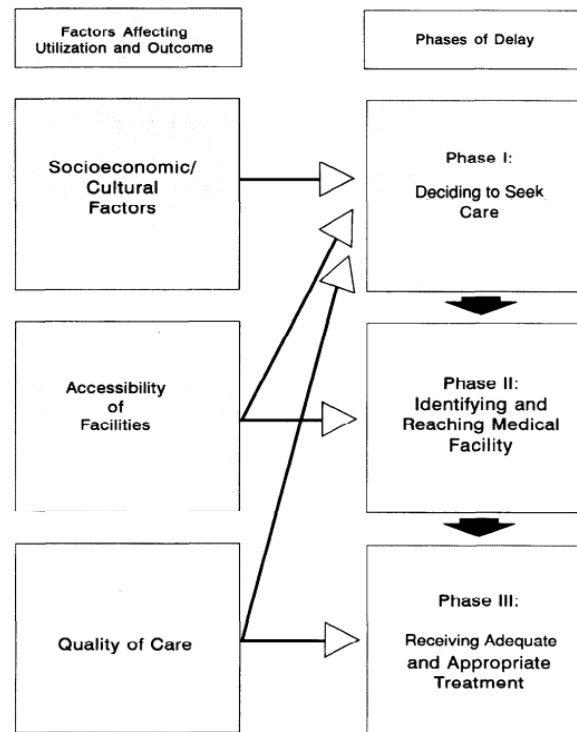
Studies have demonstrated that reproductive behaviors and choices of women are influenced by societal norms and expectations in relation to marriage, kinship and inheritance (Ginsburg & Rapp, 1991). Women's reproductive decisions are influenced by their husbands and community norms, making men's wishes and societal norms determining factors in women's decisions about their reproductive activities (Browner, 2001). In some situations, women can be held accountable for infertility and pregnancy loss (Ginsburg & Rapp, 1991). Sometimes, mothers-in-laws supervise women's menstrual cycles and pregnancies (Ginsburg & Rapp, 1991).

### **Thaddeus and Maine's Framework: The Three Phases of Delay**

This framework posits that maternal death is a result of delays in seeking medical care, reaching a medical facility, and receiving medical care (Thaddeus & Maine, 1994). This framework is concerned with emergency care seeking, as it addresses the causes of maternal death as the result of hemorrhage, obstructed labor, infection and unsafe abortion (Thaddeus & Maine, 1994).

This model describes intervals between an onset of an obstetric complication and receiving of care during emergency complications (Thaddeus & Maine, 1994, p.1092). The three phases of delay are: a) deciding to seek care; b) identifying and reaching medical facility; and c) receiving adequate and appropriate care. Delays in seeking healthcare during each of these phases are caused by different factors. The first phase of delay, deciding to seek care, is influenced by socio-economic and cultural barriers to making a decision to seek medical care: socio-economic status, quality of care, perception of severity of a medical condition, and a woman's status within the family. The second phase of delay, reaching a medical facility, is influenced by location of the medical facility, distance, cost, and transportation. The third phase of delay, receiving adequate treatment, is caused by the lack of quality care, such as a lack of qualified staff in a medical facility and the availability of medical supplies. Empirical analysis has revealed that most maternal deaths occur in hospitals due to delays in managing health complications and delays in receiving adequate care (Ronsmans & Graham, 2006).

Figure 1. The three delays model for preventing maternal death



Reprinted from “Too Far to Walk: Maternal mortality in Context”, by S. Thaddeus and D. Maine, 1994, *Social Science and Medicine*, p. 1093

Gabrysch and Campbell expanded the model of three delays by adding preventive care seeking (2009). Adding preventive care assumes that some complications can be prevented from occurring through identification and monitoring of potentially dangerous conditions. Seeking preventive care could be influenced by sociocultural factors (age, social class), perceived benefits of receiving care, affordability of care, and geographical access to health facilities (Gabrysch & Campbell, 2009).

### **Andersen’s Behavioral Model of Health Services Use**

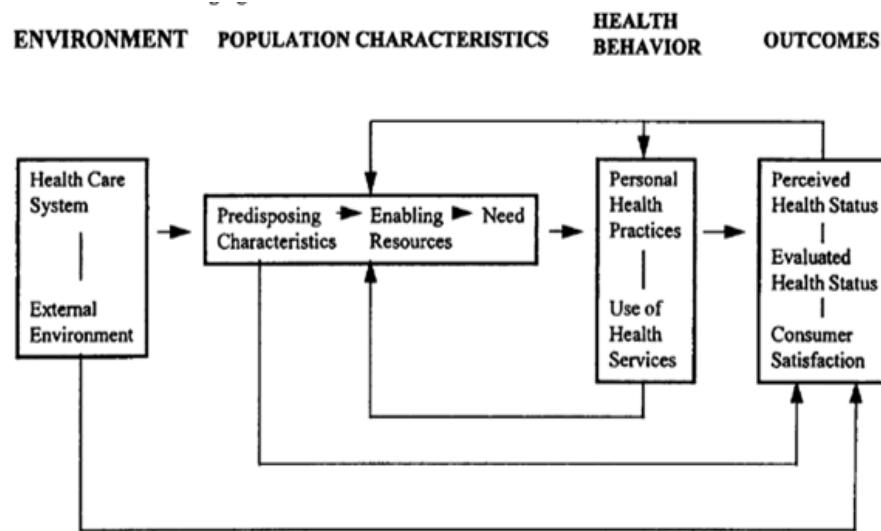
Andersen’s behavioral model of health services use was developed for assisting policy makers to provide equitable access to healthcare, and to provide a theoretical

understanding of why and how people use health services (Andersen, 1995). Andersen provided a description of dimensions of utilization of health care services. Utilization is based on type, site, purpose, and the interval between visits to health facilities (Aday & Andersen, 1974). Depending on the dimension of the utilization of health services, the determinants of the utilization may also differ. There will be different predictors and determinants of the utilization of health services based on the type of medical intervention, whether the help sought is for primary healthcare needs or for a health condition that requires specialized intervention, and the required number of visits to a health service provider for treatment.

According to Andersen's model, three sets of determinants predict the use of health services by individuals: predisposing characteristics, enabling resources, and need of health services. Predisposing characteristics are demographic factors, social structure, and health beliefs. Enabling resources include personal and family resources, and resources present within community. The need for health services can be either perceived by individuals or based on expert evaluation.

The initial model of Andersen's theory was developed in the late 1960's and went through several changes resulting in a shift from families to individuals as the unit of analysis (Andersen, 1995). The last version of the model (Figure 2) was developed during the 1990's and was extended to add environmental factors (health care system, external environment) and outcomes (health status and consumer satisfaction) to population factors (predisposing characteristics, enabling resources, and need) and health behavior (personal health practices, use of health services).

Figure 2. The behavioral model of health services use



Reprinted from “Revisiting the Behavioral Model and Access to Medical Care: Does It Matter?”, by R.M. Andersen, 1995, *Journal of Health and Social Behavior*, p. 7

Empirically, all sets of characteristics potentially can have predictive power for utilization of health services by individuals. However, from a perspective of policy goals, determinants of utilization should be mutable (Andersen, 1995). According to Andersen (1995, p. 3), demographic factors, social structure, health beliefs and the need for health services are determinants that have low or medium mutability.

Demographic factors, such as age and gender, cannot be easily altered to influence utilization. Similarly, social structures, such as ethnicity, income and educational level, cannot be altered at all or are difficult to alter within a policy-related timeframe. Health beliefs can be altered and sometimes affect utilization behaviors. Among all of the determinants of health care utilization, the enabling resources have the greatest potential for mutability (Andersen, 1995). Enabling resources include availability of health facilities and personnel in places where people live, as well as access to health

insurance or other resources needed to seek health care. Travel and waiting time are also determinants with high mutability. Anderson posited that these determinants can be influenced by appropriate policy measures, which can lead to changes in health services utilization rates (1995, p.5).

Andersen's model was developed and applied to explain the utilization of health services in the United States (Sunil, Rajaram, & Zottarelli, 2006), and the model has been widely applied in health research and policy (Newacheck, Hughes, Hung, Wong, & Stoddard, 2000; Knowlton et al., 2001; Andersen et al., 2002). Empirical studies with application of the model were conducted with groups of homeless women, African-American population, Mexican American population, older immigrant population, and HIV positive individuals (Austin, Andersen, & Gelberg, 2008; Bradley et al., 2002; Stein, Andersen, & Gelberg, 2007; Estrada, Trevino, & Ray, 1990; Anthony et al., 2007). The model has been applied in research in developing countries as well (Habibov & Fan, 2008; Fan & Habibov, 2009; Sunil, Rajaram, & Zottarelli, 2006; Abor P.A., Abekah-Nkrumah, Sakyi, Adjasi, & Abor J., 2010). Systematic review of studies conducted with application of this model showed that it was applied for understanding of utilization behaviors related to in-home care, child mental health services, mammography, and dental services (Phillips, Morrison, Andersen, & Aday, 1998).

One of the advantages of using this model is that findings from the studies can provide a basis for policy recommendations that link well to predictions from theory. For instance, one study identified that structural factors influencing utilization of health services by homeless women in the US included lack of housing opportunities and health insurance, and that addressing these issues would be necessary for reducing costly health



services such as repeated hospitalizations (Stein, Andersen, & Gelberg, 2007). In relation to Mexican-American immigrants, one study found that barriers to utilization were mainly cultural differences related to language, but the cost of health services and appointments during working hours (Estrada, Trevino, & Ray, 1990). In relation to HIV-infected persons, policy recommendations from studies using the model have included the need for primary health care insurance in order to link disadvantaged populations to health systems (Anthony et al., 2007).

Another advantage of the model is that it can be modified to different contexts. A study investigating prenatal utilization in Tajikistan used a modified version of the model. Specifically, researchers controlled for the year of childbirth as a predictor of utilization. It was hypothesized that the closer the childbirth was to the Soviet period, the more likely it was that women would utilize health services (Habibov & Fan, 2008). In another study of utilization of health services in Tajikistan, it was hypothesized that due to absence of a strong insurance policy in the country, help-seeking individuals would rely on out-of-pocket expenditures (Fan & Habibov, 2009). The model has been adapted for testing utilization of social services in New Zealand as well (Lorentzen, 2008), and also has been applied in countries with transitional economies and for different substantive areas.

The greatest criticism of the model is a low level of explained variance in utilization of health services resulting from the factors considered, which generally have not exceeded 16-26 percent (Choi, 2010). This could be attributed to errors in conceptualization, measurement, and model specifications (Choi, 2010). Therefore, it is

important to develop models with strong theoretical justifications for including variables in analysis, and to account for possible errors in measurement and conceptualizations.

## CHAPTER 4

### METHODOLOGY

This chapter provides an overview of the survey data and statistical methods that were used for empirical analysis. It consists of an overview and description of the data sources, analytical samples for each country, and a pooled sample. These are followed by descriptions of outcomes – variables related to prenatal care and descriptions of procedures for creating index measures. The chapter also includes descriptions of independent variables related to autonomy of women at the household level, as well as covariate measures. Finally, research questions, hypotheses, and analytical strategies are described in this chapter.

#### **Description of Data Sources**

The data analyzed in this study were obtained from two sources: (1) the 2005 Demographic and Health Survey Armenia; and (2) the 2006 Demographic and Health Survey Azerbaijan. Demographic and Health Surveys (DHS) conducted in developing countries are part of the worldwide MEASURE DHS project, which evolved from World Fertility Surveys and Contraceptive Prevalence Surveys conducted in 1970s and 1980s. DHS core questionnaires included data on fertility, family planning, maternal and child health, domestic violence, HIV/AIDS, and malaria. DHS were conducted by national statistical services, with technical assistance from ORC Macro. Country datasets are available for public use.

DHS datasets include nationally representative data at individual and household levels. They include a set of variables related to prenatal care and women's autonomy at the household level. The advantage of using DHS surveys for this study was that they

contained standard questionnaires for women and households, making it possible to combine data from different countries. Combining data from two countries for one research project allowed for a robust examination of proposed hypotheses across independently collected data. DHS data were based on a sampling strategy that requires a large sample size, probability sampling, sampling frame, and simplicity of the design (ICF International, 2012).

### **Armenia Demographic and Health Survey**

The 2005 Armenia Demographic and Health Survey was a national representative survey of women of reproductive ages (National Statistical Service, 2005). The total sample included 6,566 women. All women age 15-49 who were permanent residents or visitors in surveyed households, were eligible for an interview. A sampling frame included 308 population clusters selected from a 2001 population census. For each selected cluster, a complete list of housing units was prepared, and 7,655 housing units then were systematically selected for the survey. In the process of fieldwork, it was determined that 7,003 of these households were occupied. In these occupied households, 6,773 women were identified as eligible for interviews, and a response rate of 97% was obtained (National Statistical Service, 2005). Questionnaires were developed in English and translated into Armenian. Three-week training was conducted for interviewers, supervisors, and field editors by the National Statistical Service before fieldwork started. Sampling weights were applied for women's and household data to reflect the national population.

The survey questionnaire included sections on reproduction, contraception, pregnancy, children's and women's nutrition, immunization, and HIV and sexual history.

The 2005 Armenia Demographic and Health Survey was conducted by the National Statistical Service, Ministry of Health of the Republic of Armenia. ORC Macro provided technical assistance and the U.S. Agency for International Development (USAID) provided funding. UNICEF and UNFPA provided in-kind contributions to support the survey.

### **Azerbaijan Demographic and Health Survey**

The 2006 Demographic and Health Survey of Azerbaijan was a national representative survey of women of reproductive ages (State Statistical Committee, 2006). All women age 15-40, who permanent residents or visitors in surveyed households were eligible for the interview. The total sample included 8,444 women. A two-stage sampling strategy was applied for the survey. In the first stage, 318 population clusters were selected with probability proportionate to size from all regions of the country, excluding the Autonomous Republic of Nakhichevan, which represents 4.5% of the total population of Azerbaijan (State Statistical Committee, 2006).

A population census was used as a sampling frame at this stage. In the second stage, a complete listing of housing units was prepared for each of the selected clusters. After that, using systematic sampling, 7,619 housing units were selected for the survey. During fieldwork, 7,341 housing units were found to be occupied. In these households, 8,652 women were eligible for interviews, and 98% completed interviews. Questionnaires were prepared in English and translated in Azeri and Russian. Three-week training was conducted for interviewers, supervisors, and field editors by the State Statistical Committee and Macro International. Sampling weights were applied for women's and household data to reflect the national population.

The survey questionnaire included sections on reproduction, contraception, pregnancy, children's and women's nutrition, immunization, and HIV and sexual history. The 2006 Health and Demographic Survey was conducted by the State Statistical Committee of the Republic of Azerbaijan. Macro International provided technical assistance for the survey. USAID provided funding, and UNICEF/Azerbaijan provided in-kind contributions to the project (State Statistical Committee, 2006).

### **Selection Criteria for the Analytic Sample**

This section provides information about selection criteria for women in this study and samples sizes for each country. The first criterion for including women in the analytical sample was marital status. A filter question to identify a woman's marital status in both country surveys was, "Are you currently married or living together with a man as if married?" The reason why only married or women in cohabitation were selected in the study was that measures of autonomy included questions pertaining to household and health care autonomy, with response categories including decisions made by respondent women and their husbands. Therefore, it was decided to include only women who were married or in union in this study.

The second criterion for including women was birth history. Only women who had given birth to at least one child in the five years preceding the survey were included for analysis. A filter question for identifying women who had given a birth in the last five years was, "One or more births in 2000 or later" for Armenia, and "One or more births in 2001 or later" for Azerbaijan. If a woman chose "yes" for response, she was interviewed about prenatal care. Using this filter question allowed ensuring that the maximum time between the survey interview and the last pregnancy was five years.

In Armenia, 62.63% of women were married or living with a man as if married. Among them, 16.59% gave birth in the last five years. The total sample for analysis for Armenia included 1,089 women meeting these criteria. For Azerbaijan, 62.29% of women were married or living with a man, and among these women, 19.34% gave births in the last 5 years preceding the survey. The total analytical sample for Azerbaijan included 1,633 women. The pooled sample for both countries included 2,722 women. Table 4 displays samples sizes for each country.

Table 4

*Sample Size per Country and for the Pooled Sample*

<b>Eligible Women</b>	<b>Armenia (%)</b>	<b>Azerbaijan (%)</b>	<b>Pooled Sample (%)</b>
Full sample	6,566 (100%)	8,444 (100%)	15,010 (100%)
Married and in stable union	4,112 (62.63%)	5,260 (62.29%)	9,372 (62.44%)
Women who gave birth in the last 5 years	1,122 (17.09%)	1,698 (20.11%)	2,820 (18.79%)
Women who were married/in union and gave birth in the last 5 years	1,089 (26.48%)	1,633 (31.05%)	2,722 (29.04%)

Women in Armenia had utilization rates for prenatal care at 89.30%, the percent of women in Azerbaijan who saw a doctor during the last pregnancy was 74.03. The percent of utilization of prenatal care for the pooled sample was 80.11%. In Armenia, women on average women had initiated pregnancy care at 3.52 months of pregnancy; in Azerbaijan, on average, women had their first prenatal check at 3.35 months of pregnancy. For the pooled sample, women started prenatal care at 3.42 months. The mean number of prenatal care visits was 5.34 in Armenia and 3.66 in Azerbaijan; in the pooled sample, it was 4.33.

As for the content of care, in Armenia 98.18% of women reported being weighed during prenatal care visits, the percentage in Azerbaijan was 58.25. The percentage for the pooled sample was 75.93. In the Armenian sample, 98.43% women reported their blood pressure was taken during prenatal care visits, compared to 83.73% in the Azerbaijani sample. In the pooled sample, the percentage was 90.25. In Armenian sample, 98.37% of women reported that their urine sample was taken during prenatal care visits, and in Azerbaijan the percentage was 72.09. In the pooled sample, the percentage was 83.73%. As for the blood samples being taken during prenatal care visits, 98.47% of women in Armenia and 75.29% in Azerbaijan reported it. In the pooled sample, the percentage was 85.55. Distribution of outcome measures was reviewed. Table 5 displays percentages for dichotomous measures of utilization of prenatal care and content of prenatal care during visits. Means and standard deviations for the month of the first prenatal care check and a number of prenatal care visits are also displayed. Women were asked questions about prenatal care during their most recent pregnancy during the five years preceding the survey.

Table 5

*Frequencies and Means for Prenatal Care Outcomes*

<b>Prenatal Care Outcome</b>	<b>Armenia</b>	<b>Azerbaijan</b>	<b>Pooled Sample</b>
Utilization (%)	89.30%	74.03%	80.11%
Month of the first check	3.52 (1.45)	3.35 (1.78)	3.42 (1.65)
Number of visits	5.34 (3.51)	3.66 (3.54)	4.33 (3.62)
Content of care (%):			
Weighted	98.18%	58.25%	75.93%
Blood pressure taken	98.47%	83.73%	90.25%
Urine sample taken	98.37%	72.09%	83.73%
Blood sample taken	98.47%	75.29%	85.55%



## **Measures for Prenatal Care Outcomes**

This section discusses how outcome measures were selected and operationalized for this study. Theoretically, the Andersen behavioral model of health services use guided the selection of the outcome measures. The Andersen model helped to develop predictions for health behaviors of women as a function of predisposing characteristics of women. From a practical perspective, the choice of outcome measures was based on the WHO's model for prenatal care (Villar & Bergsjø, 2002). The model was developed as a basic component for women with uncomplicated pregnancies.

**Utilization of prenatal healthcare.** Relying on the Andersen's model, this study defined seeing a health provider for prenatal care as an outcome variable for utilization. In the surveys, seeing a health provider for prenatal care was measured using a question, "Did you see anyone for prenatal care for this pregnancy?" If a woman said yes, she was then asked, "Whom did you see: doctor, nurse/midwife, feldsher, traditional healer, village health worker?" A separate variable was created for each category of health providers for prenatal care: saw a doctor for prenatal care=1, no=0; saw nurse/midwife for prenatal care=1, no=0, etc. For this study, seeing the most qualified personnel for prenatal care was selected as an appropriate outcome; therefore a dichotomous variable for whether a woman saw a doctor for prenatal care was selected as a utilization variable. In Armenia, 89.30% of women saw a doctor for prenatal care and in Azerbaijan 74.03% did so. In a pooled sample, 80.11% of women saw a doctor for prenatal care during the last pregnancy, and so were classified as utilizing prenatal care.

**First prenatal care visit.** The next outcome of interest was the timing of the first prenatal care visit. Timing of the first prenatal care visit is important for diagnosing risk

factors and potential complications for pregnancies. According to the WHO model, the first prenatal care visit should occur during the first trimester of pregnancy. In DHS surveys, the question for this measure was, “How many months pregnant were you when you first received prenatal care for this pregnancy?” Responses of women were entered as numbers ranging from 0 to 9. One approach would be to use it as a continuous variable, with statistical analysis predicting changes in coefficients for months of pregnancy. Another approach would be looking at this variable as a dichotomous variable, with the first trimester months coded as 1 and other months coded as 0. Regression analysis would predict the odds of women starting prenatal care during the first trimester versus second and third trimesters combined. From a practical standpoint, a more important outcome was that women started prenatal care during the first trimester of pregnancy. In this case, the month of pregnancy was not as important as the trimester when the prenatal care occurs. Therefore, for this study the timing of the first prenatal care was specified as a dichotomous variable first ANC visit: first trimester (1-3 months of pregnancy) = 1 and other trimesters = 0.

**Number of prenatal care visits.** In addition to utilization and timing of the first prenatal care visit, a number of prenatal visits was another outcome of interest. A regular contact with a health provider can detect pregnancy-related complications. According to the WHO model, four prenatal visits are required for women with uncomplicated pregnancies (Villar & Bergsjö, 2002). In surveys, a question for this measure was, “How many times did you receive prenatal care for this pregnancy?” Responses were entered as numbers ranging from 0 to 20. It was possible to specify this variable as dichotomous, with coding 4 and more visits = 1 and 0-3 visits = 0. This model would predict the odds

of women making four or more prenatal visits. Another option for this variable was to use it as a continuous variable. It seemed more practical to use this variable as continuous and analyze what factors contributed to an average number of prenatal care visits, and this option was chosen.

**Content of care.** Another aspect of prenatal care is the extent of care received during prenatal care visits. In both countries, guidelines for prenatal care included weighing women, taking blood and urine samples, and measuring their blood pressure. According to country reports, these measures helped to identify health conditions that require specialized care and prevent complications during pregnancy (National Statistical Service, 2005; State Statistical Committee, 2006). In the surveys, a question to measure the extent of care was, “As part of your prenatal care during this pregnancy, were any of the following done at least once?” Responses were recorded as answers to closed-ended questions: (1) “Were you weighed?” (2) “Was your blood pressure measured?” (3) “Did you give a urine sample?” (4) “Did you give a blood sample?”

The WHO model for prenatal care includes more procedures for prenatal visits, such as clinical examinations, obstetric and gynecological examinations, tests for syphilis and other sexually-transmitted infections, and hemoglobin tests (Villar & Bergsjø, 2002). Questions for these additional measures were not included in DHS surveys, probably because recalling these procedures would require at least a basic level of medical training, and it would be problematic for respondents to provide adequate. Therefore, constructing an adequate measure for the quality of prenatal care was not possible with the current dataset.

Instead, an outcome variable content of care was constructed. An index variable combining four items related to procedures received by women during prenatal visits was created for this outcome measure, using a factor analysis. A Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was used to identify correlations and partial correlations between variables in the index. The overall correlation was 0.78, assessed as “middling”, according to the KMO criteria. Values for the KMO measure ranged between 0 and 1. An assessment of internal consistency for this measure showed the value of Cronbach’s alpha at 0.87.

### **Measures for Autonomy of Women**

One of the limitations of previous research is that most studies have used single-item measures of women’s autonomy in the household, by considering how women made decisions for household purchases, every day purchases, and visits to family. This study overcame this limitation by creating an index measure of autonomy and adding another index measure reflecting women’s status in their relationships with their husbands or partners: attitudes toward refusing sex with husbands. Two index measures related to autonomy were constructed from the combined dataset.

**Household autonomy.** This index measure represented women’s autonomy for making decisions for the household. Household autonomy was a three-item index of household-related decisions. It included questions about decision-making for major household purchases; purchases for daily household needs, and visits to a woman’s family or relatives. For each of these decisions, a respondent woman was asked: (1) “Who usually makes decisions about making major household purchases?” (2) “Who usually makes decisions about making purchases for daily household needs?” (3) “Who

usually makes decisions about visits to your family or relatives?” Responses for these questions were coded as follows: decisions made by someone else=1 ( e.g. mother-in-law), decisions made by husband/partner alone=2, decisions made by respondent and other person/husband=3, decisions made by respondent alone=4. Missing values were dropped.

Methodologies used in other studies for creating index measures were applied for creating index measures of autonomy (Krishnan, 2010; Antony & Rao, 2007). Factor analysis was used for creating an index measure of household autonomy as the first step. Factorization of three items was performed resulting in generation of one factor.

Table 6

*Factor Loadings and Unique Variances for Household Autonomy Index*

<b>Variable</b>	<b>Regression Coefficients</b>	<b>Uniqueness</b>
Decisions about major household purchases	0.83	0.31
Decisions about making purchases for daily household needs	0.82	0.33
Decisions about visits to family or relatives	0.62	0.62

All three items had positive values as shown in Table 6, and uniqueness or percentage of variance for the variable not explained by common factors. One of the variables, decision-making about family visits, had a value of 0.62. Unexplained variance of greater than 0.60 is usually considered high, and variables with high uniqueness are considered less relevant for the factor model (StataCorp, 2013, p. 306). The decision-making about family visits variable was retained for creating an index, and further validation of the index was initiated. In the second step, a household autonomy index was created using a Bartlett scoring method. For validation of the index, two post-estimation

measures were applied. A Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was used to identify the correlations and partial correlations between variables in the index. Values for KMO measure range from 0 to 1, with correlations below 0.49 considered “unacceptable”, between 0.50 to 0.59 “miserable”, “mediocre” for 0.60-0.69, “middling” for 0.70 -0.79, “meritorious” for 0.80-0.89, and “marvelous” for 0.90-1.00. The value of the KMO test for the measure of the household autonomy was 0.68, an acceptable but not optimal level for an index variable.

The second post-estimation step was checking a value of Cronbach’s alpha for the household autonomy index. Its value was 0.82, with the highest possible value of 1.00. The generated household autonomy index has high internal consistency but its measure of sampling adequacy was mediocre, according to the KMO test. For easier interpretation of index coefficients, the index was standardized to a scale of 0 to 100, using a formula applied in other studies (Krishnan, 2010; Antony & Rao, 2007). The resulting values for the index were between 10 and 66.7. A formula for standardizing an index is below:

$$\text{Standardized Index} = \frac{(\text{Household Index} - \text{Household Index Minimum})}{(\text{Household Index Maximum} - \text{Household Index Minimum})} \times 10$$

**Attitude toward sex refusal.** Attitude toward sex refusal was a three-item index that measured attitudes of women toward refusing sex with husbands or partners. The rationale for including a measure of attitudes toward sex refusal was that it reflected an ability of women to demonstrate autonomy in relations with their husbands. It was hypothesized that women with high autonomy in their relationships with men were more likely to utilize healthcare, because they had more control in the decision-making process pertaining their well-being. The survey question was, “Husbands and wives do not

always agree on everything. Please tell me if you think a wife is justified in refusing to have sex with her husband when: (1) she knows her husband has a sexually transmitted disease? (2) She knows her husband has sex with other women? (3) She is tired or not in the mood?” Responses were coded as no=1, yes=0, missing values=0, do not know=0. Factor loadings and uniqueness were assessed, using factor analysis.

Table 7

*Factor Loadings and Unique Variances for Sex Refusal Index*

<b>Variable</b>	<b>Regression Coefficients</b>	<b>Uniqueness</b>
When husband has a sexually transmitted disease	0.73	0.47
When husband has sex with other women	0.75	0.43
When she is tired or not in the mood	0.65	0.62

The third coefficient, “when she is tired or not in the mood” had a high percentage of unexplained variance. This indicated that its relevance for the given factor was less than optimal with the recommended value of no more 0.60, but it was retained for the index for further estimations. An index measure was generated using a regression coefficients method. A post-estimation test using a KMO test showed a value of 0.69, assessing the constructed index as a “mediocre” measure. The level of Cronbach’s alpha for this index was 0.78. The index had a range of values of -1.82 to 0.58. For ease of interpretation, it was standardized on a scale 0 to 100. Resulting values ranged from 10 to 29.19. The same formula that was used for standardizing the household autonomy index was used for standardizing:

Standardized Index

$$= \frac{(\text{Sex Refusal Index} - \text{Sex Refusal Index minimum})}{(\text{Sex Refusal Index maximum} - \text{Sex Refusal Index minimum})} \times 10$$

These indices measured constructs reflecting women’s status in the household and relationships with their husbands. Women who agreed that they had no right to refuse sex with their husbands for any of the reasons, may have had low levels of overall autonomy, and that could negatively reflect on their decisions regarding their healthcare and utilization of prenatal care. Table 8 shows unstandardized and standardized mean values for constructed indices.

Table 8

*Indices of Household Autonomy and Sex Refusal, Unstandardized and Standardized Values*

<b>Index</b>	<b>Unstandardized Mean</b>	<b>Range</b>	<b>Standardized Mean</b>	<b>Range</b>
Household Autonomy Index (3 items)	-1.22 (1.00)	-2.43 to 1.70	33.33 (13.72)	10.00 to 66.67
Sex Refusal Index (3 items)	-1.44 (1.18)	-2.53 to 0.80	14.60 (6.80)	10.00 to 29.19

**Health autonomy.** Health autonomy was the last measure in the set of autonomy measures for women. It was a one-item variable, and the survey question was, “Who usually makes decisions about health care for yourself?” The responses were coded as: decisions not made by a woman and decisions made by someone else or husband =1, decisions are made by a woman and husband/other person=3, decisions are made by a woman alone=3. Missing values (0.25% of sample) were dropped from the analysis. As this was a categorical measure, three dichotomous variables were developed from responses for analysis. The category of decisions made by the woman and husband/other person was used as the reference. The distribution of responses across the three categories was as follows: 21% of women reported that somebody made health-related decisions for



them, 55% of women made health-related decisions together with their husbands or other person, and 24% of women made decisions about their own health independently.

### **Independent Variables**

This section describes independent variables. Some variables for the research question II were centered on community means to account for differences across communities. Centering on community means was done because analysis for the Research Question II was multi-level accounting for variations within and between communities. Table 12 describes variables for research questions I and III.

**Age.** Age of a woman was measured using a question, “How old were you at your last birthday?” The values for age ranged between 15 and 49. For research questions I and III, the age of women was measured as a continuous variable.

For research question II, the age variable was transformed to every five years of aging in order to create a more meaningful coefficient for age. In such a way, an age effect on outcome will be for every five years of age of women. Transforming age in this way increased regression coefficients, but it did not change the value of a standard error and t-tests in regression analyses. After transforming the age variable, centering on the community mean was done. Community-mean centering was completed by deducting a community-specific mean from an actual value of age. Doing so allowed for identifying an average effect of every 5 years of age for each community in the sample. The mean age of women in the sample was 31 years. Table 13 describes variables for research questions II.

**Parity.** Previous research established that the more children women had, the more likely they were to delay utilization of prenatal care and have fewer prenatal care visits

(AbouZahr & Wardlaw, 2003; Simkhada, B., Teijlingen, Porter, & Simkhada, P., 2008; Beeckman, Louckx, & Putman, 2010). Parity was a continuous variable and was measured using a question, “You have had in total [number] live births during your life. Is that correct?” The values for this variable varied between 0 and 14.

For the research question II the variable for parity was centered on a community-specific mean. Centering determined an average number of births for women in each community. The average number of children women had was 1.6.

**Pregnancy wanted.** Wanted last child was a dichotomous variable and was measured using the question, “At the time you became pregnant with (name), did you want to become pregnant then, did you want to wait until later, or did you not want to have any (more) children at all?” The variable was coded as wanted then=1, wanted later/no more and missed=0. In the sample, 81% of women reported that they wanted to have a child at the time of the pregnancy.

**More children.** More children was a dichotomous variable, and measured with a question, “Would you like to have (a/another) child, or would you prefer not to have any (more) children?” Coding for the desire to have more children in the future was: 1=wants more children, 0=else. In the sample, 38% of women reported wanting more children in the future.

**Age at birth of the first child.** Age at birth of the first child was a continuous variable and was constructed from the birth history of women. There was no question for this measure in the survey. It was calculated from survey data and included as a variable. For research question II, it was centered on a community-specific mean to determine an

average age of women at their first birth for each community. The average age of women at the birth of the first child was 22.

A selection bias could be a methodological issue in assessing utilization behaviors of pregnant women. The source of the bias could be introduced by women with health conditions, such as diabetes or heart diseases, seeking consultations with their health providers at early stages of pregnancy. In addition, women who have been identified as having potential or real complications related to pregnancy could have more frequent prenatal visits compared to healthy women. Therefore, variables representing reproductive history of women were included in the analysis.

**Complications.** Pregnancy complication was included in the study to control for a potential bias in assessment of outcomes resulting from health conditions of women. A question in the survey was, “During any of your prenatal care visits, were you told about signs of pregnancy complications?” A dichotomous variable was coded as yes=1, no/do not know=0. 40% of women reported complications during the last pregnancy.

Another source of a selection bias could be that healthy women seek prenatal care later than women with potential complications. An assessment of a health status of a woman during pregnancy could account for this selection bias, but these datasets did not include a variable for health status of women during pregnancy; therefore it was impossible to control for this potential bias. In order to address a potential issue of omitted variables, four variables related to reproductive history of women were included: total number of pregnancies, number of abortions, number of miscarriages, and number of stillbirths. These variables were continuous, and were centered on group means. It was expected that these measures affected health-seeking behaviors of women during

pregnancy in terms of the timing of the first prenatal visit and a number of visits. The mean values for these variables were: 3 pregnancies, 1 abortion, 0.12 miscarriages, and 0.02 stillbirths.

**Type of health care facilities.** Facilities where women received prenatal care were included in analysis as dichotomous measures. The reason for including these measures was that outcomes, such as timing of the first prenatal care visit, a number of ANC visits, and content of the care could be a function of a facility where women received services. For example, healthy women could use services of a clinic in their communities, while women with potential complications, or women who have experienced complications in previous pregnancies, could be referred to services of a secondary health care level, such as care in hospitals or maternity houses. A question in the survey was, “Where did you receive prenatal care for this pregnancy?” Response categories included: home, public sector hospital, public sector children’s hospital, public sector maternity hospital, public sector polyclinic, ambulatory, women’s health consultation center, medical diagnostic center, and a midwife service center. In the survey, response categories were coded as separate variables. For the purposes of this study, the health care facilities where women received prenatal care were divided into two categories: primary health care facilities and secondary health care facilities.

**Primary health care facilities.** Clinics and home visits were grouped in the category of primary health care. A dichotomous variable phc\_facility was created and coded as clinic and home visits=1 and else=0.

**Secondary health care facilities.** Maternity houses, children’s hospitals, and hospitals for adults were included in the secondary level of care. A dichotomous variable

shc\_facility was created. It was coded as hospital care=1 and else=0. Among women in the sample, 18.01% (425 women) received care at primary care facilities, and 62.50% received care at secondary care facilities (1,475 women).

**Socioeconomic determinants.** The social gradient and economic status contribute to disparities in the health status. A number of socio-economic determinants of prenatal care utilization were included in this analysis.

***Household wealth.*** This index variable was developed to reflect the economic status of households in DHS surveys. The measure of household wealth is relevant for developing countries where direct income may be influenced by seasonal jobs (Rutstein & Staveteig, 2013). An advantage of using a wealth index was that it can be used for comparison across country surveys. It is constructed for each country every time a DHS survey is conducted, meaning that it is time and country specific (Rutstein & Staveteig, 2013). The measures included in the wealth index are related to the assets, services, and amenities (Rutstein & Staveteig, 2013). Calculated indices for each residential area are specific for urban and rural areas (Rutstein & Staveteig, 2013, p.13). The wealth of the household was classified by five dichotomous variables coded as: (1) poorest=1, (2)=poorer, (3)=middle, (4) richer=4, (5)=rich. The poorest category is used as a reference group for analysis. In the combined dataset, 19% were in the poorest category, 22% in the poorer category, 22% in the middle category, 20% in the richer category, and the 17% were in the richest category.

***Education.*** Education has been found to be a strong predictor of utilization of healthcare services in previous studies. Therefore, this measure was included in this study. In the DHS surveys, it was measured using a question, “What is the highest level

of school you attended: primary/secondary, secondary special, or higher?” Education was an ordinal variable and was coded as primary/secondary and secondary special=1, higher=0, creating a dichotomous variable. Higher education was used as the reference group. In the sample, 82% had secondary education, and 18% of women had higher education.

**Employment.** Employment was another measure of a socio-economic status of women and could also affect their ability to pay for prenatal care services. It is a dichotomous variable measured with the question, “Have you done any work in the last 12 months?” Due to the high level of unemployment among women, the variable was coded as unemployed=1 and employed=0. In the sample, 14.70% of women were employed and 85.30% were unemployed.

**Residence.** Due to anticipated differences in utilization of prenatal care between women living in rural and urban areas, a variable on the residence type was included in analysis. Residence was a nominal variable including three categories: residence in a capital or large city=1, residence in a small town=2, residence in countryside=3. Living in the capital city or a large city was the reference category. 20% of women lived in a capital or a large city, 41% lived in a small town, and 39% lived in rural areas.

**Community.** Community was a level two variable, and was used to model between-cluster differences with hierarchical linear models for research question II. A sampling cluster was found to be a consistent measure of community in demographic studies in many countries (Uthman, 2010); therefore, sampling clusters were used to denote communities in Armenia and Azerbaijan. A total of 626 communities were included in the pooled sample.

Table 9

*Means and Standard Deviations of Independent Variables*

	<i>M</i>	<i>SD</i>	<i>Min</i>	<i>Max</i>
HH_autonomy	38.93	14.34	10.00	66.67
Health_smb	0.30	0.46	0.00	1.00
Health_woman	0.17	0.38	0.00	1.00
Sex_index	13.40	5.73	10.00	29.19
Age	27.40	5.58	16	49
Age_1birth	22.02	3.97	14	44
Wanted_preg	0.80	0.40	0.00	1.00
Complications	0.40	0.49	0.00	1.00
Children_born	2.07	1.07	1	10
Want_morech	0.36	0.48	0.00	1.00
Pregnancies	2.97	2.03	0	22
Abortions	0.72	1.27	0	18
Middle	0.22	0.42	0.00	1.00
Richer	0.20	0.40	0.00	1.00
Richest	0.14	0.35	0.00	1.00
Primary health facility	0.63	0.48	0.00	1.00
Secondary health facility	0.18	0.38	0.00	1.00
Town	0.39	0.49	0.00	1.00
Country	0.44	0.50	0.00	1.00

Table 10

*Frequencies and Percentages of Independent Variables*

<b>Variables</b>	<b>N</b>	<b>Percent</b>
Decision-making for women's healthcare		
Somebody makes decisions	822	30.23%
Together with husband or smb. else	1,426	52.45%
Woman makes decisions	471	17.32%
Pregnancy complications	904	39.60%
Want more children	976	35.86%
Last child wanted	2,190	80.46%
Unemployed	2,358	86.63%
Education		
Secondary education	2,253	82.77%
Higher education	417	15.32%
Household wealth		
Poorest	579	21.27%
Poorer	611	22.45%
Middle	612	22.48%
Richer	533	19.58%
Richest	387	14.22%
Type of facility for prenatal care		
Primary care facility	400	17.52%
Secondary care facility	1,429	62.59%
Residence		
Capital	466	17.12%
Town	1,065	39.13%
Countryside	1,191	43.75%



Table 11

*Correlations between Variables*

	1	2	3	4	5	6	7	8	9	10	11	12
HH_autonomy (1)	1.00											
Health_smb (2)	0.50	1.00										
Health_woman (3)	-0.31	-0.29	1.00									
Sex_index (4)	0.03	0.07	-0.02	1.00								
Age (5)	-0.37	-0.20	-0.13	-0.19	1.00							
Age_1birth (6)	-0.06	-0.05	0.03	-0.01	0.28	1.00						
Wanted_preg (7)	0.03	0.00	0.02	0.00	-0.11	0.05	1.00					
Complications (8)	-0.06	-0.09	0.01	-0.11	0.04	0.03	-0.05	1.00				
Children_born (9)	-0.22	-0.12	0.06	-0.19	0.68	-0.18	-0.24	0.02	1.00			
Want_morech (10)	0.23	0.11	-0.08	0.11	-0.61	0.01	0.19	0.05	-0.63	1.00		
Pregnancies (11)	-0.21	-0.11	0.05	-0.14	0.53	-0.13	-0.23	0.03	0.73	-0.49	1.00	
Abortions (12)	-0.14	-0.07	0.03	-0.09	0.34	-0.09	-0.16	0.00	0.40	-0.32	0.85	1.00
Miscarriages (13)	-0.03	-0.02	-0.00	-0.05	0.12	0.05	-0.02	0.06	0.12	-0.08	0.29	0.08
Stillbirths (14)	-0.03	-0.01	0.00	-0.01	0.07	-0.04	-0.01	0.07	0.08	-0.05	0.13	0.03
Education_s (15)	0.08	0.10	-0.08	0.10	0.02	-0.16	-0.03	-0.11	0.08	-0.09	0.08	0.06
Unemployed (16)	0.17	0.14	-0.08	0.10	-0.26	-0.09	-0.00	-0.04	-0.11	0.12	-0.08	-0.05
Poorer (17)	0.05	0.04	-0.04	0.04	-0.00	0.01	-0.03	-0.07	-0.01	-0.02	-0.02	-0.02
Middle (18)	-0.01	-0.02	-0.00	-0.01	0.00	-0.03	0.02	-0.01	0.01	-0.01	0.00	0.01
Richer (19)	-0.03	-0.09	0.02	-0.03	-0.00	-0.02	0.04	0.03	-0.01	0.02	0.01	0.01
Richest (20)	-0.08	-0.15	0.08	-0.09	-0.01	0.00	0.02	0.12	-0.01	0.06	-0.00	0.01
PHC_facility (21)	-0.12	-0.15	0.11	-0.03	-0.01	0.03	-0.03	0.04	-0.04	0.06	-0.00	0.02
SHC_facility (22)	0.13	0.17	-0.09	-0.01	0.08	0.02	0.01	-0.01	0.03	-0.06	0.01	-0.01

Table 11

*Correlations between Variables (Continued)*

	1	2	3	4	5	6	7	8	9	10	11	12
Town (23)	-0.06	-0.05	-0.00	-0.01	0.00	0.00	0.02	-0.05	-0.00	-0.01	0.00	0.00
Country (24)	0.14	0.14	-0.11	0.08	-0.00	-0.00	-0.2	-0.11	0.00	-0.04	-0.00	-0.00

Table 11

*Correlations between Variables (Continued)*

	13	14	15	16	17	18	19	20	21	22	23	24
Miscarriages (13)	1.00											
Stillbirths (14)	0.04	1.00										
Education_s (15)	0.01	0.02	1.00									
Unemployed (16)	-0.02	0.00	0.18	1.00								
Poorer (17)	0.00	0.00	0.13	0.04	1.00							
Middle (18)	-0.01	0.01	0.03	-0.00	-0.28	1.00						
Richer (19)	0.00	-0.01	-0.06	-0.02	-0.26	-0.27	1.00					
Richest (20)	-0.00	-0.00	-0.29	-0.07	-0.24	-0.24	-0.23	1.00				
PHC_facility (21)	-0.05	-0.01	-0.10	-0.03	-0.02	-0.04	0.02	0.07	1.00			
SHC_facility (22)	0.05	0.02	0.06	0.04	-0.01	0.03	0.01	0.01	-0.46	1.00		
Town (23)	0.00	0.00	-0.02	-0.01	-0.06	0.13	0.19	-0.03	-0.05	-0.04	1.00	
Country (24)	-0.00	-0.00	0.19	0.06	0.22	-0.08	-0.27	-0.33	-0.14	0.05	-0.67	1.00

Table 12

*Coding for Independent Variables for Research Questions 1 and 3*

<b>Variable</b>	<b>Coding</b>	<b>Measurement</b>
Household autonomy	Standardized index of 3 items	Continuous
Health autonomy		
Husband or somebody else makes decisions	1=yes; 0=else	Binary
Woman and husband/others make decisions together	1=yes; 0=else	Binary
Woman alone makes decisions	1=yes; 0=else	Binary
Sex refusal attitudes	Standardized index of 3 items	Continuous
Age	Number of years (five-year interval)	Continuous
Parity	Number of births	Continuous
Pregnancy wanted	1= wanted then; 0=else	Binary
Want more children	1=wants more; 0=else	Binary
Age at birth of the first child	Number of years	Continuous
Complications	1=yes; else=0	Binary
Abortions	Number	Continuous
Miscarriages	Number	Continuous
Stillbirths	Number	Continuous
Primary health care facility	1=yes; 0=else	Binary
Secondary health care facility	1=yes; 0=else	
Economic status		
Poorer	1=yes; 0=else	Binary
Middle	1=yes; 0=else	Binary
Richer	1=yes; 0=else	Binary
Richest	1=yes; 0=else	Binary
Education	1=secondary; 0=higher	Binary
Employment	1=unemployed; 0=employed	Binary
Residence		
Large city	1=yes; 0=else	Binary
Town	1=yes; 0=else	Binary
Countryside	1=yes; 0=else	Binary

Table 13

*Independent Variables for the Research Question 2*

<b>Variable</b>	<b>Coding</b>	<b>Measurement</b>
Household autonomy	Standardized index of 3 items	Continuous
Health autonomy		
Husband or somebody else makes decisions	1=yes; 0=else	Binary
Woman and husband/others make decisions together	1=yes; 0=else	Binary
Woman alone makes decisions	1=yes; 0=else	Binary
Sex refusal attitudes	Standardized index of 3 items	Continuous
Age	Every 5 years of age	Continuous, centered on community mean
Parity	Number of births	Continuous, centered on community mean
Pregnancy wanted	1= wanted then; 0=else	Binary
Want more children	1=wants more; 0=else	Binary
Age at birth of the first child	Number of years	Continuous, centered on community mean
Complications	1=yes; else=0	Binary
Abortions	Number	Continuous, centered on community mean
Miscarriages	Number	Continuous, centered on community mean
Stillbirths	Number	Continuous, centered on community mean
Primary health care facility	1=yes; 0=else	Binary
Secondary health care facility	1=yes; 0=else	
Economic status		
Poorer	1=yes; 0=else	Binary
Middle	1=yes; 0=else	Binary
Richer	1=yes; 0=else	Binary
Richest	1=yes; 0=else	Binary
Education	1=secondary; 0=higher	Binary

Table 13

*Independent Variables for the Research Question 2 (Continued)*

<b>Variable</b>	<b>Coding</b>	<b>Measurement</b>
Employment	1=unemployed; 0=employed	Binary
Residence		
Large city	1=yes; 0=else	Binary
Town	1=yes; 0=else	Binary
Countryside	1=yes; 0=else	Binary

**Research Question I: Association between Autonomy and Prenatal Care Utilization**

Is household autonomy of women associated with utilization of prenatal care services?

**Hypotheses**

H1: Household autonomy of women is associated with an earlier timing of the first prenatal care visit.

H2: Household autonomy of women is associated with a higher number of prenatal care visits.

H3: Household autonomy of women is associated with higher content of care during prenatal care visits.

**Plan for Analysis**

The objectives of the analysis were to test hypotheses for the proposed hypotheses. The first outcome variable, timing of the first visit, was coded as a dichotomous variable: first trimester=1, other=0. The second outcome variable, the number of prenatal care visits, was coded as a continuous variable with values ranging

between 0 and 20. The third outcome variable, content of care, was coded as a continuous variable representing an index measure consisting of four variables.

**Timing of the first visit.** A logistic regression for binary outcomes was fitted to estimate the odds ratios for the first visit for prenatal care to occur during the first trimester (Equation 1).

$$\text{Odds ratio of the visit} = \exp(\beta_0 + \beta_1(x_i + 1)) / \exp(\beta_0 + \beta_1 x_i) \quad (1)$$

**Number of prenatal care visits.** A Poisson regression was fitted to assess the coefficient for the autonomy.

$$\text{Incidence rate ratio} = e^{\ln(E) + \beta_0 + \beta_1(x_i + 1) + \beta_{23} x_{23}} / e^{\ln(E) + \beta_1 x_1 + \beta_{23} x_{23}} \quad (2)$$

**Content of care.** An OLS regression was fitted first to examine the coefficients for the autonomy variable.

$$\text{ANC\_content} = \beta_0 + \beta_1 \text{household\_autonomy}_i + \dots + \beta_{23} \text{countryside}_i + \varepsilon_{ij} \quad (3)$$

### **Research Question II: Determinants of Utilization of Prenatal Care**

What are the determinants of prenatal care outcomes?

- a. What are the determinants of utilizing prenatal care?
- b. What are the determinants of the timing of the first visit?
- c. What are the determinants of the number of prenatal care visits?
- d. What are the determinants of the content of care?

## **Hypotheses**

The main objective for this research question was to identify associations between utilization of prenatal services and reproductive history of women. Hypotheses were developed for factors related to the reproductive history of women.

H1: It is hypothesized that age will be positively associated with utilization of care.

H2: It is hypothesized that age will be positively associated with the first visit and frequency of care.

H3: It is hypothesized that parity will be negatively associated with the utilization of prenatal care.

H4: It is hypothesized that parity will be negatively associated with the first visit for prenatal care

H5: It is hypothesized that parity will be negatively associated with frequency of care.

H6: It is hypothesized that a desired pregnancy is positively associated with utilization of care.

H7: It is hypothesized that a desired pregnancy is positively associated with timing of the first prenatal care visit.

H8: It is hypothesized that a desired pregnancy is positively associated with frequency of care during pregnancy.

H9: It is hypothesized that women's wish to have more children in the future is positively associated with utilization.



H10: It is hypothesized that women's wish to have more children in the future is positively associated with frequency of care.

H11: It is hypothesized that complications during pregnancy are positively associated with frequency of prenatal care.

H12: It is hypothesized that complications during pregnancy are positively associated with the content of care.

### **Plan for Analysis**

The hierarchical structure of data in the DHS surveys was the most important factor in selecting appropriate strategies for analysis. The units of analysis in DHS surveys were women, and data were collected on individual characteristics and behaviors of women. However, the selection of survey participants was based on systematic sampling of households. Households were sampled from population clusters that were also sampled with probability proportionate to size from the sampling frame. In this way, the data were structured hierarchically in the DHS surveys: large clusters were selected first, and then households were randomly sampled within clusters. Every woman between 15 and 49 years of age residing in the selected household was eligible for participation in the survey.

Another feature of the DHS surveys was clustering of data. In Azerbaijan, 26 households were selected from each selected cluster. In Armenia, 27 households were selected for the survey in each cluster. This strategy was related to the expectation that behaviors and characteristics of women living in the same village or town were more

similar than behaviors of women from various villages or towns. For example, women living in the same village might have had similar health behaviors because they utilize services of the same clinic, and receive the same content of services. In this case, differences in women's behaviors between clusters would be higher than differences within clusters. Because data were clustered, the observations could be correlated, and thus violate an assumption of independence of observations. Another assumption of the regression, that coefficients were the same for all observations, may not hold for DHS data. In a one-level data analysis, it is assumed that influence of parameters is the same for all individuals, but in DHS surveys influence of factors could vary depending on the cluster women live in. Therefore, a two-level analysis was an adequate strategy for DHS survey data.

A relevant methodological approach for addressing a hierarchical nature of DHS data and a correlation of error terms between observations in the same clusters was the use of hierarchical linear models. Agresti (2010) recommends using a random effects model if the focus of a study is differences between individuals. The purpose of this study was to examine individual differences in behaviors of women and predict their future behaviors; therefore, random effect models were applied for the study. Under this approach, models were based on cluster specific variability.

## Specifications for Random Effect Models

**Outcome 1: Utilization of prenatal care.** First a base model was fitted for estimating whether multilevel modeling was necessary (see Table 14). The base two-level model included an intercept and community effects:

$$\text{logit}(\pi_{ij}) = \beta_0 + u_j \quad (4)$$

In the equation 6  $\beta_0$  was an intercept and  $u_j$  was a measure of random effects and showed variance between clusters. The intercept was the same for all clusters, while the variance  $u_j$  was specific to community  $j$ . And then a full model was fitted including measures of autonomy and covariates:

$$\begin{aligned} \text{logit}(\pi_{ij}) = & \beta_0 + \beta_1 \text{household\_autonomy}_{ij} + \beta_2 \text{health\_smb}_{ij} + \beta_3 \text{health\_woman}_{ij} + \\ & \beta_4 \text{sex\_index}_{ij} + \beta_5 \text{age}_{ij} + \beta_6 \text{ageat1birth}_{ij} + \beta_7 \text{pregnancy\_wanted}_{ij} + \beta_8 \text{childrenborn}_{ij} \\ & + \beta_9 \text{wantmorechildren}_{ij} + \beta_{10} \text{pregnancies}_{ij} + \beta_{11} \text{abortions}_{ij} + \beta_{12} \text{miscarriages}_{ij} + \\ & \beta_{13} \text{stillbirths}_{ij} + \beta_{14} \text{education}_{ij} + \beta_{15} \text{unemployed}_{ij} + \beta_{16} \text{poorer}_{ij} + \beta_{17} \text{middle}_{ij} + \\ & \beta_{18} \text{richer}_{ij} + \beta_{19} \text{richest}_{ij} + \beta_{20} \text{PHC\_facility}_{ij} + \beta_{21} \text{SHC\_facility}_{ij} + \beta_{22} \text{town}_{ij} + \\ & \beta_{23} \text{countryside}_{ij} + u_j \end{aligned} \quad (5)$$

In the full model  $\beta_0$  was an intercept,  $\beta_{1...24}$  were coefficients for predictors,  $i$  denoted a number of a woman,  $j$  denoted a number of a cluster, and  $u_j$  was variance between clusters. The full model was a random intercept model, allowing the intercept to vary across clusters.

**Outcome 2: Timing of the first prenatal care visit.** Because the outcome measure was an ordinal variable, multilevel mixed-effects ordered logistic regression was fitted to estimate the probabilities of utilization of prenatal care during each trimester (see Table 14). A base model was developed first:

$$\Pr(y_{ij} > k | x_{ij}, \kappa, u_j) = H(\beta_0 + z_{ij}u_j - \kappa_k) \quad (6)$$

And a full model was fitted:

$$\Pr(y_{ij} > k | x_{ij}, \kappa, u_j) = H(\beta_0 + \beta_1 \text{household\_autonomy}_{ij} + \beta_2 \text{health\_smb}_{ij} + \beta_3 \text{health\_woman}_{ij} + \beta_4 \text{sex\_index}_{ij} + \beta_5 \text{age}_{ij} + \beta_6 \text{ageat1birth}_{ij} + \beta_7 \text{pregnancy\_wanted}_{ij} + \beta_8 \text{childr\_enborn}_{ij} + \beta_9 \text{wantmorechildren}_{ij} + \beta_{10} \text{pregnancies}_{ij} + \beta_{11} \text{abortions}_{ij} + \beta_{12} \text{miscarriages}_{ij} + \beta_{13} \text{stillb\_irths}_{ij} + \beta_{14} \text{education}_{ij} + \beta_{15} \text{unemployed}_{ij} + \beta_{16} \text{poorer}_{ij} + \beta_{17} \text{middle}_{ij} + \beta_{18} \text{richer}_{ij} + \beta_{19} \text{richest}_{ij} + \beta_{20} \text{PHC\_facility}_{ij} + \beta_{21} \text{SHC\_facility}_{ij} + \beta_{22} \text{town}_{ij} + \beta_{23} \text{countryside}_{ij} + z_{ij}u_j - \kappa_k) \quad (7)$$

In the notation, the  $ij$  represented cluster  $j$  with  $i$  observations,  $\kappa_{1,2,3}$  represented cut points for trimesters and a number of possible outcomes, and  $z_{ij}u_j$  was an estimation of random effects.  $H$  represented cumulative probability. The full model was a random intercept model allowing the intercept to vary across clusters.

**Outcome 3: number of prenatal care visits.** The outcome variable number of ANC visits was continuous and therefore a multilevel mixed-effects linear regression was fitted. A base model was fitted first to determine whether multilevel modeling was necessary for this outcome (see Table 14):

$$Y_{ij} = \beta_0 + u_j + \varepsilon_{ij} \quad (8)$$

And then a full two-level was developed:

$$\begin{aligned}
Y_{ij} = & \beta_0 + \beta_1 \text{household\_autonomy}_{ij} + \beta_2 \text{health\_smb}_{ij} + \beta_3 \text{health\_woman}_{ij} + \\
& \beta_4 \text{sex\_index}_{ij} + \beta_5 \text{age}_{ij} + \beta_6 \text{ageat1birth}_{ij} + \beta_7 \text{pregnancy\_wanted}_{ij} + \\
& \beta_8 \text{pregnancy\_complications}_{ij} + \beta_9 \text{childrenborn}_{ij} + \beta_{10} \text{wantmorechildren}_{ij} + \\
& \beta_{11} \text{pregnancies}_{ij} + \beta_{12} \text{abortions}_{ij} + \beta_{13} \text{miscarriages}_{ij} + \beta_{14} \text{stillbirths}_{ij} + \\
& \beta_{15} \text{education}_{ij} + \beta_{16} \text{unemployed}_{ij} + \beta_{17} \text{poorer}_{ij} + \beta_{18} \text{middle}_{ij} + \beta_{19} \text{richer}_{ij} \\
& + \beta_{20} \text{richest}_{ij} + \beta_{21} \text{PHC\_facility}_{ij} + \beta_{22} \text{SHC\_facility}_{ij} + \beta_{23} \text{town}_{ij} + \beta_{24} \text{countryside}_{ij} + \\
& u_j + \varepsilon_{ij} \quad (9)
\end{aligned}$$

In the full model  $\beta_0$  was an intercept,  $\beta_{1...24}$  were coefficients for predictors,  $i$  denoted a number of a woman,  $j$  denoted a number of a cluster,  $u_j$  was variance between clusters, and  $\varepsilon_{ij}$  was an error term. The full model was a random slopes model, allowing the dichotomous variable denoting complications during pregnancy (coded as complications=1, no=0) to vary across clusters.

**Outcome 4: content of prenatal care visits.** Base model was fitted first (see Table 14) to determine whether multilevel modeling was necessary for this outcome:

$$Y_{ij} = \beta_0 + u_j + \varepsilon_{ij} \quad (10)$$

And then a full two-level was developed:

$$\begin{aligned}
Y_{ij} = & \beta_0 + \beta_1 \text{household\_autonomy}_{ij} + \beta_2 \text{health\_smb}_{ij} + \beta_3 \text{health\_woman}_{ij} + \\
& \beta_4 \text{sex\_index}_{ij} + \beta_5 \text{age}_{ij} + \beta_6 \text{ageat1birth}_{ij} + \beta_7 \text{pregnancy\_wanted}_{ij} +
\end{aligned}$$

$$\begin{aligned}
& \beta_8 \text{pregnancy\_complications}_{ij} + \beta_9 \text{childrenborn}_{ij} + \beta_{10} \text{wantmorechildren}_{ij} + \\
& \beta_{11} \text{pregnancies}_{ij} + \beta_{12} \text{abortions}_{ij} + \beta_{13} \text{miscarriages}_{ij} + \beta_{14} \text{stillbirths}_{ij} + \\
& \beta_{15} \text{education}_{ij} + \beta_{16} \text{unemployed}_{ij} + \beta_{17} \text{poorer}_{ij} + \beta_{18} \text{middle}_{ij} + \beta_{19} \text{richer}_{ij} \\
& + \beta_{20} \text{richest}_{ij} + \beta_{21} \text{PHC\_facility}_{ij} + \beta_{22} \text{SHC\_facility}_{ij} + \beta_{23} \text{town}_{ij} + \beta_{24} \text{countryside}_{ij} + \\
& u_j + \varepsilon_{ij}
\end{aligned} \tag{11}$$

In the full model  $\beta_0$  was an intercept,  $\beta_{1...28}$  were coefficients for predictors,  $i$  denoted a number of a woman,  $j$  denoted a number of a cluster,  $u_j$  was variance between clusters, and  $\varepsilon_{ij}$  was an error term. The full model was a random slopes model, allowing the dichotomous variable denoting complications during pregnancy (coded as complications=1, no=0) to vary across clusters.

Table 14

*Statistical Models for Research Question 2*

**Outcome 1. Utilization of Prenatal Care**

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Statistical model	Two-level mixed-effects logistic regression
Level 2 variable	Population cluster
Base model	$\text{logit}(\pi_{ij}) = \beta_0 + u_j$ ,
Full model	$\text{logit}(\pi_{ij}) = \beta_0 + \sum \beta_{1..24} + u_j$

**Outcome 2. Timing of the First Prenatal Care Visit**

---

Statistical model	Two-level mixed-effects ordered logistic regression
Level 2 variable	Population cluster
Base model	$\Pr(y_{ij} > k   x_{ij}, \kappa, u_j) = H(\beta_0 + z_{ij}u_j - \kappa_k)$
Full model	$\Pr(y_{ij} > k   x_{ij}, \kappa, u_j) = H(\sum \beta_{1..24} + z_{ij}u_j - \kappa_k)$

*Statistical Models for Research Question 2 (Continued)*

**Outcome 3. Number of Prenatal Care Visits**

---

Statistical model	Two-level random slopes Poisson regression
Level 2 variables	Population cluster, pregnancy complications
Base model	$Y_{ij} = \beta_0 + u_j + \varepsilon_{ij}$
Full model	$Y_{ij} = \beta_0 + \sum \beta_{1..} \beta_{24} + u_j + \varepsilon_{ij}$

**Outcome 4. Content of Prenatal Care**

---

Statistical model	Two-level random slopes linear regression
Level 2 variables	Population cluster, pregnancy complications
Base model	$Y_{ij} = \beta_0 + u_j + \varepsilon_{ij}$
Full model	$Y_{ij} = \beta_0 + \sum \beta_{1..} \beta_{28} + u_j + \varepsilon_{ij}$

**Measures of Fit for the Models**

There are two statistics used to assess the fit of multilevel models. The first one is the Bayesian information criterion (BIC), defined as an approximation for selecting a model among a set of models (StataCorp., 2013, p. 158). The second one is the Akaike information criterion (AIC) used for selecting a model with a better fit from a number of estimated models (StataCorp., 2013, p.158). Both tests generate numeric values to assess whether a model is a better fit for the data: the model with a smaller value is a better fit. According to Raftery’s criteria (1995), the difference between two models, using BIC statistics, can be assessed as the difference in *t*-test values: a) weak (0-2), b) positive (2-6), c) strong (6-10), very strong (10 and more). The more difference between the models, the more evidence is for supporting a model with a smaller value.

In this study, two types of models were compared using BIC and AIC statistics. First the base model was fitted and then a full model including all predictor variables was fitted. Then a comparison of BIC and AIC values between the two models showed whether a full model was a better fit. It should be noted that the BIC statistic is sensitive to differences in the number of observations between the models compared; therefore, the same number of observations should be used in models to estimate the BIC statistic.

### **Variance in Multilevel Models**

Variance in STATA is calculated with standard deviations. The output for the multilevel regression shows the mean value of the outcome variable across communities. The output for the random effects shows two types of standard deviations for the outcome variable: standard deviation for the outcome variable within community, and standard deviation for the outcome variable between communities. Variances within community and between communities were assessed to see how much variability was present in the data.

### **Intra-Class Correlation**

One of the features of the data in DHS surveys was that observations were potentially correlated within the same community. For example, a number of visits to a hospital or clinic for prenatal care could be influenced by recommendations of the provider in the community. Another example would be communication about prenatal care among women living in the same community. Younger women tend to seek advice from women who have already had children about pregnancy-related matters, and this



communication could contribute to homogeneity or correlations of reported behaviors within the same community. To assess these homogeneities, the community level intra-class correlation coefficients were assessed for each outcome. Percentage values were used for reporting variances.

### **Research Question III: The Social Gradient in Utilization of Prenatal Care**

What are the differences in utilization of care across economic levels?

#### **Hypotheses**

One of the findings in the multilevel analysis of outcomes was a positive association between the economic status of households and prenatal outcomes. This finding confirmed existing evidence about the influence of social and economic determinants in health behaviors and outcomes. In order to further test the hypothesis about the social gradient of health in the given sample, three additional hypotheses were tested:

H1: Women with lower economic status start prenatal care later compared to women with higher economic status.

H2: Women with lower socioeconomic status have fewer prenatal care visits compared to women with higher economic status.

H3: Women with lower economic status receive less content of care compared to women with higher socioeconomic status.

## **Plan for Analysis**

Margin statistics were used as statistics for testing these hypotheses. Margin statistics are used to make predictions based on a fitted model and can provide average values for fixed values of variables (StataCorp., 2013). Average values for the timing of the first visit, number of visits, and content of care were calculated for women in each economic level: poorer, middle, richer, and richest households. They were compared with the poorest households.

For the timing of the first prenatal care visit, an OLS regression was fitted with the month of pregnancy as the outcome variable. After fitting the model, the margin statistics were used to assess the timing of the first visit for women from each economic stratum. For the number of prenatal care visits, a simple Poisson regression was fitted first, with the outcome variable operationalized as a count outcome. The margin statistics were used to assess the probabilities for the number of visits during pregnancy for women from each economic stratum. For the content of care, a simple OLS regression was fitted with the content of care operationalized as a continuous outcome variable.

## CHAPTER 5

### ANALYSIS AND RESULTS

#### **Research Question I: Association between Household Autonomy and Utilization of Prenatal Care**

##### **Results for Timing of the First Prenatal Care Visit**

H1: The hypothesis that household autonomy of women would have a positive association with the timing of the first visit was supported by the results. For a one unit increase in the household autonomy, the odds of the first prenatal visit during the first trimester increased by a factor of 1.01 ( $OR = 1.01$ ; 95% CI 1.00 to 1.02,  $p = 0.02$ ), holding other variables constant. As discussed in Chapter 4, the autonomy index was standardized to a scale from 0 to 100, with the resulting values for women in the sample ranging between 10 and 66.7. This finding about the association between autonomy and timing could be interpreted as follows: an increase of autonomy by 10 points would result in a 10% increase in the odds of the first visit during the first trimester. For women who made decisions about health-related matters independently, the odds of the first prenatal visit during the first trimester increased by a factor of 1.39 ( $OR = 1.39$ ; 95% CI 1.09 to 1.78,  $p = 0.01$ ), holding other variables constant. In other words, making decisions for health independently was associated with 39% increase in the odds of the first visit during the first trimester, holding other variables constant. For women for whom the most recent pregnancy was desired, the odds of the first prenatal visit during the first trimester increased by a factor of 1.41 ( $OR = 1.41$ ; 95% CI 1.11 to 1.78,  $p = 0.00$ ), holding other

variables constant. Percent wise, this result showed that for women, who reported that the most recent pregnancy was desired the odds of the first visit during the first trimester increased by 41%, holding other variables constant.

For women with secondary education, the odds of the first visit during the first trimester decreased by a factor of 0.76 ( $OR = 0.76$ ; 95% CI 0.59 to 0.99,  $p = 0.04$ ), holding other variables constant. In other words, the odds of the first visit during the first trimester decreased by 23.8% for women who had secondary education versus women who had higher education, holding other variables constant. For unemployed women (70% of the sample), the odds of the first visit during the first trimester decreased by a factor of 0.72 ( $OR = 0.72$ ; 95% CI 0.55 to 0.94,  $p = 0.02$ ), holding other variables constant. Percent wise, the odds for unemployed women decreased by 28.2% compared to employed women, holding other variables constant.

Economic status was associated with the timing of the first visit. The poorest economic status was a base category for comparisons with other economic levels. For women from poorer households, the odds of the first prenatal visit during the first trimester increased by a factor of 1.32 ( $OR = 1.32$ ; 95% CI 0.99 to 1.75,  $p = 0.06$ ), holding other variables constant. The result was marginally significant, with the value for  $p$ -level at 0.06. For women from the middle economic level, the odds of the first prenatal visit during the first trimester increased by a factor of 1.61 ( $OR = 1.61$ ; 95% CI 1.20 to 2.16,  $p = 0.002$ ), holding other variables constant. In other words, for women in the middle economic level, the odds of the first visit during the first trimester increased by

60.9%. For women in a richer economic level, the odds of the first prenatal visit during the first trimester increased by a factor of 2.12 ( $OR = 2.12$ ; 95% CI 1.53 to 2.92,  $p = 0.00$ ), holding other variables constant. For women in the richer category, the odds increased by 112%. For women in the richest category, the odds of the visit during the first trimester increased by a factor of 2.38 ( $OR = 2.38$ ; 95% CI 1.64 to 3.46,  $p = 0.00$ ), holding other variables constant. . For women in the richest category, the odds increased by 138%.

Table 15

*The Regression of Women's Autonomy on Timing of the First Visit*

	OR (N=2245)	95% CI
<b>HH_autonomy</b>	<b>1.01 (0.004)*</b>	<b>[1.00, 1.02]</b>
Health_smb	0.99 (0.12)	[0.78, 1.24]
Health_woman	1.39 (0.17)**	[1.09, 1.78]
Sex_index	0.99 (0.01)	[0.98, 1.01]
Age	1.03 (0.08)	[0.88, 1.20]
Age_1birth	1.00 (0.02)	[0.96, 1.04]
Wanted_preg	1.41 (0.17)**	[1.11, 1.79]
Children_born	1.05 (0.18)	[0.76, 1.47]
Want_morech	1.13 (0.12)	[0.92, 1.40]
Pregnancies	0.87 (0.13)	[0.64, 1.17]
Abortions	1.16 (0.19)	[0.84, 1.60]
Miscarriages	1.34 (0.25)	[0.93, 1.93]
Stillbirths	1.54 (0.56)	[0.76, 3.13]
Education	0.76 (0.10)*	[0.59, 0.99]
Unemployed	0.72 (0.10)*	[0.55, 0.94]
Poorer	1.32 (0.19)*	[0.99, 1.75]
Middle	1.61 (0.24)**	[1.20, 2.16]
Richer	2.12 (0.35)**	[1.53, 2.92]
Richest	2.38 (0.45)**	[1.64, 3.46]
PHC_facility	1.08 (0.15)	[1.55, 2.39]
SHC_facility	1.92 (0.21)	[0.82, 1.42]
Town	0.85 (0.12)	[0.65, 1.11]
Country	1.13 (0.18)	[0.83, 1.55]

\*  $p < 0.05$ , \*\*  $p < 0.01$

## Results for the Number of Prenatal Care Visits

**H2:** The hypothesis that household autonomy would be positively associated with the number of prenatal care visits was not supported. Increasing women's autonomy by one unit decreased the number of visits by 1% ( $IRR = 0.99$ , 95% CI 0.99 to 1.00,  $p = 0.004$ ). In other words, an increase of autonomy by 10 points reduced the number of prenatal visits by 10%. The autonomy index was standardized to a scale from 0 to 100. The number of the prenatal visits reduced by 5% if somebody else made decisions about a woman's health, holding other variables constant ( $IRR = 0.95$ , 95% CI 0.91 to 1.00,  $p = 0.05$ ). For age increase by five years, the number of visits reduced by 5%, holding other variables constant ( $IRR = 0.95$ , 95% CI 0.92 to 0.99,  $p = 0.006$ ). For every additional year of the age at the time of the birth, the number of visits increased by 2%, holding other variables constant ( $IRR = 1.02$ , 95% CI 1.01 to 1.02,  $p = 0.00$ ). If a woman reported that the most recent pregnancy was desired, the number of visits increased by 6%, holding other variables constant ( $IRR = 1.06$ , 95% CI 1.00 to 1.11,  $p = 0.04$ ). If a woman wanted more children in the future, the percent of visits increased by 7%, holding other variables constant ( $IRR = 1.07$ , 95% CI 1.02 to 1.11,  $p = 0.003$ ). If a woman reported complications during pregnancy, the number of visits increased by 27%, holding other variables constant ( $IRR = 1.27$ , 95% CI 1.22 to 1.32,  $p = 0.00$ ). If a woman had had stillbirths in the past, the number of visits increased by 19%, holding other variables constant ( $IRR = 1.19$ , 95% CI 1.04 to 1.38,  $p = 0.02$ ).

Women from poorer households had 8% more visits compared to women from the poorest households, holding other variables constant ( $IRR = 1.08$ , 95% CI 1.01 to 1.15,  $p = 0.03$ ). Women from the middle economic level had 19% more visits compared to women from the poorest households ( $IRR = 1.19$ , 95% CI 1.11 to 1.28,  $p = 0.00$ ). Women from richer households had 37% more visits compared to women from the poorest households ( $IRR = 1.37$ , 95% CI 1.28 to 1.48,  $p = 0.00$ ). Women from the richest households had 40% more visits compared to women from the poorest households ( $IRR = 1.40$ , 95% CI 1.29 to 1.51,  $p = 0.00$ ).

For women living in towns the number of visits reduced by 11%, compared to women living in large cities ( $IRR = 0.89$ , 95% CI 0.85 to 0.94,  $p = 0.00$ ). For women in rural areas the number of visits reduced by 15%, compared to women from large cities ( $IRR = 0.85$ , 95% CI 0.80 to 0.91,  $p = 0.00$ ).



Table 16

*A Poisson Regression of the Number of Visits on the Household Autonomy*

	<i>IRR</i> (N =2208)	95% CI
<b>HH_autonomy</b>	<b>0.99 (0.001)**</b>	[0.996, 0.999]
Health_smb	0.95 (0.02)*	[0.91, 1.00]
Health_woman	0.96 (0.02)	[0.91, 1.01]
Sex_index	1.00 (0.002)	[1.00, 1.002]
Age	0.95 (0.02)**	[0.92, 0.99]
Age_1birth	1.02 (0.004)**	[1.01, 1.02]
Wanted_preg	1.06 (0.03)*	[1.00, 1.11]
Children_born	1.01 (0.04)	[0.93, 1.08]
Want more children	1.07 (0.04)**	[1.02, 1.11]
Complications	1.27 (0.02)**	[1.22, 1.32]
Pregnancies	1.01 (0.02)	[0.95, 1.08]
Abortions	0.96 (0.03)	[0.90, 1.03]
Miscarriages	1.04 (0.04)	[0.96, 1.12]
Stillbirths	1.19 (0.04)*	[1.04, 1.38]
Education	0.97 (0.09)	[0.92, 1.02]
Unemployed	0.96 (0.02)	[0.91, 1.01]
Poorer	1.08 (0.03)*	[1.01, 1.15]
Middle	1.19 (0.04)**	[1.11, 1.28]
Richer	1.37 (0.04)**	[1.28, 1.48]
Richest	1.40 (0.05)**	[1.29, 1.51]
PHC_facility	1.16 (0.03)**	[1.09, 1.23]
SHC_facility	1.06 (0.02)*	[1.01, 1.11]
Town	0.89 (0.02)**	[0.85, 0.94]
Country	0.85 (0.03)**	[0.80, 0.91]

\*  $p < 0.05$ , \*\*  $p < 0.01$

### **Results for the Content of Care during Prenatal Care Visits**

**H3:** A hypothesis that women's autonomy had a positive association with the content of care was not supported by findings. In the analysis, an association between household autonomy and the content of care was negative. An increase of household autonomy by one unit was associated with a 0.004 reduction in the content of care during visits, holding all other variables constant ( $\beta(SE) = -0.004(.002)$ ,  $p = .01$ ). If autonomy of women increased by ten points, the content of care reduced by 0.04 points. The maximum value of the measure for content of care was 0.53. Health autonomy was a significant predictor of the content of care. When somebody else in the household made decisions about a woman's health, the content of care during visits reduced by 0.30 points, holding all other variables constant ( $\beta(SE) = -.30(.05)$ ,  $p = .00$ ). If a woman reported that the last pregnancy was desirable for her, the content of care increased by a 0.11 points, holding other variables constant ( $\beta(SE) = .11(.05)$ ,  $p = .05$ ). If a woman wanted more children, she received less care during visits, holding all other variables constant ( $\beta(SE) = -.12(.05)$ ,  $p < .03$ ). Women reporting complications received more content of care during visits, holding all other variables constant ( $\beta(SE) = .10(.04)$ ,  $p = .00$ ).

Among enabling determinants, employment and economic status were significant predictors of the content of care. Unemployed women received less content of care during visits, holding all other variables constant ( $\beta(SE) = -.11(.06)$ ,  $p = .05$ ). Women from a poorer economic level received more content of care compared to women from

the poorest households, holding all other variables constant ( $\beta(SE) = .17(.07)$ ,  $p = .01$ ).

Women from the middle economic level received more content of care compared to women from the poorest households, holding all other variables constant ( $\beta(SE) = .30(.07)$ ,  $p = .00$ ). Women from richer households received more content of care compared to women from the poorest households, holding all other variables constant ( $\beta(SE) = .40(.07)$ ,  $p = .00$ ). Women from the richest households received more content of care compared to women from the poorest households, holding all other variables constant ( $\beta(SE) = .51(.08)$ ,  $p = .00$ ).

Visiting a primary health care facility or receiving prenatal care at home was associated with a -0.23 unit decrease in the content of care compared to other types of health facilities, holding all other variables constant ( $\beta(SE) = -.23(.06)$ ,  $p = .00$ ). Visiting a secondary health care facility or receiving prenatal care at home was associated with a -0.33 unit decrease in the content of care compared to other types of health facilities, holding all other variables constant ( $\beta(SE) = -.33(.05)$ ,  $p = .00$ ). Compared to women in large cities, women in small towns received less content of care, holding all other variables constant ( $\beta(SE) = -.13(.06)$ ,  $p = .03$ ). Compared to women in large cities, women in rural areas received less content of care, holding all other variables constant ( $\beta(SE) = -.35(.07)$ ,  $p = .00$ ).

Table 17

*The Association of Autonomy and Content of Care*

	<i>B</i>	95% CI
<b>HH_autonomy</b>	<b>-0.004 (0.002)**</b>	<b>[-0.008, -0.001]</b>
Health_smb	-0.30 (0.05)**	[-0.40, -0.19]
Health_woman	0.09 (0.05)	[-0.02, 0.19]
Sex_index	0.004 (0.003)	[-0.003, 0.01]
Age	-0.06 (0.04)	[-0.13, 0.01]
Age_1birth	0.01 (0.01)	[-0.004, 0.03]
Wanted_preg	0.11 (0.05)*	[-0.000, 0.21]
Children_born	0.33 (0.08)	[-0.008, -0.001]
Want more children	-0.12 (0.05)*	[-0.008, -0.001]
Complications	0.10 (0.04)**	[0.25, 0.42]
Pregnancies	0.10 (0.07)	[-0.04, 0.24]
Abortions	-0.11 (0.07)	[-0.25, 0.04]
Miscarriages	-0.13 (0.08)	[-0.30, 0.03]
Stillbirths	-0.13 (0.15)	[-0.41, 0.16]
Education	-0.09 (0.06)	[-0.20, 0.03]
Unemployed	-0.11 (0.06)*	[-0.23, 0.002]
Poorer	0.17 (0.07)*	[0.04, 0.29]
Middle	0.30 (0.07)**	[0.17, 0.43]
Richer	0.45 (0.07)**	[0.31, 0.60]
Richest	0.51 (0.08)**	[0.35, 0.68]
PHC_facility	-0.23 (0.06)**	[-0.43, -0.24]
SHC_facility	-0.33 (0.05)**	[-0.35, -0.11]
Town	-0.13 (0.06)*	[-0.25, -0.01]
Country	-0.35 (0.07)**	[-0.49, -0.21]

\*  $p < 0.05$ , \*\*  $p < 0.01$

## **Research Question II: Determinants of Prenatal Care Outcomes**

### **Outcome 1: Utilizing Prenatal Care**

A two-level mixed effects logistic regression was implemented for the first outcome, utilization of prenatal care. First a base two-level model was fitted, in which the intercept represented the average utilization of prenatal care across communities. Further, a random intercept model was developed, including predisposing, enabling, and environmental determinants. The likelihood ratio test showed a better fit of the two-level model to the data than a one-level model,  $\chi^2(1, N = 2277) = 13.01, p < 0.001$ . In the base model, the values for AIC and BIC statistics were 2508.03 and 2519.49. When the full model was fitted, their values reduced to 691.49 and 834.76 respectively, demonstrating significant improvement of the fit of the model (see Table 21).

### **Results for Predisposing Determinants**

According to results, household autonomy was not associated with utilization of prenatal care. Similarly, health-related autonomy was not associated with the outcome. There was no significant relationship between age and utilization of care, desire for pregnancy and utilization of care, and a wish to have more children in future.

### **Results for Enabling Determinants**

There was a significant association between the economic status of the household and utilization of care. Compared to the women in the poorest wealth category, the odds of utilizing prenatal care for women in the middle category increased by a factor of 2.45

( $OR = 2.45$ ; 95% CI 1.11 to 5.38,  $p = 0.03$ ). For women in the richest wealth category the odds of utilizing prenatal care increased by a factor of 4.45 compared to women in the poorest category ( $OR = 4.45$ ; 95% CI 1.08 to 18.29,  $p = 0.04$ ).

### **Results for External Environmental Determinants**

While no hypotheses were developed related to the type of the health facility and prenatal care utilization, the analysis revealed significant associations in this respect. For women who went to a hospital for prenatal care the odds of seeing a doctor increased by a factor of 5.80 ( $OR = 5.80$ ; 95% CI 2.99 to 11.24,  $p = 0.00$ ). No hypotheses were developed for testing an association between the residence type and utilization of care, but significant associations between them were revealed during the analysis. The odds for of seeing a doctor were 84% less for women living in the countryside than women living in large cities ( $OR = 0.16$ ; 95% CI 0.04 to 0.62,  $p < 0.01$ ).

### **Variation of the Outcome**

An estimation of between-community variance did not show variation in utilization of care between communities. Within-community variation was 32% demonstrating that that women living in the same community differed in the utilization of care.

Table 18

*Fixed and Random Effects for Utilization of Prenatal Care*

		Base model	Full model	
Model fit	AIC	2508.03	691.49	
	BIC	2519.49	834.76	
	N	2720	2277	
	$\chi^2$ (df)		78.41 (1)	
Fixed effects		<i>OR</i> ( <i>SE</i> )	<i>OR</i> ( <i>SE</i> )	95% CI
Predisposing determinants				
	HH_autonomy		0.96 (0.14)	[0.72, 1.28]
	Health_smb		1.16 (0.39)	[0.60, 2.24]
	Health_woman		2.64 (1.11)*	[1.16, 6.00]
	Sex_index		1.00 (0.02)	[0.96, 1.04]
	Age		1.50 (0.35)	[0.94, 2.38]
	Age_1birth		0.94 (0.06)	[0.84, 1.06]
	Wanted_preg		1.27 (0.40)	[0.69, 2.34]
	Children_born		0.38 (0.25)	[0.10, 1.41]
	Want_morech		1.12 (0.33)	[0.62, 2.01]
	Pregnancies		1.66 (1.06)	[0.47, 5.83]
	Abortions		0.67 (0.44)	[0.18, 2.43]
	Miscarriages		0.56 (0.39)	[0.14, 2.17]
	Stillbirths		0.26 (0.23)	[0.04, 1.53]
Enabling determinants				
	Education		0.66 (0.30)	[0.28, 1.59]
	Unemployed		1.19 (0.45)	[0.57, 2.49]
	Poorer		1.12 (0.35)	[0.60, 2.06]
	Middle		2.45 (0.98)*	[1.11, 5.38]
	Richer		2.24 (1.02)	[0.92, 5.46]
	Richest		4.45 (3.21)*	[1.08, 18.29]
External environment determinants				
	Primary health facility		0.65 (0.21)	[0.35, 1.22]
	Secondary health facility		5.80 (1.96)**	[2.99, 11.23]
	Town		0.40 (0.26)	[0.11, 1.45]
	Country		0.16 (0.11)**	[0.04, 0.62]
Random parameters				
	ICC		0.36 (0.04)	0.32 (0.09)

## **Outcome 2: Timing of the First Visit for Prenatal Care**

A two-level ordered logistic regression was applied for the second outcome, the trimester when women had their first visit for prenatal care. A base model including only an intercept was fitted first which represented the community mean for the trimester when the first visit occurred. The next step was fitting a full model including predictor variables. The likelihood ratio test showed a better fit of the two-level model to the data than a one-level model,  $\chi^2(1, N = 2230) = 13.59, p < 0.001$ . Further, the BIC and AIC statistics were evaluated. The value for the BIC statistic increased in the full model from 3632.61 to 3666.77 indicating that the fit of the data was worse than the base model. However, the value of the AIC showed a minor improvement of the fit of the model, changing from 3615.48 to 3515.32 in the full model (see Table 22). Due to the known sensitivity of BIC to differences in the number of observations between models (STATA manual, p.161), it was concluded that the overall fit of the model improved with fitting the model with predictors.

The full model showed values for cut points between trimesters. In the logistic regression, the cut point represents values differentiating trimesters on the latent variable, when values of the predictor variables equal zero (Bruin, 2006). The cut value for the first trimester was -0.50 (0.34), indicating that women who were 6.5 or less weeks pregnant would be classified as women who had their first prenatal care visit during the first trimester given that values of predictor variables were zero. The cut value for the



third trimester was 2.28 showing that women who had a value of approximately 18 weeks of pregnancy or higher on the underlying latent variable would be classified as women who had their first prenatal care visit during the third trimester, given that values of predictor variables were equal 0. Women who had values between 0.5 and 2.28 were classified as having the first prenatal care visit during the second trimester, when values of the predictor variables equaled 0.

### **Results for Predisposing Determinants**

The results for this analysis are shown in Table 4. Household autonomy was significantly associated with the trimester when women began utilizing prenatal care. For a one unit increase in the household autonomy, the odds of the first prenatal visit for the combined third and second trimester were lower than for the first trimester, given the other variables were held constant in the model ( $OR = 0.99$ , 95% CI 0.98 to 1.00,  $p = 0.03$ ). In other words, a one unit increase in household autonomy was associated with a 1% reduction in the odds of the first visit for prenatal care during the third trimester versus the combined second and first trimesters, given that the other variables were held constant.

Making health-related decisions independently was another significant predictor. The results showed that independent decision-making to health-related matters was associated with a 30% reduction in the odds of the first visit for prenatal care during the third trimester versus the combined second and first trimester, given that the other variables were held constant ( $OR = 0.70$ , 95% CI 0.54 to 0.90,  $p = 0.01$ ). Likewise, the

odds of the combined third and second trimesters versus the first trimester are 0.70 times lower for women who make decisions independently, given the other variables were held constant in the model.

There was no significant association between age and the timing of the first visit ( $OR = 0.95$ , 95% CI 0.81 to 1.12,  $p = 0.86$ ). Parity was not a significant predictor of the timing of the first prenatal care visit ( $OR = 0.96$ , 95% CI 0.68 to 1.36,  $p = 0.81$ ).

A significant predictor for the timing of the first visit for prenatal care was the pregnancy wish. In the model, the odds of the first visit during the second and third trimesters were 35% less for women who wanted the last pregnancy ( $OR = 0.65$ , 95% CI 0.51 to 0.83,  $p < 0.01$ ), given the other variables were held constant in the model. In other words, the desired pregnancy was associated with a 35% increase in the odds of the first visit for prenatal care during the first trimester.

### **Results for Enabling Determinants**

The economic status of the household was associated with the timing of the first prenatal care visit. Women living in households in the middle economic level had higher odds of utilizing prenatal care for the first time during the first trimester compared to women in the poorest households. According to the results of the model, households in the middle economic status were associated with a 40% increase in the odds of the first visit for prenatal care during the first trimester compared with women from the poorest households ( $OR = 0.60$ , 95% CI 0.44 to 0.82,  $p = 0.001$ ), holding other variables constant. The odds for women from richer households were 56% higher during the first

trimester than during the second and third trimesters, compared to women from the poorest households ( $OR = 0.44$ , 95% CI 0.32 to 0.63,  $p < 0.001$ ), holding other variables constant. This association between the economic status and the timing of the first visit was even greater for women from the richest households. Women from the richest households had 60% higher odds of the first visit for prenatal care during the first trimester versus the combined second and third trimesters, compared to women from the poorest households ( $OR = 0.40$ , 95% CI 0.27 to 0.59,  $p < 0.001$ ), holding other variables constant.

Employment was a significant predictor for the timing of the first visit for prenatal care. The odds of utilizing prenatal care increased by a factor of 1.38 for unemployed women during the third trimester than during the first and second trimesters, given that other variables were held constant ( $OR = 1.38$ , 95% CI 1.04 to 1.83,  $p = 0.03$ ). These result showed that employed women had higher odds of utilizing care earlier compared to unemployed women.

### **Results for External Environmental Determinants**

The type of the healthcare facilities that women attended for prenatal care was a significant predictor. Visiting a hospital was associated with a 41% reduction in the odds of the first visit during the second and third trimesters than the first trimester, holding other variables constant ( $OR = 0.59$ , 95% CI 0.47 to 0.75,  $p < 0.00$ ).

### **Variation of the Outcome**

The between-community variance is estimated as  $\sigma_{u0}^2 = 0.29$ . The model did not assess the individual level variance, from which it was assumed a 0 variance between women. The total variance was estimated at 0.29. The coefficient for VPC for the community level was 0, showing no variation between communities in the outcome.

Table 19

*Fixed and Random Effects for Timing of the First Prenatal Care Visit*

	Base model	Full model	
Model fit			
AIC	3615.48	3515.32	
BIC	3632.61	3666.77	
N	2236	2230	
$\chi^2$ (df)		125.76 (23)	
Fixed effects	<i>OR(SE)</i>	<i>OR(SE)</i>	95% CI
Predisposing determinants			
HH_autonomy		0.99 (0.004)*	[0.98, 1.00]
Health_smb		1.00 (0.12)	[0.79, 1.29]
Health_woman		0.69 (0.09)**	[0.53, 0.90]
Sex_index		1.01 (0.01)	[0.99, 1.03]
Age_1birth		1.00 (0.02)	[0.96, 1.04]
Age		0.95 (0.08)	[0.81, 1.12]
Wanted_preg		0.64 (0.08)**	[0.50, 0.81]
Complications		0.78 (0.08)*	[0.64, 0.96]
Children_born		0.96 (0.17)	[0.68, 1.35]
Want_morech		0.86 (0.10)	[0.69, 1.07]
Pregnancies		1.13 (0.18)	[0.82, 1.56]
Abortions		0.89 (0.15)	[0.64, 1.25]
Miscarriages		0.76 (0.15)	[0.52, 1.12]
Stillbirths		0.61 (0.23)	[0.28, 1.29]
Age		0.95 (0.08)	[0.81, 1.12]
Age_1birth		1.00 (0.02)	[0.96, 1.04]
Wanted_preg		0.65 (0.08)**	[0.53, 0.83]
Children_born		0.96 (0.17)	[0.68, 1.36]
Want_morech		0.85 (0.09)	[0.69, 1.06]
Pregnancies		1.13 (0.18)	[0.82, 1.55]
Abortions		0.90 (0.15)	[0.64, 1.26]
Miscarriages		0.75 (0.15)	[0.51, 1.10]
Stillbirths		0.57 (0.22)	[0.27, 1.22]
Enabling determinants			
Education		1.29 (0.18)	[0.98, 1.69]
Unemployed		1.38 (0.20)*	[1.04, 1.83]

Table 19

*Fixed and Random Effects for Timing of the First Prenatal Care Visit (Continued)*

Fixed effects	<i>OR(SE)</i>	<i>OR(SE)</i>	95% CI
Poorer		0.77 (0.12)	[0.57, 1.03]
Middle		0.60 (0.10)**	[0.44, 0.82]
Richer		0.44 (0.08)**	[0.32, 0.63]
Richest		0.40 (0.08)**	[0.27, 0.59]
External environment determinants			
Primary health facility		0.97 (0.14)	[0.73, 1.28]
Secondary health facility		0.59 (0.07)**	[0.47, 0.75]
Town		1.13 (0.17)	[0.83, 1.54]
Country		0.86 (0.15)	[0.60, 1.21]
Random parameters			
Intercept	0.43 (0.11)	0.29 (0.10)	[0.15, 0.56]

\*\* $p < 0.01$ , \* $p < 0.05$

### **Outcome 3: Number of Prenatal Care Visits**

A mixed effects two-level Poisson regression model was applied for this outcome. After fitting a base model, a full model was implemented. In the base model, the log of an expected count of visits for prenatal care during pregnancy was 4.86, when the values of predictor variables equaled 0. In the full model, the log of an expected count of prenatal care visits during pregnancy was 4.23. The likelihood ratio test showed a better fit of the two-level model to the data than a one-level model,  $\chi^2(3), N = 2208 = 356.79, p < 0.001$ . The BIC and AIC statistics showed an improvement of the fit of the model after fitting a full model, reducing from 13924.15 to 10749.96 and from 13924.15 to 10590.36 respectively (see Table 23).

### **Results for Predisposing Determinants**

The outcome was a count variable defined as a potential number of prenatal visits per nine months; therefore, the coefficients for the regression model were reported as incidence rate ratios (IRR). Interpretations of results were made using recommendations from statistical literature on count outcomes (Hilbe, 2008). If women were to increase their household autonomy by one point, they would be expected to have a zero percent increase in the number of prenatal care visits ( $IRR = 1.00, 95\% \text{ CI } 1.00 \text{ to } 1.01, p = 0.01$ ), while holding all other variables in the model constant. However, increase of household autonomy by 10 points would be associated with 10% increase in the number of prenatal care visits. The health-related autonomy was not a significant predictor for the number of visits ( $IRR = 0.99, 95\% \text{ CI } 0.93 \text{ to } 1.05, p = 0.65$ ), while holding all other variables in the

model constant. For increase of age by one year at the time of the first birth, women were expected to have a rate 1.01 times greater for prenatal care visits, holding all other variables constant ( $IRR = 1.01$ , 95% CI 0.93 to 1.01,  $p = 0.01$ ). Each additional year of age at the time of the first birth was associated with 1% increase in prenatal visits. The total number of children born was not associated with the number of prenatal care visits, holding all other variables constant ( $IRR = 1.01$ , 95% CI 0.93 to 1.11,  $p = 0.78$ ). Pregnancy wish was not associated with the number of prenatal care visits ( $IRR = 1.05$ , 95% CI 0.99 to 1.12,  $p = 0.09$ ).

Women who would have liked to have more children in the future, were expected to have a 1.06 greater rate for the number of prenatal care visits compared to women who did not want more children, given all other variables were held constant ( $IRR = 1.06$ , 95% CI 1.18 to 1.30,  $p = 0.00$ ). Wanting more children in the future was associated with 6% increase in the number of visits. With reported complications during pregnancy, women had a 1.24 greater rate for prenatal care visits given that other variables were held constant ( $IRR = 1.24$ , 95% CI 1.18 to 1.30,  $p = 0.00$ ). Women who experienced complications during the most recent pregnancy visited the doctor 24% more than women without complications during pregnancy. Additionally, for every stillbirth that a woman had in the past, her rate of prenatal care visits was 1.28 times greater holding other variables constant ( $IRR = 1.28$ , 95% CI 1.08 to 1.51,  $p = 0.004$ ). Women who reported stillbirth had 28% more prenatal visits.



## Results for Enabling Determinants

Economic status of households was a significant predictor. Compared to women from the poorest households, women in poorer households had a 1.09 greater rate of the prenatal care visits ( $IRR = 1.09$ , 95% CI 1.01 to 1.17,  $p = 0.04$ ), holding all other variables constant. Women in poorer households had 9% more visits than women from the poorest households. Women in the middle of the economic status spectrum had a 1.18 greater rate of the prenatal care visits compared to women in the poorest households ( $IRR = 1.18$ , 95% CI 1.09 to 1.28,  $p = 0.00$ ), holding all other variables constant. Women from the middle economic background visited a doctor for prenatal care 18% more compared to women from the poorest households. Women from richer households had a rate of 1.34 greater than women in the poorest households for prenatal care visits ( $IRR = 1.34$ , 95% CI 1.24 to 1.46,  $p = 0.00$ ), holding all other variables constant. Women from the middle economic background visited a doctor for prenatal care 34% more compared to women from the poorest households. Compared to women in the poorest households, women in the richest households had a 1.38 greater rate of prenatal care visits ( $IRR = 1.38$ , 95% CI 1.26 to 1.52,  $p = 0.00$ ), holding all other variables constant. Women from the middle economic background visited a doctor for prenatal care 38% more compared to women from the poorest households. Educational level of women did not influence the number of prenatal care visits ( $IRR = 0.97$ , 95% CI 0.92 to 1.03,  $p = 0.31$ ).

## **Results for External Environmental Determinants**

When women used primary healthcare for prenatal care, they had a rate of 1.10 times greater for the number of prenatal care visits compared to visits to other types of facilities ( $IRR = 1.10$ , 95% CI 1.03 to 1.18,  $p = 0.01$ ), holding all other variables constant. Women visiting primary care facilities had 10% more visits. Compared to women from large cities, women living in towns had a 0.84 lower rate of prenatal care visits, holding all other variables constant ( $IRR = 0.84$ , 95% CI 0.77 to 0.91,  $p = 0.00$ ). Women living in towns had 16% less visits compared to women in large cities. Women living in rural areas had a 0.79 lower rate for prenatal care visits compared to women living in large cities, holding all other variables constant ( $IRR = 0.79$ , 95% CI 0.72 to 0.87,  $p = 0.00$ ). Women living in rural areas had 21% less visits compared to women in large cities.

### **Variation of the Outcome**

The variance partition coefficient (VPC) was 0.41 indicating 41% of variance between communities. A number of prenatal care visits varied considerably between communities.

Table 20

*Fixed and Random Effects for the Number of Prenatal Visits*

		Base model	Full model
Model fit	AI	13924.15	10590.36
	BI	13924.15	10749.96
	N	2214	2208
	$\chi^2$		363.72
Fixed effects		<i>IRR(SE)</i>	<i>IRR(SE)</i> 95% CI
Predisposing determinants			
	HH_autonomy		1.00 (0.00)* [0.99, 1.01]
	Health_smb		0.97 (0.03) [0.92, 1.03]
	Health_woman		0.99 (0.03) [0.93, 1.05]
	Sex_index		1.00 (0.00) [0.99, 1.00]
	Age		0.97 (0.02) [0.93, 1.01]
	Age_1birth		1.01 (0.00)* [1.00, 1.02]
	Wanted_preg		1.05 (0.03) [0.99, 1.12]
	Complications		1.27 (0.04)** [1.21, 1.35]
	Children_born		1.01 (0.05) [0.93, 1.11]
	Want_morech		1.06 (0.05)* [1.01, 1.12]
	Pregnancies		1.00 (0.04) [0.92, 1.08]
	Abortions		0.98 (0.04) [0.90, 1.07]
	Miscarriages		1.06 (0.05) [0.96, 1.16]
	Stillbirths		1.27 (0.11)** [1.08, 1.51]
Enabling determinants			
	Education		0.97 (0.03) [0.92, 1.03]
	Unemployed		1.01 (0.03) [0.95, 1.07]
	Poorer		1.09 (0.04)* [1.01, 1.18]
	Middle		1.18 (0.05)** [1.08, 1.27]
	Richer		1.33 (0.06)** [1.22, 1.44]
	Richest		1.36 (0.07)** [1.24, 1.50]
External environment determinants			
	Primary health facility		1.10 (0.04)* [1.02, 1.17]
	Secondary health facility		1.04 (0.03) [0.98, 1.10]
	Town		0.85 (0.04)** [0.79, 0.93]
	Country		0.80 (0.04)** [0.73, 0.89]

Table 20

*Fixed and Random Effects for the Number of Prenatal Visits (Continued)*

Random parameters			
Intercept	0.15 (0.02)	0.09 (0.01)	[0.07 0.12]
Complications	0.21 (0.03)	0.13 (0.03)	[0.09 0.18]

\*\* $p < 0.01$ , \* $p < 0.05$

**Outcome 4: Content of Care**

A two-level mixed-effect linear regression was applied for this outcome. A base model and full models were fitted. The likelihood ratio test showed a good fit of the data when a full model was fitted,  $\chi^2(3, N = 2277) = 251.88, p < 0.001$ . In the base model, the values for AIC and BIC statistics were 6367.96.57 and 6385.16. When the full model was fitted, their values reduced to 5993.57 and 6159.76 respectively, demonstrating significant improvement of the fit of the model (see Table 24).

**Results for Predisposing Determinants**

The results of the two-level linear regression showed that when health-related decisions for women were made by somebody else, there was a -0.20 unit decrease in the content of care, holding all other variables constant ( $\beta(SE) = -.20(.05), p < .00$ ). Women who reported complications during pregnancy had a 0.31 unit increase in the content of care during prenatal care visits ( $\beta(SE) = .31(.04), p < .00$ ), holding other variables constant. For every born child, women saw a -0.11 decrease in the content of care, holding all other variables constant ( $\beta(SE) = -.11(.07), p = .05$ ).

## **Results for Enabling Determinants**

Significant associations were identified between the economic status and content of the care. Women in poorer households saw a 0.18 unit increase in the content of care compared to women in the poorest households, holding all other variables constant ( $\beta(SE) = .18(.06)$ ,  $p = .00$ ). Women in the middle economic stratum saw a 0.27 unit increase in the content of care compared to women in the poorest households, holding all other variables constant ( $\beta(SE) = .27(.07)$ ,  $p = .01$ ). Women from the richer households saw a 0.38 unit increase in the content of care compared to women in the poorest households, holding all variables constant ( $\beta(SE) = .36(.07)$ ,  $p < .00$ ). Women from the richest households saw a 0.41 unit increase in the content of care compared to women from the poorest households, holding all other variables constant ( $\beta(SE) = .41(.08)$ ,  $p < .00$ ).

Education was not associated with the received content of care during prenatal care visits ( $\beta(SE) = -.09 (.05)$ ,  $p = 0.11$ ), even though the sign was negative indicating that women with secondary education would receive less care compared to women with higher education.

## **Results for External Environmental Determinants**

Visiting a primary health care facility or receiving prenatal care at home was associated with a -0.14 unit decrease in the content of care compared to other types of health facilities, holding all other variables constant ( $\beta(SE) = -.14(.06)$ ,  $p < .05$ ). Visiting a hospital for prenatal care was associated with a -0.16 unit decrease in the content of

care, holding all other variables constant ( $\beta(SE) = -.16(.05)$ ,  $p < .00$ ). Because the coefficients for the content of care were almost identical for the primary and secondary health care facilities, a separate test was conducted to compare if there were differences between the two in providing the content of care. The test with a base hypothesis that the content of care was the same in primary and secondary health facilities was not significant,  $\chi^2(1) = 0.00$ ,  $p < 0.97$ .

Living in towns versus living in big cities was associated with a -0.12 unit decrease in the content of care, holding other variables constant ( $\beta(SE) = -.12(.06)$ ,  $p < .05$ ). Living in a rural area versus living in a big city was associated with a -0.35 unit decrease in the content of care received by women, holding all other variables constant ( $\beta(SE) = -.35(.08)$ ,  $p < .00$ ).

### **Variation of the Outcome**

There was a 39% of variation of the content of care within communities indicating that women living in the same population unit reported different content of care during visits for prenatal care. There was 19% of variation in the content of care between women who reported complications during pregnancy. This result showed disparities in the reported content of care between women who experienced complications during pregnancy.

Table 21

*Fixed and Random Effects for the Content of Care*

	Base model	Full model	
Model fit			
AIC	6367.96	5993.57	
BIC	6385.16	6159.76	
N	2283	2277	
$\chi^2$ (df)		308.06 (24)	
Fixed effects	$\beta$ (SE)	$\beta$ (SE)	95% CI
Predisposing determinants			
HH_autonomy		-0.002 (0.00)	[-0.01, 0.00]
Health_smb		-0.20 (0.05)**	[-0.29, -0.10]
Health_woman		0.07 (0.05)	[-0.03, 0.17]
Sex_index		0.00 (0.00)	[-0.01, 0.01]
Age		-0.02 (0.03)	[-0.08, 0.05]
Age_1birth		0.040 (0.01)	[-0.01, 0.02]
Wanted_preg		0.06 (0.05)	[-0.04, 0.15]
Complications		0.31 (0.04)**	[0.23, 0.40]
Children_born		-0.11 (0.07)*	[-0.25, 0.04]
Want_morech		0.07 (0.04)	[-0.01, 0.16]
Pregnancies		0.07 (0.07)	[-0.06, 0.20]
Abortions		-0.08 (0.07)	[-0.22, 0.06]
Miscarriages		-0.10 (0.08)	[-0.25, 0.06]
Stillbirths		-0.12 (0.13)	[-0.37, 0.14]
Enabling determinants			
Education		-0.09 (0.05)	[-0.19, 0.02]
Unemployed		-0.10 (0.05)	[-0.20, 0.02]
Poorer		0.18 (0.06)**	[0.06, 0.30]
Middle		0.27 (0.07)**	[0.15, 0.40]
Richer		0.36 (0.07)**	[0.22, 0.50]
Richest		0.41 (0.08)**	[0.25, 0.57]
External environment determinants			
Primary health facility		-0.16 (0.06)**	[-0.28, -0.04]
Secondary health facility		-0.16 (0.05)**	[-0.28, -0.04]
Town		-0.12 (0.06)*	[-0.25, 0.00]
Country		-0.35 (0.08)**	[-0.49, -.020]

Table 21

*Fixed and Random Effects for the Content of Care (Continued)*

Fixed effects	$\beta(SE)$	$\beta(SE)$	95% CI
<b>Random parameters</b>			
Intercept	0.70 (0.06)	0.41 (0.04)	[0.17, 0.36]
Complications	0.32 (0.05)	0.25 (0.05)	[0.17, 0.36]
ICC	0.35 (0.02)	0.39 (0.03)	[0.33, 0.45]

\*\* $p < 0.01$ , \* $p < 0.05$



### Research Question III: The Social Gradient in Utilization of Prenatal Care

#### Timing of the First Visit

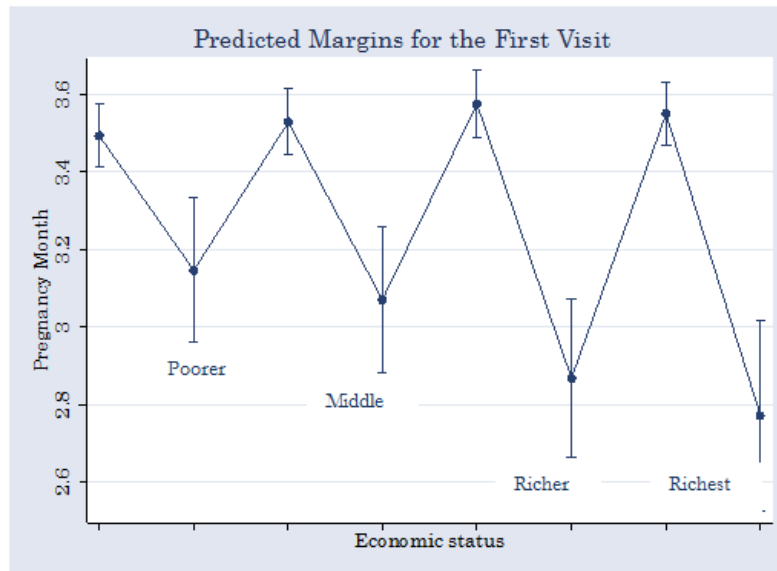
Results showed that the point at which for women from poorer households were predicted to have their first visit was at 3.15 months of pregnancy (see Table 25), ( $\beta(SE) = 3.15(.10)$ ,  $p < 0.00$ ). For women from the middle stratum of the economic level the probability of having the first prenatal care visit was predicted at 3.07 months of pregnancy, ( $\beta(SE) = 3.07(.10)$ ,  $p < .000$ ). For women from richer households, the probability of having the first visit was predicted at 2.87 months of pregnancy ( $\beta(SE) = 2.87(.10)$ ,  $p < .000$ ). For women from the richest households the probability of having the first visit for prenatal care was predicted at 2.77 months of pregnancy ( $\beta(SE) = 2.77(.12)$ ,  $p < .000$ ). Figure 3 shows confidence intervals for each economic level.

Table 22

#### *Margins for Economic Status and Timing of the First Prenatal Care Visit*

	Pregnancy month	SE	CI 95%
Poorer economic status	3.15**	0.10	[2.96, 3.33]
Middle economic status	3.07**	0.10	[2.88, 3.26]
Richer economic status	2.87**	0.10	[2.66, 3.07]
Richest economic status	2.77**	0.12	[2.53, 3.02]

Figure 3. Predicted probabilities for the first visit



### Number of Prenatal Care Visits

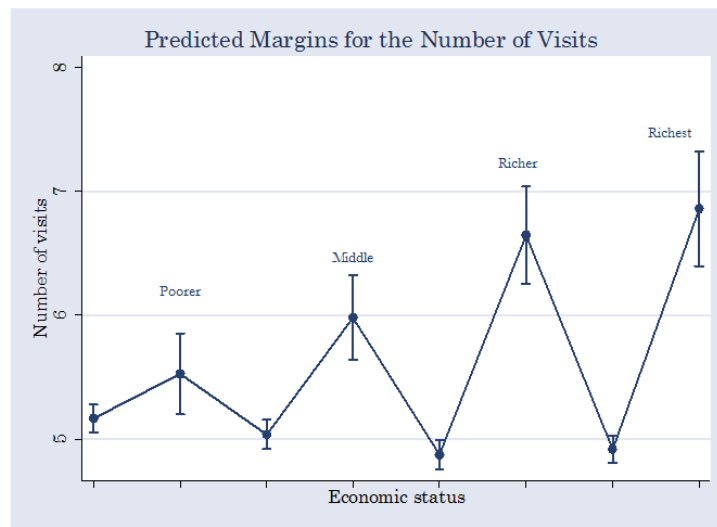
For women from poorer households, the probable number of visits during pregnancy was 5.53, ( $\beta(SE) = 5.53 (.17)$ ,  $p < .000$ ) (see Table 26). For women from middle-level households the probable number of visits was 5.98, ( $\beta(SE) = 5.98 (.17)$ ,  $p < .000$ ). For women from richer households the probable number of visits was 6.65, ( $\beta(SE) = 6.65 (.20)$ ,  $p < .000$ ). For women from the richest households the probable number of visits was 6.86, ( $\beta(SE) = 6.86 (.24)$ ,  $p < .000$ ). Figure 4 shows confidence intervals for each economic level.

Table 23

*Margins for Economic Status and Number of Prenatal Care Visits*

	Number of visits	SE	CI 95%
Poorer economic status	5.53**	0.17	[5.20, 5.85]
Middle economic status	5.98**	0.17	[5.64, 6.32]
Richer economic status	6.65**	0.20	[6.25, 7.04]
Richest economic status	6.86**	0.24	[6.40, 7.32]

Figure 4. Predicted probabilities for number of visits



### Content of Care

For poorer women, the probability for the content of care was predicted at 0.12, ( $\beta(SE) = 0.12 (.06)$ ,  $p < .000$ ), with the maximum value being 0.53 (see Table 27). For women in the middle-level economic status, the probability of the content of care was predicted at 0.22, ( $\beta(SE) = 0.22 (.06)$ ,  $p < .000$ ). For women from richer households, the probability of the content of care was 0.34, ( $\beta(SE) = 0.34 (.06)$ ,  $p < .000$ ). For women in the richest households, the probability of the content of care was 0.41, ( $\beta(SE) = 0.41$

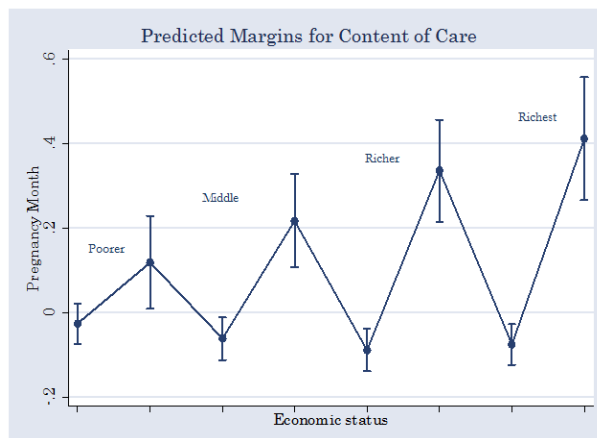
(.07),  $p < .000$ ). The graph shows confidence intervals for each economic level (see Figure 5).

Table 24

*Margins for Economic Status and Content of Care*

	Content of care	SE	CI 95%
Poorer economic status	0.12	0.06	[0.01, 0.23]
Middle economic status	0.22	0.06	[0.11, 0.33]
Richer economic status	0.34	0.06	[0.22, 0.46]
Richest economic status	0.41	0.07	[0.27, 0.56]

*Figure 5. Predicted probabilities for content of care*



## CHAPTER 6

### DISCUSSION

This dissertation study examined three questions related to prenatal care utilization. The first question was whether household autonomy of women was positively associated with utilization of prenatal care. The second research question was whether reproductive histories of women predicted their utilization behaviors. The third research question was whether the social gradient of health was evident in utilization behaviors of women. The study assessed three outcomes: timing of the first prenatal care visit, the number of prenatal care visits, and the content of care received during visits. Hypotheses were developed for each research question (see Chapter 4).

#### **Association of Autonomy and Utilization**

The hypotheses for the first research question represented the central argument of this study. It was argued that autonomy has a positive association with utilization of care. Findings showed that household autonomy was associated with utilization outcomes. However, the association was differential across utilization outcomes. The first hypothesis was that autonomy was associated with an earlier timing of the first prenatal care visit. Congruent with the stated hypothesis, results of the analysis showed that higher household autonomy was positively associated with the timing of the first visit for prenatal care. Further, a second hypothesis was that the number of prenatal care visits is positively associated with household autonomy. Results of the analysis demonstrated that autonomy of women had a negative relationship with the number of prenatal care visits.

The third hypothesis for this research question was that autonomy is positively associated with higher content of care received during prenatal care visits. This hypothesis was not supported by findings, as the regression coefficient was negative.

These results revealed that autonomy was a significant predictor of prenatal care utilization. They showed that women with higher autonomy started prenatal care earlier, but they had fewer visits and they did not receive more content of care during visits. These findings were congruent with earlier studies. Some studies showed that utilization of prenatal care was not associated with autonomy of women, but in general previous research has established positive associations between autonomy and utilization (Allendorf, 2007; Mistry, Galal, & Lu, 2009; Kamiya, 2011; Hou & Ma, 2012; Beegle, Frankenberg, & Thomas, 2003; Bloom, Wypij, & Das Gupta, 2001; Ahmed, Creanga, Gillespie, & Tsui, 2010).

Autonomy is a complex concept and cannot be measured using only tangible means or observations. In this study, household autonomy of women was measured using a limited set of three variables. It is possible that autonomy of women could be influenced by additional factors, such as a woman's feelings of self-worth, self-esteem, or agency. Measuring these factors would be a difficult task for health and demographic surveys as they would require preparation of complex measures based on extensive theoretical work and statistical validation techniques.

Inability to account for those invisible and immeasurable factors could present an endogeneity problem for regression models. Endogeneity is a possibility of alternative

factors influencing the outcome. In other words, autonomy of women could be correlated with some unobserved variables that were not included in the equation. Statistically, it manifests itself when the predictor variable in the regression equation correlates with the error term creating unobserved variance in the outcome (Antonakis, Bendahan, Jacquart, & Lalive, 2010). Correlation of the autonomy of women with these unobserved variables would mean that some variance in prenatal outcome was contributed by these factors. For example, variance explained by autonomy could be partially due to its correlation with the number of people in the household, resulting in lower autonomy of women in their households. Another example could be the number of years married, which could positively correlate with the autonomy of women and give an impression that autonomy is positively associated with prenatal care outcomes. The resulting endogeneity could produce inconsistent coefficients (Antonakis, Bendahan, Jacquart, & Lalive, 2010; Antonakis, Bendahan, Jacquart, & Lalive, 2014) and bias the estimations of the prenatal care outcomes.

The results of this study point to a potential endogenous influence of the family relationships and expectations for women. The finding that household autonomy had significant associations with utilization outcomes could imply that women had to negotiate or ask for permission of other members in their households in making decisions about purchases and visiting relatives. Many women, over 21% of the sample, reported that another person in the household, a husband or other members, make decisions about household purchases, visits to relatives, and health care.

An apparent influence of family members on decision-making processes could indirectly point to potential endogenous effects of the household on utilization outcomes. These endogenous factors could theoretically capture unobservable aspects of women's family life, such as expectations for women to do shopping, clean the house, and other household chores. More than half of the women in the analytic sample reported their roles as daughters-in-law in their households. In extended households with two generations sharing a house, young women typically perform the majority of household chores, from cooking, doing laundry, cleaning, caring for children and elderly, to making decisions about everyday purchases and visiting relatives. This expectation could lead to a higher level of autonomy for women within the household.

The second unobservable aspect captured by these instruments was an expectation for women to have children. Giving birth is a major function of women in families, and being in the active reproductive age (15-49 years old) as women in the sample, could facilitate the expectations for women to have children. The fertility expectation could also lead to an expectation to utilize prenatal care during pregnancy in order to promote safe deliveries. Women with high levels of autonomy could receive support from their husbands and other family members to utilize prenatal care.

It should be noted that another source of endogeneity could be measurement error in the autonomy variable (Antonakis, Bendahan, Jacquart, & Lalive, 2010). The autonomy of women is a complex characteristic, and the created index measure of autonomy included only three items due to the lack of other relevant variables in the DHS data.



According to the KMO measure, correlations with values 0.60-0.79 are categorized as acceptable levels for index measures. The correlation between variables in the autonomy index was at 0.68 showing an acceptable but not optimal level measure. The less than optimal adequacy of the autonomy measure could contribute to the endogeneity problem in the measurement of prenatal care behaviors.

### **Reproductive History of Women**

The main objective for the second research question was to identify associations between utilization of prenatal services and the reproductive histories of women. Hypotheses were developed for factors related to the reproductive history of women including: age at the first birth, parity, a wish for the most recent pregnancy, desire to have more children in the future, and complications during pregnancy. Statistical models also controlled for the health-related autonomy, sexual autonomy, and other determinants.

**Utilization.** Among predisposing components, health-related autonomy was the only significant predictor of utilizing prenatal care. Women who were sole decision-makers for their health had higher odds of utilizing prenatal care than women who made decisions about healthcare together with their husbands or other persons. Among enabling determinants, economic status was positively associated with utilization. Women with higher economic status were more likely to utilize prenatal care than poor women. As for the environmental determinants, more than half of the women utilized prenatal care in hospital settings (62.5%) and only 18% of women went to see a doctor in

primary health care facilities. There was no variation in the outcome across communities; pregnant women were in general likely to utilize prenatal care.

**Timing of the first visit.** A number of predisposing determinants was associated with this outcome. Higher levels of household autonomy were associated with reduced odds of seeing a doctor during the first trimester, but independent decision-making about health was associated with higher odds of seeing a doctor during the first trimester. Women for whom the most recent pregnancy was desired were more likely to see a doctor during the first trimester. For enabling determinants, economic status was associated with timing of the first visit. Compared to women in the poorest households, women in poorer, middle-level, richer and rich households had a greater likelihood of utilizing care during the first trimester. The odds of utilizing care during the third trimester were higher for unemployed women when compared to those who worked. The variation in the outcome across population clusters and between women was low.

**Number of prenatal care visits.** Predisposing determinants that were associated with the number of prenatal care visits were age, desire to have more children in the future, complications during pregnancy, and stillbirths. All of these determinants were associated with increased likelihood for prenatal care visits. Among enabling determinants, higher economic status was associated with increased odds for higher numbers of prenatal care visits. Women who visited a primary care facility had higher numbers of prenatal care visits. Women living in towns and in the countryside had lower numbers of prenatal care visits. There was moderate variation in the outcome between

communities.

**Content of care.** Among predisposing determinants, health related autonomy, complications during pregnancy, and number of children were associated with content of care. When somebody else made decisions about health care for women, the content of care decreased. When women reported complications during their pregnancy, they received higher content of care. The number of children previously born reduced the content of care for women. Economic status was the only enabling determinant to have a significant association with the content of care. Women from richer households received higher content of care compared to women from poor households. Environmental factors also were associated with the content of care, with women who lived in towns and rural areas receiving less care compared to women living in large cities. There was moderate variation in the outcome across population clusters and between women.

### **The Social Gradient of Health**

This research question was concerned with the social gradient of health. Determinants representing the social gradient of health were economic status, education, employment, and a residence area. Hierarchical linear models showed that economic status of households was a strong predictor of utilization. Women from poorer households started prenatal care later, had fewer visits, and received less content of care compared to women with higher economic status.

Education previously has been found to be associated with utilization of services in studies conducted in developing countries (Fan & Habibov, 2009; Paruzzolo &

Deliver, 2010). However, in this study education was not associated with any of the outcomes in the hierarchical linear models. An explanation for this could be the relatively high overall levels of education of the population in Armenia and Azerbaijan, with 82% of women reporting secondary education completion and 18% reporting receiving higher education. An overall high level of education could contribute to the lack of variation in outcomes.

Location of services was a predictor of utilization in previous studies, with women living in rural areas utilizing care less often than women living in urban areas. Living in urban areas and having access to health facilities in community has been found to be positively associated with utilization (Obermeyer & Potter, 1991; Stephenson & Tsui, 2002). Finding from this study are consistent with existing evidence. Women received less content of care and reported fewer visits if they lived in countryside or small towns.

### **Findings Related to Theory**

In the context of Andersen's model, autonomy of women is a socio-cultural determinant of behavior, exercised by individuals in the context of family. Autonomy is an aspect of human behavior that can have a predisposing or preventing influence on utilization. Andersen states that predisposing determinants have low mutability and would be difficult to address with policy measures (Andersen, 1995). This implies that it may not be useful to intervene in the structure of women's families to increase their autonomy levels with interventions. Still, women's autonomy should be taken into

account for developing interventions aiming to encourage women to utilize maternal health services. For example, outreach and communication campaigns could address household responsibilities of women and appeal to the support of a woman's husband and other members of family, particularly given the findings that lower autonomy actually may be associated with some prenatal care outcomes.

The Andersen's model proved to be an appropriate model for analyzing health care utilization. This model was helpful for the initial assessment of individual level determinants, such as autonomy, reproductive history, and economic status and employment of women. However, its explanatory power was limited for explaining the important role of the economic status and employment for utilization of care in transitional countries. The theory does not provide guidance for explaining relationships among women's autonomy at the household level and their employment and economic status. The literature on poverty reduction and social assistance programs in transitional countries provided more guidance for understanding interactions between women's autonomy in utilization of care and their employment status. Therefore, it is recommended to utilize theories of social welfare for assessing an impact of labor market participation and maternal health outcomes in transitional countries in future studies.

In the context of a life course perspective, autonomy of women belongs to a socio-structural dimension of family life. Expectations for help-seeking behaviors of women could be a function of norms and traditions for women in positions of wives or daughters-in-law within households. Contrary to existing evidence that young women

have lower levels of autonomy (Gabrysch & Campbell, 2009), the correlation between autonomy and the age of women was negative for women in the sample. Young women did not necessarily have lower levels of autonomy compared to older women in the sample. The life course perspective can be used for cohort studies on maternal health outcomes in transitional countries. Differences in utilization patterns across cohorts of women can reveal the effects of the transitional period on maternal health.

Findings on the reproductive history of women could be explained in the context of the theory of three delays, which posits that the first stage of delay occurs when women and their families decide to seek care; the second and third stages of delay are caused by reaching medical facilities and receiving care (Gabrysch & Campbell, 2009). In the study, age at the first birth was positively associated with a number of prenatal visits, which could indicate that women who were older utilized care more often in order to prevent health risks associated with the birth at an older age. Complications during pregnancy and stillbirths also were positively associated with the number of visits. This could indicate a desire of women to prevent these conditions, and might also reflect recommendations of health providers to utilize prenatal services more often.

### **Directions for Future Research**

This study established associations between utilization of prenatal care outcomes and household autonomy. Contrary to existing evidence, household autonomy did not always have a positive association with utilization of prenatal services. Depending on the outcome, it could have either an enabling or deterring influence on utilization.

Associations between the timing and the number of prenatal visits were positive; however, the content of care was negatively associated with the autonomy of women.

No serious psychometric examination has been done on measures of autonomy at the household level in developing countries. Measures of autonomy are typically constructed from a limited number of available variables from survey data. Validity studies need to be conducted to ensure high quality of the autonomy measures. Future studies should also consider whether traditional measures of autonomy based on decision-making for households represent the true ability of women to make decisions pertaining to their own health and well-being, or whether they represent expectations for women's responsibilities in their households. Future studies should account for an endogenous influence of women's roles in their households. Health and demographic surveys should include more measures on household structures and relations between household members, as well as the division of responsibilities in households.

Another area for future study would be using macro level measures related to women's status and gender equity in countries. This would allow for control of macro level determinants of health service utilization. Macro level measures could include indicators from the OECD database on Gender, Institutions, and Development, such as indicators on family law, physical integrity, and ownership rights (Jütting, Morrisson, Dayton-Johnson, & Drechsler, 2008). Another possibility would be integrating measures from the Gender Equity Index, which includes measures on education, economic participation, and representation of women in parliament and leadership positions

(Jütting, Morrisson, Dayton-Johnson, & Drechsler, 2008).

The Demographic and Health Surveys used for this study did not include measures on distance to maternal health facilities and availability of transport. Such issues of distance and transport have been discussed in previous research (Gage, 2007; Celik & Hotchkiss, 2000). Another set of measures missing from the Demographic and Health Surveys is information about density of health infrastructures in communities. Information about the number of clinics and hospitals per community would be helpful. Further, DHS surveys do not include measures on perceptions of quality of care (Mamdani & Bangser, 2004), which is an important determinant of utilization.

A promising area of future research could be qualitative studies on family structures and relationships in post-Soviet countries. An in-depth examination of family life, expectations for reproductive functions, relations between daughters-in-law and parents-in-law, and access to and control over family resources would provide rich material for understanding family life in this region. In this study, it was not possible to control for these relationships and interactions between members of households, due to the absence of relevant variables in the data. There is also a theoretical gap in understanding family life in post-Soviet countries. Most of family life theories applied in the US were developed in the postindustrial period, and they may not be a good match to explain on-going family dynamics in these countries, and the development of free markets and post-industrial societies.



## **Implications for Social Welfare**

Characteristics of women who had less favorable utilization outcomes were similar to the overall poverty profile outlined in national development strategies. Poverty was associated with high rates of unemployment in Armenia and Azerbaijan, according to government and international financial institutions (World Bank, 1999; International Monetary Fund, 2003). In both countries, women were affected by poverty and unemployment more than men (IMF, 2003; Government of the Republic of Armenia, 2001). In this study, women who delayed the first prenatal care visit were unemployed, did not have higher education, and had a lower economic status. The group of women reporting fewer visits had lower economic status and lived in towns and rural areas. Women who received less content of care were unemployed, had lower economic status, and lived in towns and rural areas.

Under the socialist system, women had access to an extensive menu of social services, such as universal health care, affordable child care, child benefits, and paid maternity leaves. Most of the social services were provided by employer organizations (Pascall & Manning, 2000). With the transition, many state enterprises were privatized and were unable to provide social services for their employees in the same volume that existed under the Soviet system. These changes could negatively influence the help-seeking behaviors of women during the transitional period, resulting in delayed utilization and less content of care.

One of the findings in the study was that women had limited opportunities for employment and generating their own income. In the analytic sample, consisting of married women with children, only 30% were employed in the 12 months preceding the surveys. Previous research has argued that employment and access to social services gave advantages to women within their families (Pascall & Manning, 2000). Having independent income and access to an extensive social service infrastructure, women had high autonomy in making decisions pertaining to health and utilizing maternal health services during the Soviet system. With transition to market economies, loss of employment and underdeveloped social services left women depending on family support for utilizing health care (Pascall & Manning, 2000).

In this study, household and health autonomy were strong predictors of utilization; the more autonomy women had, the more likely they were to start prenatal care earlier and have more visits. It is probable that women with higher levels of autonomy in their households received more support from their families for utilization of prenatal services. At the same time, reliance on husbands' earnings as the only source of income in the family could negatively affect negotiating powers of women within their families.

Transitional shocks were exacerbated by the lack of robust welfare systems in transitional countries. Armenia and Azerbaijan inherited social protection systems that were not designed to respond to needs of the vulnerable and poor population (World Bank, 1999; Habibov & Fan, 2007). High percentages of the eligible population did not

receive poverty benefits (Habibov & Fan, 2007). Additionally, the amount of benefits were too low to have substantial protective effects against poverty (Habibov & Fan, 2007). These factors could potentially explain why poorer women had fewer prenatal care visits and received less content of care. Inability to gain access to assistance and the minimal amounts of cash assistance received by women could negatively influence their ability to seek prenatal care services or make a required number of visits.

Recommendations for poverty reduction included targeted assistance for the poor, improving diagnostic methods for identification of the eligible families for assistance, and simplifying procedures for accessing services in Armenia and Azerbaijan (World Bank, 1999). Other recommendations were to consider decentralized, community-level assistance mechanisms to improve targeting of the poor (Habibov & Fan, 2007). Implementation of these measures could improve poor women's access to cash benefits, and could potentially increase utilization rates of maternal health services. However, in a long-term perspective, viable employment opportunities would be more important than social protection measures, for reducing poverty in the population. Household responsibilities, coupled with low levels of employment, can create barriers for women in making decisions pertaining to their own health and the well-being of their children. Therefore, interventions are critically needed that focus on providing viable opportunities for vocational training and employment for women in these transitional countries.

## **Implications for Social Work Interventions**

Results from this study have shown that women with higher household autonomy tended to start utilization of prenatal care earlier and have more visits. One of the important implications from the previous literature was that autonomy of women was a function of their employment and access to social assistance services (Pascall & Manning, 2000). Therefore, interventions designed to increase prenatal care should aim to increase the autonomy of women, and to encourage women to receive a required volume of prenatal care visits, even when they are busy managing their households. The findings also suggested that it may be useful to apply outreach and educational strategies for targeting other family members in addition to women, such as husbands or in-laws.

Further, previous analysis revealed weaknesses in the developing welfare systems of Armenia and Azerbaijan. Specifically, the social assistance programs in these countries were ineffective in identification and targeting of the poor population eligible for state support at the beginning of the transition (Habibov & Fan, 2007; World Bank, 1999). Social workers in these countries could be trained to deliver effective poverty diagnostic assessments, screen people for assistance eligibility, and assist persons in need with referrals to proper social assistance and insurance services. Social workers could also help in developing efficient and simplified procedures for helping the population to register and receive social assistance benefits. The training of social workers and establishment of proper procedures would require significant financial resources; therefore social protection and social insurance agencies would need additional support

from the state budget to implement these measures. The development of procedures and training of social workers to implement these functions would eventually lead to strengthening the social welfare functions of the state.

One of the recommendations for increasing effectiveness of social assistance in Azerbaijan was to use community-level structures for better targeting of the poor and ensuring access to assistance to people in need (Habibov & Fan, 2007). Social workers could facilitate the development of community-level mechanisms for assisting the poor. Using evidence-based practices and community development theories, social workers can assist communities in mapping various services within communities and assisting community members to access the services. Other areas of community-level interventions could include assessments of community assets, such as financial, social, cultural, and human capitals. These assessments could be used for developing income-generation activities, job training, and employment opportunities for unemployed women and other members of communities. Assessments of risk and resiliency factors within communities could also help to identify areas of concern and strengths to support community development. A more targeted area for social work interventions in communities could be liaising health facilities with social assistance offices, so that women eligible for social assistance could receive primary health care free of charge. This intervention could assist in improving maternal health outcomes

One of the main critiques of transitional welfare systems was that they failed to recognize and assist the vulnerable and poor populations during the transitional period.

These systems were developed under the assumption of marginal levels of poverty and unemployment in society. It would require a paradigm shift in thinking about social welfare systems, to recognize existing social and economic inequalities and assist the most vulnerable groups of the population. Social workers could assist in developing social policies for the transitional period, when large segments of the population are unable to have viable employment and many people are part of the informal labor market.

### **Directions for Social Work Education**

For social policy classes, the findings of this study can be used to demonstrate the links between labor market participation and health outcomes for women in transitional countries. Additionally, students can be taught that in transitional countries social welfare systems are in developing stages, and cannot be classified according to existing theoretical frameworks. As developing welfare states, transitional countries are struggling to identify the poor and vulnerable populations and target them with social protection measures, such as cash transfers and affordable social services.

Another learning component from this study could be high rates of unemployment and poverty in transitional countries. Weak labor markets unable to provide sustainable employment for the population lead to higher rates of poverty. Implications for social policy development in transitional countries should include the development of poverty diagnostic methods and targeting the poor with social protection measures.

This study can be used to explain to social work students the changes in thinking about values embedded in social policies. Social policies reflect values prevailing in

societies, and transitional countries represent examples of paradigm shifts in thinking about social welfare. For a long time, the social welfare system in post-Soviet countries was based on universal coverage of the population with extensive social services. Another underlying assumption of the social welfare policies in the Soviet system was a marginal level of poverty in the population. With the transition to market economies, governments faced the challenge to address the needs of the poor population and quickly develop mechanisms for social assistance. These developments required a change in thinking about social welfare functions and acceptance of disparities in health and other outcomes due to unfavorable social conditions. While the transitional countries are still developing their welfare systems, they have an opportunity to choose welfare functions that will best protect their citizens from economic and social adversities.

Another significant implication for social work education from this study is the vulnerability of women and children in the face of economic and social challenges in transitional countries. Having lost access to social services provided through employment during the Soviet system, women also lost their ability to negotiate their family relationships and challenge existing perceptions about gender roles. Supporting women's autonomy for their reproductive health and employment opportunities should become important policy goals. The social work curriculum includes theories of human behavior in the social environment, through which students are taught about the diversity of forms and functions of modern family. This study provides evidence that in transitional countries the birth of children and autonomy of women are mainly exercised in the

context of the heterosexual and patriarchal traditional family. In the absence of strong protective mechanisms in the welfare system, women and their families reverted to their families as sources of safety and support. Social work students can be taught that in transitional countries poverty and unemployment are associated with negative maternal health outcomes. Emerging economic inequalities have resulted in an inequitable access to and utilization of maternal health services, resulting in high rates of maternal mortality in these countries.

Results of this study provide evidence for family-centered practice. Understanding family dynamics and relations is an important part of culturally competent practice. One of the objectives of teaching multiculturalism to social work students is to increase their knowledge about cultures in a manner that facilitates more sensitive and effective practice (Boyle & Springer, 2008; Ronnau, 2009). This study provides evidence that traditional family structures, such as expectations for women's roles in the household and the gendered division of labor, are prevalent in transitional countries. When students are trained to conduct biopsychosocial assessments and to interview clients, they can learn that hierarchies within families and economic levels of households influence women's access to social services. Traditional family structures, where a husband is a breadwinner and a wife is a caretaker, can have negative or positive effects on maternal health. Depending on the family, women can be encouraged to utilize prenatal care and other maternal health services, or they can face obstacles for utilizing care due to the lack of support in the family and financial constraints. In order to create culturally sensitive



interventions for health outcomes in diverse communities, literature recommends engaging with community members and including family members in treatment decisions as strategies (Brach & Fraserirector, 2000). In communities where women depend on their family income for accessing services, engaging the support of their husbands and other members of families would be critical for effective interventions.

### **Limitations**

The first limitation of this study pertains to the year of data collection for the surveys. These DHS surveys were used in 2005 and 2006, and it is possible that maternal health outcomes have changed in both countries since then. Therefore, results of the study should be interpreted and applied to the timeframe. However, socio-cultural aspects, such as women's responsibilities in the family, generally are not likely to change quickly, so it is hoped that the results of this study about the nature of decisions made by women within their households remain applicable in these countries.

This study identified a relationship between autonomy and utilization. However, in the absence of randomization and other essential conditions for inferring causality, one cannot claim that estimations of utilization outcomes would have been the same, if women would have taken part in an intervention for increasing their autonomy. Therefore, the results of this study should be interpreted as an estimation of the relationship between household autonomy and utilization.

Further, autonomy of women was the main predictor in this study. An advantage of this study was the development and application of an index measure of autonomy

consisting of three variables. Principal factor analysis was used to develop the index measure of autonomy. The resulting measure was of an acceptable quality, but it was not an optimal measure as post-estimation tests showed. Existing literature does not include studies on construct validity of autonomy measures from the DHS data. Future studies, as discussed earlier, must include psychometric work for validation of measures of autonomy, based on theoretical relations between variables. Development of adequate measures of women's autonomy, self-determination, and agency are important for the current and future development agendas in transitional countries. In this study, it was impossible to control for interactions between household members and decision-making dynamics. It is believed that controlling for these factors would increase explanatory powers of regression models, and also lead to a richer consideration of how family relationships may affect prenatal care.

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