FEMALE EDUCATION AS A PATH TO FAMILY HEALTH - IS IT A PANACEA? EVIDENCE FROM TURKISH HEALTH SURVEYS

A THESIS SUBMITTED TO
THE GRADUATE SCHOOL OF SOCIAL SCIENCES
OF
MIDDLE EAST TECHNICAL UNIVERSITY

BY

AYŞENUR AHSEN

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR
THE DEGREE OF MASTER OF SCIENCE
IN
THE DEPARTMENT OF ECONOMICS

FEBRUARY 2021

I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.

Name, Last Name: AYŞENUR AHSEN

Signature :

ABSTRACT

FEMALE EDUCATION AS A PATH TO FAMILY HEALTH - IS IT A PANACEA?
EVIDENCE FROM TURKISH HEALTH SURVEYS

Ahsen, Ayşenur
M.S., Department of Economics
Supervisor : Assist. Prof. Dr. İlhan Can Özen

February 2021, 107 pages

The compulsory schooling reform introduced in 1997 had a substantial effect on the middle school graduations of women. By taking advantage of this natural experiment, we aim at investigating the impacts of women education on health-related decisions and health outcomes for themselves and their children. After confirming the validity of the reform effect, we continued our research by using an instrumental variable approach in accordance with the fuzzy regression design. The results reveal that having at least a middle school diploma contributes to the possibility of using family planning methods and it also has a significant impact on the timing, and frequency of antenatal care demand. We also observed modifications in healthcare preference over institutions caused by middle school education. For instance, some evidence suggests a shift from private to public preference over institutions for antenatal care and delivery, and an adverse education effect on acknowledging family physician as a primary health service provider is also reported. Together with the improvements observed in woman's likelihood of being in a healthy BMI range, we find evidence for that middle school education of mother also improves birth weight of female babies, reduce the probability of born with low birth weight and support higher anthropometric measures for children. Based on these results it is concluded that the impact of middle school education can be identified on the different dimensions of decision-making for women in the different spheres of health, with specific importance given to the consequences of child health of these decisions. We have also checked for the exogenous effect of father‘s education and results suggest that the parent’s education effect on children that we have found may not be a gender-neutral effect.

Keywords: education, gender inequality, health, Turkey

ÖZ

AİLE SAĞLIĞINA GİDEN BİR YOL OLARAK KADIN EĞİTİMİ - HER DERDİN İLACI MI? TÜRKİYE SAĞLIK ARAŞTIRMALARINDAN ELDE EDİLEN BULGULAR

Ahsen, Ayşenur
Yüksek Lisans, İktisat Bölümü
Tez Yöneticisi : Assist. Prof. Dr. İlhan Can Özen

Şubat 2021 , 107 sayfa

1997 yılında uygulamaya konulan temel eğitim reformu kadınların ortaokul mezuniyetleri üzerinde belirgin bir artışa sebep oldu. Bu artışın oluşturduğu doğal deney koşullarından faydalanarak kadın eğitiminin kendisinin ve çocuklarının sağlığını etkileyen kararlarının ve sağlık çıktılarının üzerindeki nedensel etkisini araştırmayı amaçlıyoruz. Bu çalışmada reformun etkisini geçerliliği ispatlandıktan sonra Süreksiz Regresyon Tasarımı (Regression Discontunity Design)'nın argümanlarını takip ederek Araç Değişkenler (Instrumental Variable) yöntemini kullanıyoruz. Sonuçlarımız en az ortaokul mezunu olmanın kadınların doğum kontrol yöntemi kullanmakla ilgili kararları üzerinde etkisi olduğunu gösteriyor. Aynı zamanda kadının eğitimi, doğum öncesi bakım talebinin zamanlaması ve sıklığı üzerinde de önemli bir etkiye sahip gözüküyor. Kadınların sağlık hizmeti aldıkları kurumlarla ilgili tercihleri de ortaokul eğitiminden etkilenmiş gözüküyor. Örneğin bulduğumuz bazı kanıtlar doğum öncesi bakım ve doğum için yapılan tercihlerin eğitimle beraber kamu sağlık kurumlarının lehine değiştiğini, özel sağlık kurumlarının görece daha az tercih edildiğini gösteriyor. Buna ek olarak kadınların birinci basamak sağlık hizmeti sunan aile hekimlerini tanıma ihtimallerinin de ortaokul eğitimiyle beraber azaldığını gözlemledik. Kadınların daha sağlıklı bir vücut kitle endeksi aralığında kalma ihtimalindeki artışla beraber, annenin ortaokul eğitiminin bebeklerin düşük bir kilo ile doğma olasılığını da azalttığını ve çocukların antropometrik ölçümlerinde de iyileşmelere sebep olduğuna dair deliller sunduk. Bulgulara bakarak ortaokul eğitiminin etkisinin kadınların farklı boyutlardaki ve özellikle de çocukları ilgilendiren sağlık kararlarını etkilediği sonucuna vardık. Babanın eğitimindeki değişimi kullanarak da analizlerin tekrarlanmasıyla, bulunan ebeveyn eğitiminin etkisinin cinsiyetten bağımsız olmayabileceğini ortaya çıkardık.

Anahtar Kelimeler: eğitim, cinsiyet eşitsizliği, sağlık, Türkiye

To my family

ACKNOWLEDGMENTS

acknowledgments

TABLE OF CONTENTS

LIST OF TABLES

TABLES

LIST OF FIGURES

FIGURES

LIST OF ABBREVIATIONS

BMI	Body Mass Index
CSL	Compulsory Schooling Law
FRDD	Fuzzy Regression Discontinuity Design
HUIPS	Hacettepe University Institute of Population Studies
IV	Instrumental Variable
OLS	Ordinary Least Squares
RDD	Regression Discontinuity Design
TDHS	Turkey Demographic and Health Survey
THS	Turkey Health Survey
TURKSTAT	Turkish Statistical Institute

CHAPTER 1

INTRODUCTION

Although education has always been an essential concept in economic theory, it has gained a solid theoretical grounding with the seminal work of (Becker S., 1964) who established a relationship between education and human capital approach. In addition to broadening the knowledge, capabilities, and efficiency of every individual as an investment in human capital, education delivers benefits to society as a whole via women education. The women's agency carries a huge potential as a "dynamic promoter of social transformation", to enhance the well-being of both women and men (Sen, 1999) and strengthening this agency is possible by education. Moreover, when women gain more voice and freedom within the household, better decisions are made in case of a conflict (Sen, 1999; Duflo and Udry, 2004). Therefore, while the knowledge and capabilities of a woman improve, these gains are likely to exhibit themselves in health decisions and outcomes within the household, especially for their children. Studies also confirm that maternal education is the most significant factor in child mortality among the other socioeconomic factors (Caldwell, 1979).

The importance of women's education is even more profound for developing countries where the gender gap still persists and countries cannot fully utilize the power of women's agency. Likewise, in Turkey, there is still room for improvement in women education, and proving the value of it might urge to take policy actions. Additionally, the health reforms introduced in the 2000s in Turkey have improved the accessibility of health services, which offers a more convenient set-up for health-related studies. Then, by all means, investigating the impact of women education in healthcare services may help to design education programs that advance health utilization and health of women, their families, and eventually of the wider public.

In this regard, the purpose of this study is to investigate the impact of women education on decisions and outcomes related to both self and children's health in Turkey. This study particularly aims to identify the causal effect of graduation from a middle school, on the health-related decisions that women have precise control over and the health outcomes both for themselves and their children.

The claim of positive effects of education is rather straight forward or which the economic theory about is well established. However, providing empirical proof is rather challenging due to the risk of endogeneity. In order to establish a causal link from women education to health decisions and outcomes, we use the natural experiment created by the 1997 Compulsory Schooling Law, which expanded the obligatory schooling from 5 years to 8 years, in Turkey. The instant jump in middle school graduations generated by the reform allows us to utilize the fuzzy regression discontinuity design (FRDD), which ensures an almost random experimental design. To this end, we use the microdata sets obtained from Turkey Demographic and Health Surveys (TDHS) conducted by Hacettepe University Institute of Population Studies (HUIPS) in 2008 and 2013, and Turkish Health Surveys (THS) conducted by Turkish Statistical Institute (TURKSTAT) in 2008, 2010, 2012, 2014, and 2016.

While investigating the causal effects of middle school education of women, we offer a comprehensive view that aims to trace the impact of education on health, starting from human development gains to health behavior and utilization, to health outcomes. Although previous studies have provided insights regarding Turkish case (Cesur et al., 2014; Dinçer et al., 2014; Güneş, 2016; Baltagi et al., 2019; Tansel and Karaoglan, 2016), health utilization aspect has received limited attention in the literature so far. Accordingly, we aim to fill this gap in the literature. Since we also use a larger data sample that contains the most recent survey waves and combines information for both TDHS and THS surveys, we believe our results can shed further light on the impact of women education on health decisions and outcomes, in a developing country setting.

The rest of the study is organized as follows. In Chapter2, we first review the theoretical evidence on education in general, and women education in particular, and empirical evidence in the literature. Second, we elaborate on the potential issues regarding the endogeneity problem and present our empirical approach by explaining the compulsory schooling law applied in

Turkey in detail. In Chapter 3, following a detailed description of the data and variables, we present the methodology and model used in the study. We show and discuss the findings of the study in Chapter 4, conclude by summarizing the main points and implications in Chapter 5.

CHAPTER 2

LITERATURE REVIEW

2.1 Education

Education studies have taken a significant place in the social sciences. The reason for this emphasis might be the multiplicity of subjects which are theorized as education should have an impact on them. Education is considered as having the capability of increasing knowledge, unleashing the potential of the human mind (Brock, 2011), giving the freedom of choice among multiple life paths by broadening the functioning space of a person (Sen, 1992), leading to different thinking and decision-making patterns (Cutler and Lleras-Muney, 2006), being an investment in human capital (Becker S., 1964) and so on. Hence, by such high expectations, it is linked with numerous monetary and nonmonetary benefits, which can be classified further as private and social benefits (Vila, 2000) . Health is one of the main and clearly identified forms of nonmonetary benefits of education, and child health precedes that with an emphasis on women education. Additional to the listed expectations of education, women education offers further potential improvements for herself, her family, and overall society. Before reviewing the findings regarding these benefits or outcomes of women education, it might be beneficial to investigate the demand for schooling by concentrating on the concept of development. In this chapter, we will first introduce some of the theories that link education and development to have a better understanding of the motivations behind the education studies. Then, we will restrict our focus on the value of women education and discuss the additional impacts of education under this specification. Next, some of the studies analyzing the outcomes of women education will be summarized in literature by emphasizing on health. Finally, after visiting the problem of empirical identification, we will review the compulsory schooling law's usage as a solution to that issue and its importance in the literature by specifying the case in Turkey.

2.2 Education as a Tool of Development

Most of the time, education is seen as an important tool for human development, and its importance is emphasized, especially by social scientists. In the 1930s, psychologist Vygotski claimed that "Learning is not development; however, properly organized learning results in mental development and sets in motion a variety of developmental processes that would be impossible apart from learning." (Vygotski and Cole, 1978). His emphasis was mainly on the individual's developmental processes, which might differ from the economist's view of development. However, their view of development is also faced with paradigm shifts as including less economic measures (Hoffmann, 2006). Amartya Sen's view of development was also parallel to that shift. He argued that development can be described by the progress in the expansion of freedoms. Alongside measures like GNP and individual income, freedom also depends on additional determinants such as the political and civil rights, education, and health facilities (Sen, 1999). Furthermore, Sen's capability approach forms a link between freedom and education; in other words, the link between development and education. He claims that development can be possible with expanding capabilities reflected as the person's freedom to choose among different options in life. Correspondingly, being educated is described as one of the basic capabilities and also a foundation of other capabilities by facilitating a set of basic abilities such as reading, writing, calculating (Hoffmann, 2006).

Another framework for human development and its linkage to education is "human capital". Even the term human capital can be found in literature before, it gains its popularity after Jacob Mincer's article "Investment in Human Capital and Personal Income Distribution" (1958) (Goldin, 2016). However, the foundation of the modern theory was established by Gary S. Becker (Checchi, 2006). He broadens the view of the capital by including schooling, getting training courses, attending lectures that increase skill sets, expenses on health care, morality into its representations (Becker S., 1964). According to the theory, expenditures on education are considered as an investment in human capital, and Becker (1992) tried to measure both private and social returns to different social groups from this investment. Meanwhile, Grossman (2005) points out the characteristics of these returns in Becker's works. He claims that before Becker's pioneer works, causal effects of education on nonmarket returns and behaviors were not investigated. Even though the economists expected that tastes and preferences influence real income and relative prices; they did not pay significant attention to their formation. On the other hand, Gary Becker proposed that preferences can be formulated with standard economic models of rational behavior, and he also introduced important implications to show connections between schooling decisions and some outcomes such as investment in children, harmful addictions, consumption patterns by age, savings (Grossman, 2005). Likewise, in his Nobel Lecture, Becker (1992) explains the main motivation behind the human capital analysis as:

> Human capital analysis starts with the assumption that individuals decide on their education, training, medical care, and other additions to knowledge and health by weighing the benefits and costs. Benefits include cultural and other non-monetary gains along with improvement in earnings and occupations, while costs usually depend mainly on the foregone value of the time spent on these investments.

Predictably human development, including expectations from its outcomes, can be seen as a significant concept to explain the demand for education. Likewise, Checchi (2006) answers the question of why people and nations demand education, starting with the previously mentioned capability approach and human capital theory. He claims that at the initial level, people need basic functionings (reading, writing, calculating, processing information) to live in a society without shame and be able to have an ordinary social life. Without them even finding an address, paying their bills, reading instructions, enrolling their children at school, or even getting adequate healthcare might be challenging. Hence, these functionalities are fundamental for a person; similarly, they are also crucial for the government since they assist people in following public rules to function in a more multifaceted organized social order, so provision of them should be a non-excludable public good. Furthermore, the demand for education can be beyond the minimum requirements for living, and individuals might choose a higher level of education. Alongside with capability approach, human capital model formulates that education will be demanded until the level where the marginal cost equals marginal benefit since schooling is considered as an investment (Checchi, 2006).

Altogether, it can be inferred that education and development are interrelated with each other. For instance, education advances human development, which can appear as an improvement in productivity in an economy and well-being for a person. Meanwhile, these individual or social outcomes can lead to the demand for education. Notably, women education brings out additional aspects to these human development discussions, which are addressed further in the next section, and it is seen as having great potential to boost development, especially for developing countries.

2.3 Women Education

Empirical evidence shows that differences exist in the outcomes in various fields between men and women (Jacobsen, 2007; Eswaran, 2014b), and education is one of the topics that women face unequal treatment. Even the gender gap in education has almost vanished in developed countries; it persists in developing countries (Mason and King, 2001; Eswaran, 2014b; Orazem and King, 2007), whereas equality might be a cure for low growth rates. According to Mason and King (2001) gender inequalities hinder human development, and accomplishment in eliminating them assures improvement in well-being, productivity, economic growth, and governance. Therefore, Paul Schultz (2002) stated that governments should support girls' education and spend more money on it, especially in developing countries. He claims that it is essential in two aspects; equity and efficiency. The equity aspect points out that women and men should have the same opportunities and treated similarly, and fairness should be a sufficient reason to eliminate the gender gap. The efficiency aspect covers that by increasing women education, GDP will also rise due to the redressed imbalance. He states that if gender creates a bias against women toward educational resources, employment opportunities and consequently reduces a country's production, which can translate into GDP, correcting for the inequality should raise it.

However, even it is an essential aspect, the value assigned to women education has been much more profound than economic productivity. As an "active agent of change" like Sen (1999) describes the education of women linked with social transformations and additional benefits for her family and society. Its effects on her well-being and the others well being, division of labor, consumption patterns, health care within the family are largely discussed and of-ten claimed as beneficial. Caldwell (1997) suggests that education leads to social change, lessens the male's authority over the female, brings changes in family relations, and increases women's freedom of choice, which result in lower child mortality and fertility rates. He supports this argument by tracing the correlations between educated women and fertility transformations, child mortality indices, and other health outcomes while emphasizing its importance for developing countries. By this means, he discovered two similar characteristics, higher educational attainment and women's freedom of choice in the countries in which human developmental achievements were observed, such as Kerala and Sri Lanka.

Amartya Sen also states parallel arguments about the importance of female education by incorporating the capability approach. Sen (1999) claims that by education, women agency will be strengthened, which means her influence will be more visible while she becomes more efficient, informed, skilled, and has more voice. As an example, according to Sen (1992), Kerala had one of the lowest real income per capita among the Indian states and still preserved lower infant mortality rates and high life expectancy rates from birth, about 70 years in comparison with 57 years for India. He argues that health gains might be acquired by the basic capabilities; female education and health services since Kerala also had a 92 percent general literacy rate and 87 percent female literacy rate, while Indian's average is 52 percent for general literacy and 39 percent for female literacy. A similar set up observed in Sri Lanka where low income per capita does not provide an additional advance. Still, lower mortality rates followed alongside with higher rates in female education (Caldwell, 1979). As another insight found in these cases Sen (1999) emphasizes the potential effect of women education on the lives of the others within the family. He argues that the influence of educated women can enchant the solutions to the conflicts that occurred in the family since education increases her power in bargainings, and more favorable alternatives linked with women. He claims that she can change the distribution of family resources in favor of children and the other family members by determining the consumption pattern, division of healthcare, food, and other provisions.

This view conflicts with Becker S. (1964) economic model for households, which expects benefits gained with the joint contribution of all members of households, and no distinction between women and men. Moreover, it also contributes to the common idea of the association formed between the effect of women education and improvements in socioeconomic status gained by other indirect reasons such as matching with a wealthier husband and inadequately seen the benefits of education as a result of a better income (Caldwell, 1979). Along with John Caldwell and Amartya Sen's arguments, Duflo and Udry (2004) provide empirical evidence that indicates income cannot be the only answer for better health outcomes and other benefits in the family. Their study challenges the advances of income by investigating the different consumption patterns when the men and women dominated the income and so the deals for the conflicts. In Cote d'Ivoire, women and men have different crops, so Duflo and Udry (2004) had the opportunity to investigate household consumption when the women or men had higher income came from their harvest. They find that when women's crops bring more revenue, the bigger share of household spending is made on food and private goods for women in that year. If the man has the highest income, the bigger share of household spending is made on tobacco, alcohol, and men's private goods. Further evidence was found by using cash transfer programs in developing countries. Thomas (1990) finds that if the unearned income is given to the mother, the child survival probabilities become 20 times higher than the case in which the father controls the income in Brazil. Similarly, Pitt and Khandker (1998) and Khandker (1998) investigate group-based credit programs in Bangladesh and find that borrowing by women is associated with more outstanding results in child welfare than men. They find that women have a greater statistically significant impact on the nutritional status of children. Furthermore, Duflo (2003) shows that the superior benefits caused by women are not limited to mothers since she observes improvements on the children's anthropometric status when their grandmothers receive a social pension and no significant results when their grandfather receives it.

Henceforth, these provide evidence that the higher participation in decision making of women might result in better solutions that have positive effects on child health outcomes primarily. As discussed before, education provides more voice and power for women within the family. Besides, it can be expected that, like income, further educational gains of women, such as improved knowledge and skills, might also be more effectively allocated in favor of child health than the father education. For instance, the correlation between parental education and child health is commonly found more significant for mother education than father education (Duflo, 2012).

Altogether, the impact of maternal education on child expected to be positive and empirical evidence prove a strong relationship especially in developing countries. Previously mentioned, successes of comparatively higher self-health and child health rates in Kerala and Sri Lanka also provides insight into the gains from higher rates of female education (Sen, 1992; Caldwell, 1979). It is expected that women become better producers in health for themselves and their children through education. Caldwell (1979) claims that even there are other socioeconomic factors that affect child mortality, maternal education is the most significant one and support this by the evince formed by developing countries such as Ghana, Nigeria.

It is hypothesized that these substantial effects observed in developing countries might be a result of the gender roles such as the traditional division of labor, which assigns childcare as the women's primary responsibility in the household (Grossman, 2005; Mensch et al., 2019; Makate and Makate, 2016). However, it is discussed that education also has the potential to transform these gender roles in a positive way since gender inequality matters for human development. Likewise, Duflo (2012) points out that even the policies such as cash transfers might have immediate results in the short run, to assure more persistent human development outcomes, the existent imbalances in the gender roles within the family should be fixed for developing countries. In this sense, it is possible that while women alter the decisions within the family, they also reshape their behavior and decision patterns, which are inherited majorly by their family and society with education. So that education might redress the mindset of herself and the people around her, which might result significant changes in various aspects of her life such as attitudes toward children, their time-preferences for marriage and fertility, and gender roles (Ertürk and Dayıoğlu, 2004; Duflo, 2012).

Therefore, the delay in marriage and pregnancy is commonly associated with women education. Alongside with teenage childbearing, early marriages are correlated with adverse outcomes in both mother and child health (Dinçer et al., 2014). One reason for the expected delays in them can be the knowledge about it adverse effects. However, the more popular explanation is formed by Gary Becker's human capital model, which states that people invest in education as much as their expected future outcome. Hence, if marriage and childbearing result in withdrawal from the labor market, an educated woman might decide not to marry or delay it to increase her human capital investment return (Eswaran, 2014a). Additionally, delay first pregnancies can be affected indirectly by female education from other externalities that education creates. For example, schooling may improve women's bargaining power in the household, so her effectiveness in the decision-making will increase (Mason, 1986). It may raise awareness about family planning methods and expand her knowledge about contraceptives and effective usage of them (Rosenzweig and Schultz, 1985,9). Female education also improves child health and decreases child mortality, so fewer births will be enough for the desired child (Schultz, 1990; Lam and Duryea, 1999). Lastly, educated women may invest more in their child's human capital in the form of both knowledge and health capital, so the real cost of a child might rise, which may lead the decision to have fewer children with better education and health (Becker and Lewis, 1973).

Education also improves the health behaviors and health outcomes of women. Human capital theory suggests that knowledge capital and health capital are two components of human capital, and they interact with each other (Grossman, 2005). First, health is treated as a commodity good and a durable item, and then expenses on it are considered as an investment in human capital by itself (Grossman, 1972). Therefore, it is important to realize that education can utilize health care by providing some basic capabilities. When this is coupled with the knowledge capital that education directly affects, we can conclude that education is capable of impacting both aspects of human capital. (Feinstein et al., 2006) summarizes the role of education as it brings changes for self and also into the multilayered context in which individuals exist. Together they affect a person's behavior, her/his lifestyle, and service usage. Moreover, they assign a dynamic role for education and claim that additional to direct benefits on individuals and their community, it may continue to moderate the context and provide protection from stress and risky environment. For a more systematic understanding, Lochner (2011) provides possible channels through which education might improve health. According to the list, education leads to better decision making and information assembling, better and healthier environments for living and working, better peers, reduction in stress, a higher probability of having health insurance, and healthier behaviors.

Health utilization is one of the essential health behavior that might be affected by education. Since it is hypothesized that education increases health production efficiency, one channel for that might be efficient and active use of health facilities. According to Feinstein et al. (2006), health care services are used for its three important elements. The first one is its preventative element, which means using health facilities without a necessity to demand health care but for a checkup and monitoring present health conditions. The second one is its responsive element when individuals use health services in response to a health problem such as pains, disease, or accidents. The last one is its management element for chronic and disabling conditions. It is almost sure that if education can improve these elements' effective use, this can have a great impact on health. One theoretical baseline for the channels that education can impact these elements is suggested by Andersen (1995) known as the behavioral model of health service usage. Andersen (1995) argues that deciding on the usage of the health service depends on the following factors; "predisposing factors," which refers to individual characteristics of age, gender education, health beliefs etc., "enabling factors" as the price of healthcare, income, health insurance, and the "need" for healthcare. By keeping in mind the discussion done until now, it will not be wrong to say that education may influence the effective usage of health facilities directly and indirectly through all of these three factors. Therefore, the efficient use of health facilities is also considered and investigated as one of the explanations for parental education's impact on health outcomes for children. Usage of formal antenatal care, delivery services, and healthcare usages such as taking the child to a health facility can be analyzed to identify the maternal education impact on healthcare utilization.

With these theories in mind, we claim that the impact of enhanced human capital by the increase in women education flows through human development to health utilization and health outcomes as visualized in Figure 2.1. It is suggested that education is an investment in human capital that also advances human development, such as strengthening women agency, bargaining power, freedom, and lowering gender inequality. Further, these improvements may alter the needs and expectations in life and also facilitate meeting her and her children's health care needs according to her own judgments. Hence such developments probably result in different health behaviors, which are ultimately expected to influence health outcomes. As a matter of fact, it should also be noted that education continues to intensify all of these steps by improved knowledge and functionalities. The next section will show the empirical evidence found in the previous literature related to the educational impact on these steps.

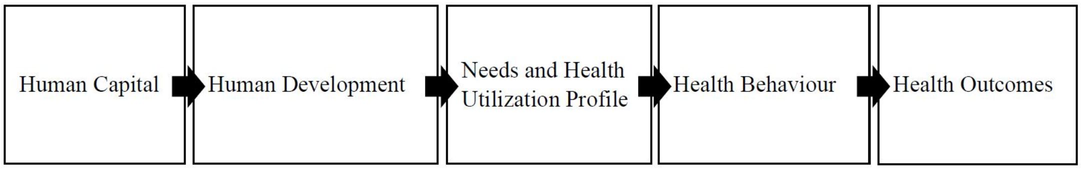

Figure 2.1: Expected Flow of The Education Impact

2.4 Empirical Evidence

If we examine the discussion thus far, we can conclude that the impact of women education is two-fold. Such education is a powerful tool for human development regardless of gender, and it is expected that women education enhances the outcomes by its discussed characteristics in the previous part. Therefore, an extensive literature has developed on the women education impacts on various aspects.

As we argued previously, education reshapes women's decisions, which can be reflected in time preferences of marriage and fertility. Moreover, these decisions have significant impacts on mother and child health. The associated literature emphasizes less on marriage than fertility, which can be understandable with the further concerns arise with fertility. Moreover, marriage related results are heterogeneous, and the results seem to be shaped by other characteristics such as development level and the gender-role context (Raymo and Iwasawa, 2005; Torr, 2011). Torr (2011) observed the change in the relationship between marriage and education in the US. The paper shows that between 1940-1960 women who have at least a high school diploma are less likely to be currently married, but after 2000 college-educated women were most likely to be married. This change is partly explained by women influx into the labor market during that time and its effect on gender roles. Moreover, additional evidence for the US and most of the other industrialized countries indicates that even education may lead delays in the first marriage age, the impact of education on marriage is either positive or insignificant (Goldstein and Kenney, 2001; Bracher and Santow, 1998; Blossfeld and Huinink, 1991). However, Raymo and Iwasawa (2005) finds that this relationship is still negative in Japan, unlike the industrialized countries. They explain that result mostly with "a highly asymmetric gender division of labor" exists in Japan, and it is difficult to cope with both housework and work. Hence, these show that the "traditional" view of the division of labor in the house might have a significant impact on how educated women decide on marriage.

Delayed marriage is generally associated with education; however, results in developing countries are also not universally the same. The studies on developing countries made by Breierova and Duflo (2004) for Indonesia, Duflo et al. (2015) for Kenya, and Keats (2018) for Uganda suggest that women education leads to an increase in first marriage age. On the other hand, Lavy and Zablotsky (2011) and Erten and Keskin (2016) find no evidence for schooling effect on marriage age in Israel among Arab women and Turkey, respectively. However, results found for Turkey are also controversial in itself. Alongside Erten and Keskin (2016), Gulesci and Meyersson (2013) also finds no evidence in delay in marriage using 1997 CSL as a cut-off point in RD design, while Güneş (2016) suggests an increase in marriage age within an IV framework by using the intensity of CSL measured by additional classroom as an instrument. Dinçer et al. (2014) claims a negative relationship between education and the probability of marriage using CSL as an instrument in IV methodology. Kırdar et al. (2018) reported partly similar results. Their study had an emphasis on teenage marriage and births linked with additional adverse outcomes such as poor mother and child health. They separate the CSL effect into two ways: incarceration and human capital effect. Then using RDD design with 1997 CSL as a cut-off year, they find that with an increase in the year of schooling by CSL delays marriage, and the probability of being married most significantly drops at age 17. They note that policy had a strong incarceration effect, so they delay their marriage after finishing compulsory schooling, but the human capital effect lasted for a short time until the age of 17.

The literature about schooling and fertility decisions is more widespread than marital decisions. Some of the investigated relations with education are the first birth age, the desired number of children, their bargaining power in fertility decision, the number of children, and contraception usage. However, results vary depending on the education level of an individual, country's development level, and the average level of education in population (Kim, 2016; Weale, 1992). Weale (1992) observed that in the countries where the literacy rate is above 60 percent, education leads to a decrease in fertility, and in the ones where literacy rate is below 40 percent, education is associated positively with fertility. Klepinger et al. (1999) find a substantial fertility reduction as a result of female education in the United States. Rosenzweig and Schultz (1985) finds that more educated women use more complex contraceptive methods and their higher success rate results in lower fertility rates in the US in 1970. In contrast, McCrary and Royer (2011) and Breierova and Duflo (2004) find no significant evidence for the link between education and fertility in the United States and Indonesia. More results for developing countries are as follows; Ozier (2015) finds attending secondary school reduces teenage fertility in Kenya. Similarly, Keats (2018) states that having a secondary school diploma delays and decreases fertility, and increases the probability of using contraceptives before the first pregnancy in Uganda.

Similar results are also stated in papers analyzing the effect of education in Turkey. Güneş (2016) find that female education decreases fertility, and she argues that the reduction in the odds of becoming a mother due to education can be a result of delaying marriage or delaying pregnancy. She estimates that delaying marriage constitutes 21 percent, and delaying pregnancy within marriage constitutes 79 percent of the effect of schooling. Moreover, she also notes that with a more specific definition, delaying first birth within marriage constitutes 76.6 percent of the schooling effect on fertility. She also finds a positive impact on contraceptive use. Erten and Keskin (2016) and Dinçer et al. (2014) also add evidence on the negative impact of schooling on the probability of ever giving birth and its positive impact on contraceptive use. Similar to their marriage results Gulesci and Meyersson (2013) reports no evidence of education on fertility timing, but they find a positive effect on having a say while deciding the type of the contraceptive method as a measure of the women's power in decision-making. Meanwhile, Kırdar et al. (2018) argues that the probability of giving first birth decreases between ages 15-17 due to the educational policy change in 1997, and impact rate is higher than the developed country results for teenage fertility. However, after age 18, this effect fades out and returns to the pre-policy rates as well as the marriage age.

The impact of women education, especially maternal education on child health, is one of the relations that expected to be strong, as discussed earlier. In their reviews Feinstein et al. (2006) and Grossman (2005) provide considerable evidence that shows the positive and significant effect of maternal education on child health and children's anthropometric outcomes. This result suggests further benefits since height has a positive correlation with cognitive ability, which can be seen as a possible predictor for higher wages (Case and Paxson, 2008). Chou et al. (2010) used Taiwan's educational reform to extending compulsory education as an instrument to identify the causal effect. They find increased maternal education causes a 0.7

percentage decrease in the possibility of low birth weight, which is seen as an important identifier for infant health, and associated with child mortality and morbidity. Whereas, Currie and Moretti (2003) reports a higher reduction compared to that Chou et al. (2010) about 1.2 percentage points by using the number of newly opened colleges in some counties in the US as an instrument, and Meara (2001) reports 11-12 years of maternal education lets 1.37 and 1.1 percent reduction in the probability of white and black mothers, respectively. However, some studies report relatively minor effects. McCrary and Royer (2011) reports a little maternal education effect on infant health by using age at school entry policies in the US. Similarly, Lindeboom et al. (2009) finds a small effect on child health by using British Compulsory School Laws (henceforth referred to as CSL) as an instrument. The maternal education level might explain these different results. It seems that when the subject education level increases, the effect becomes more significant. However, the studies that use compulsory schooling laws and similar reforms in response to endogeneity are restricted to analyze the impact of the lower educational levels.

Evidence from developing countries shows a more significantly positive relationship between maternal education and child height. Thomas et al. (1991), Glewwe (1999) and Alderman et al. (2003) report evidence to support this claim for Brazil, Morocco, and Peru, respectively. Moreover, they also compare the results with father education and note that maternal education has a higher impact on child height. Dursun et al. (2017) investigated the maternal education effect on the birth outcomes by using the Ministry of Health Birth Outcomes Data and Population and Housing Census for 2011. To identify the causal effects of maternal education, they used the 1997 education reform as an instrument. They reported that the probability of having babies with low birth weight is smaller when the mother has at least a middle school diploma. Güneş (2015) introduces an intensity measure as an instrument to investigate the impact of maternal education. She uses the newly constructed classrooms in mothers' birthplace due to the education plan of the 1997 CSL as an instrument. She finds that mothers' completion of primary school is associated negatively with the possibility of having a baby with low birth weight and positively associated with height for age and weight for age z scores.

Alongside with the profound effects on child health directly by augmented knowledge and indirectly through decisions of their mother, women are also benefited by education for their own health production. Grossman (2005) claims that there is extensive evidence for the positive effect of education on good health, and this relation is true regardless of the measurement of being healthy. In the literature, self-defined health, generally having good or poor health, is a broadly used measure. Arendt (2005) compares eighteen years of schooling with eight years of schooling and finds that the probability of defining health as excellent is eight times higher for both men and women in Denmark. By using the implementation of new CSL, the following papers find that education increases health status in the sense of better-defined health and decreases mortality. Studies of Adams (2002) and Mazumder (2008) provide evidence for the US. Similarly, while Powdthavee (2010) finds a significant effect, Oreopoulos (2007) notes only a small impact for the UK. On the other hand, Jürges et al. (2013) and Braakmann (2011) find no effect for UK. Additionally, Kemptner et al. (2011)'s results differ by gender, and they note a positive education effect on German men but no evidence for the effect on German women. Brunello et al. (2016) analyzed the effect separately for women and men for a sample gathered from several European countries where CSL reform is implemented, using the reform as an instrument for education. Their IV estimates show that education reduces the odds of having poor health for both genders, but there is a higher impact on women. They suggest two possible explanations for that difference. Firstly, they remind that women had a lower enrolment rate than men before CSL so that the marginal returns might be higher. Secondly, education might raise women's awareness of healthcare issues more than men since they may take information related to health more seriously.

The impact of education on health might be higher for developing countries compared to the previously cited developed countries since education reforms have a higher effect on enrolment rates, and there may be more room for health gains. Also, the productivity gains of higher human capital are also essential for their economic development. However, the evidence for developing countries is limited. The literature for developing countries more commonly focus on education impact on fertility, or health knowledge fields (Cesur et al., 2014) (examples for fertility mentioned in the previous part and for health knowledge includes Mocan and Cannonier (2012), Mocan and Altindag (2014), Agüero and Bharadwaj (2014)). Cesur et al. (2014) investigates the case in Turkey as a middle income, developing country. Together with the OLS estimates, they used 1997 CSL to identify the causal effects of education on health. Their OLS results show that even there is a significantly positive relationship between having a middle school degree and the probability of having good health, more precisely defining their health as good or excellent. However, when the exposure of education reform is used as an instrument, effect disappears, so there is no evidence for the causal effect of education on health. Baltagi et al. (2019) reports similar results. They also used the 1997 education reform as an instrument and obtained significantly positive OLS estimates in favor of health. However, they report no causal relation due to insignificant IV results.

In literature, not only the causal impacts of education on health are directly analyzed, but studies about its impact on most of these channels also hold a large place. As a health-related behavior, body mass index (BMI) is one of these vastly analyzed variables. BMI is classified as one of the top health risk behaviors. The positive correlation between increasing BMI and "risk of coronary heart disease, ischemic stroke, and type 2 diabetes mellitus" is well-documented, and high BMI is also associated with other illnesses such as the development of colon, breast, and kidney cancers (Feinstein et al., 2006). Hence, due to its proven importance on health, extensive literature developed on the impact of education on BMI over time. Kemptner et al. (2011) find that with education, the probability of being in a healthy range of BMI increases. Brunello et al. (2013) also supports this finding and reveals that education reduces BMI among European women by using CSL in nine European countries. Moreover, Spasojević (2010) for Sweden and Grabner (2009) for the USA also provide evidence for the causal effect of education on having a more protective behavior on BMI.

It is also stated that the results showing the impact of education on health may depend on the development level of the country. For instance, according to Cutler and Lleras-Muney (2012), "education is associated with lower malnutrition in most countries, but in richer countries, the educated have lower BMIs whereas, in poor countries, the educated have higher BMIs." As a developing country, some of the results from studies done for Turkey supports this suggestion. Cesur et al. (2014) reports no causal effect of education on BMI for women, but they find that education raises the probability of being overweight and obese in Turkey. They suggest the impact of education on personal income might let this result since there is empirical evidence that shows there might be a tendency to gain weight when personal income increases, especially for poor households (Akee et al., 2010). However, even they control for household income, the result for men persists, but they note that personal income, which is unknown, might be more appropriate for this estimation. Baltagi et al. (2019) also observes insignificant

IV results for the causal relationship between education and BMI and the probability of being obese, whereas they report little but significant negative results by OLS. Tansel and Karaoglan (2016) reports a positive relationship between education and BMI by using a similar strategy but with a different instrument, the education expansion in the 1960s.

Evidence for some developed and developing countries suggests that maternal education improves health utilization in the sense of prenatal care and delivery, which can be seen as an intersection point of mothers' and babies' health. Prickett and Augustine (2016) suggest that higher levels of maternal education induce advantageous health investment behaviors, especially in the early development phase of the child in the US. Todd Jewell (2009) claims that prenatal care demand is significantly impacted by maternal education in South America. Navaneetham and Dharmalingam (2002) and Elo (1992) also support these findings for India and Peru, respectively. Celik and Hotchkiss (2000) investigates the impact of socioeconomic factors on health care utilization as prenatal care usage, and formal birth delivery in Turkey. By using a logistic regression model, they show that educational attainment is one of the significant factors for health utilization. However, Güneş (2015) finds that maternal education has a positive effect on taking formal antenatal care and receiving more than four antenatal care only with OLS results. Nevertheless, IV estimates suggest no evidence for a causal impact. She also reports no causal relationship between maternal education and delivery within a health facility or delivery by health professionals.

Other important subjects are the usage of health facilities by its preventative element and responsive element, which we mostly interest in primary health care access. Preventative health care is important for the individuals' well-being and the cost reduction in health services since preventative healthcare may help to identify the illness at the first stage before it gets severe. In general, the impact of education on preventative healthcare seems positive despite the existence of mixed results which are explained by differences in other socio-economic determinants. Goddard and Smith (2001) indicates the probability of go to a general practitioner due to preventative reasons is low for the low education groups in the UK, even the country provides universal coverage in health. Sabates and Feinstein (2004) tried to identify the direct women education effect on the uptake of preventative screening and state significantly positive impact even after controlled for income, occupation, age, and parental socioeconomic status. They deduce that education is one of the most significant factors that explains the positive impact. Jepson et al. (2000) provides a review that investigates some of the factors that might have an impact on the regular uptake screening for several developing countries. The review consists of 42 studies, and only 12 of them provide evidence for the relationship between education and uptake screening. Moreover, while 10 of them obtain a positive estimation result, two of them find a negative impact of education on screenings. On the other hand, in the literature, the direction of education impact differs for primary health care, which is design to provide easy access for both preventative and responsive health care at the first step. While Schellhorn et al. (2000) associates a higher level of education with fewer visits to primary physicians among older people, Dunlop et al. (2000) find the probability of using general practitioner services for women raises with schooling. However, the literature that investigates the causal impact of education on healthcare utilization for Turkey is limited.

2.5 Empirical Identification Issues

In the last part it can be seen that most of the evidence formed by using methods to escape the possible biases and develop a more reliable empirical identification since endogenity is a legitimate concern in education studies. Education and the variable which is thought to be impacted by education level can be correlated in various ways. For example, we can identify the correlation between education and health outcomes; even education does not have a causal effect on health at all because the source of correlation can be different. Grossman and Kaestner (1997) argues that the correlation between health and education can be formed in three ways. Firstly, the path of causality can be from education to health, which is the main concern of this study. This path occurs if better-educated people produce health more efficiently due to their increased knowledge and changes in tastes and preferences in favor of healthy choices. Secondly, the path may be from health to education. This causality occurs when healthier students are more efficient producers in education. In other words, being unhealthy may result in low education attainment. Lastly, education and health can be affected simultaneously by a third variable, such as household characteristics, environment, physical and mental ability, and time preferences. Hence if the health outcome is simply regressed on education, the result may be biased due to the existence of the second and third paths. With a similar approach, it can be seen that endogeneity concern is also valid for the relationship between education and other variables such as fertility and marriage preferences, decisions related to their children.

Consequently, the effect of education on the target variable should be isolated from the others to find the causal impact. One way to accomplish this goal is to find another variable that has an effect on education but does not affect the target variable and use it as an instrument of education. In this way, the path of causality only comes from the instrument, through education, to the target variable so the other paths will be detached.

In this sense, compulsory education laws provide a valid option for instrument selection. For instance, CSL is decided and implemented by an external authority, the policy-makers in the state, and has a direct and exogenous effect on education. Additionally, it is uncorrelated with the dependent variables considered, e.g. various health outcomes, so CSL can be used as a sufficient instrument to measure the independent impact of education on that variable. Moreover, its effectiveness on raising school enrolment rates is documented by various studies majorly done for developed countries (Acemoglu and Angrist, 2000; Lleras-Muney, 2002; Lang and Kropp, 1986; Oreopoulos, 2006; Kemptner et al., 2011; Stephens and Yang, 2014; Brunello et al., 2009). Although the magnitude of the effect varies, there is substantial evidence that strengthening CSL increases educational attainment, which provides the target sample and its magnitude related to the strength of the statistical method.

Another important aspect of CSL for education studies is that it targets the children who are in a more disadvantaged position or, in other words, the children who are excluded from the education system due to external disruptions. As a possible explanation for that exclusion Checchi (2006) notes that the receiver of the good and the one who decides for it is not the same person. Therefore parents may make misguided decisions for their child due to other concerns that came from cultural beliefs, family income, etc. Especially in poorer countries in which child labor persists, parents can expect from their child to work and help the family budget rather than go to school. Besides, it is stated that compulsory education laws decrease child labor (Fyfe, 2005). Another source of that "wrong" decisions may come from cultural barriers. In most cases, this manifests itself as a bias against girls and creates gender disparities in education. It is also suggested that female enrolment rates are more sensitive to the family income. (Checchi, 2006). Hence, it is reasonable to expect that compulsory schooling laws have higher effects on the girls' enrolment rates when inequalities exist, especially in underdeveloped areas. Therefore, by these additional channels, CSL also provides an adequate instrument to investigate impact of education, especially on more disadvantaged groups, such as girls in rural areas.

Henceforth, CSL is frequently used as an instrument to capture the causal effect of education on various subjects. For instance, Acemoglu and Angrist (2000) used CSL to investigate the causal effect of education on individual wages and find that IV estimates are significantly lower than the OLS results. McCrary and Royer (2011) used it to study the link between women education and fertility decisions, child health, and argues that the causal effect is smaller than literature. Whereas Lleras-Muney (2005) also used CSL to investigate the causal impact of education on mortality in the US and claims that the causal effect is larger compared to the previous literature and their OLS results. Using the same instrument, Adams (2002) also finds positive and significant schooling effects on self-rated health and health by functional ability. Spasojević (2010) used Swedish school reforms to show the negative impact of education on the poor health index. Similar with the Lleras-Muney (2005), the studies conducted by Adams (2002), and Spasojević (2010) also result in larger effects by IV strategy compared with the OLS estimates in absolute value. Oreopoulos (2006) documents the negative effect of CSL in the United States on the likelihood of reporting health disability, being below the poverty line and positive effects in the United Kingdom on the self-reported good health. He also compares the compulsory schooling laws' impact on the returns to schooling in the United Kingdom to the United States. He argues that The IV results usually exceed the OLS results in the United Kingdom, unlike the US and Canada results, where only a small number of students were affected by the schooling laws.

Even compulsory schooling laws serves as a useful instrument; some of their characteristics may arguably be a reason for the distinctions between the results. Firstly, the methodology takes CSL as a cutoff point for an exogenous shock, so the sample size shrinks to the people around the threshold. Suppose more cohorts are included in the sample. In that case, this can eliminate the similarities between the treated and untreated groups, which assured the randomly selected two equal groups only differed in the exposure of education shock for comparison. Conversely, a small sample may lead to a decrease in bidirectional causality. Another issue is that the usage of the schooling laws limits the education level that can be analyzed. Most of the CSLs mentioned previously are relevant to low education levels, such as having a middle school diploma. Therefore, they fail to capture higher education effects; even the intensity of the education may lead to different incentives. For example, as mentioned previously, fertility outcomes get greater while the education level increases. Correspondingly, the study of Kırdar et al. (2018) supports this claim since they show that the education effect analyzed by using the 1997 CSL in Turkey on the marriage and fertility decisions disappears after the age of 17 - 18. On the other hand, Card (2001) argues that the people who are affected by CSL could have lower education choices because of the high cost rather than expecting low returns. Therefore, marginal returns of education can be greater for them, leading to higher IV estimates than the OLS estimates, which represent a larger population and various education levels. Hence for some outcomes such as health utilization or health status, the effect of education identified by CSL may lead to higher results. Moreover, Grossman (2005) points out another explanation that the area-level instruments might be captures the spill-over effects of education on health outcomes, so the OLS estimates might be understated, as is the paper of Acemoglu and Angrist (2000). Lastly, if the people who are affected by the CSL is very few, the power of the instrument can be damaged. The law's small impact may explain the more significant effects in developing countries compared to the developed countries and some of the disappearances in the significance of results during the time.

With these in mind, Turkey grants an advantageous sample. While the case in Turkey consists of the explained pro sides of using CSL as an instrument, it also escapes some of the possible cons with the substantial effect of the CSL, since it leads to a large sample and powerful instrument, which are explained in detail within the next part.

2.5.1 Compulsory Education in Turkey

Before 1997 five years of schooling referred to as primary education was compulsory for children in Turkey. Even the law that indicates subsequent three-year schooling to be compulsory was first accepted in 1961 and redefined in 1973; governments could not provide sufficient enforcement to implement the law due to several reasons such as the lack of infrastructure, schools, teachers, and other facilities. (Dulger, 2004). Hence, the education system was already introduced as 5+3+3, which indicates five years of compulsory primary education, three years of secondary education which fail to be mandated, and three years of high school education. Additionally, from 1973 to 1997, primary enrolment rates increased from 89,6 to 96,68 percent coverage, and secondary schooling enrolment rates raised from 34,3 to 64,73 (Dulger, 2004). However, statistics confirm that the gap between primary and secondary education enrolment rates was still substantial.

In 1997 Eight-Year Compulsory Education Enforcement Law was introduced. Law extends five years of compulsory schooling and obligates eight years of education, and it is supported by the Basic Education Plan. Law unifies elementary and middle school and renames them as eight years of continuous primary education; Law Number 4603 (1997). Moreover, the law also defines earmarked taxes to finance the expense of expansion in schooling capacities. The collected revenue is used for expanding the number of teachers and schools, renovations for old school buildings, improve their conditions, and supplement educational materials to the student (Dulger, 2004).

CSL implements that the children who graduate from the fifth grade are obligated to continue with the sixth grade, and the law firstly applied in Fall 1997. According to the Turkish education system, if a child is 72 months old at the end of the year, s/he might start school in the fall, but the age is not specified precisely. Hence the children born at the end of 1986 should start the first grade in 1992 Fall; however, the ones born early in 1986 might start in 1991 instead of 1992, which means that they are not subject to the CSL since they would be graduated before Fall 1997. Therefore, the group of children born in 1986 is the first cohort exposed to the CSL, but not all of them due to the unclear cut-off age of starting school. Hence, omitting the birth cohort of 1986 is common while studying CLS effects.

Dulger (2004) lists the objectives of CSL as taking the compulsory education level to universal standards, developing primary school education, and improve the physical conditions in the primary education level. Altogether, the major policy objective of the CSL is defined as providing eight years of schooling for all children in the country. Statistics prove that CSL has a significant impact on enrolment rates in middle school. The proportion of children who receives compulsory education increased by about 15 percent from 1997-1998 to 2000-2001 academic years. Afterward, the increase in enrolments slowed down; it is 3.3 percent between 2003-2004 and 2005-2006 period (Kırdar et al., 2016). Some barriers to the main objective are also defined, such as parents' income concerns in the most deprived areas, transportation difficulties, and gender issues. To reach the children who are in the most disadvantageous conditions, The Program tried to solve these problems by increasing accessibility and supporting students from low-income families with school constructions into needed areas, free textbook program, free meal program, and school bussing program. It is argued that even it cannot reach full coverage, the most substantial proportion of the rise in enrolment rates came from disadvantaged groups. Dulger (2004) observed that the enrolment rates of the girls in rural areas had the most rapid progress, with a 162 percent increase in the first year of the program. Kırdar et al. (2016) also supports this observation up to a point. They studied the impact of CSL on two existing disparities, which are the urban-rural gap and the gender gap in middle school enrolment rates using the data from 2003 and 2008 rounds of the TDHS datasets. They find that the urban-rural difference reduced for women as in the previous suggestion. However, they also state that the overall gender gap was not affected much.

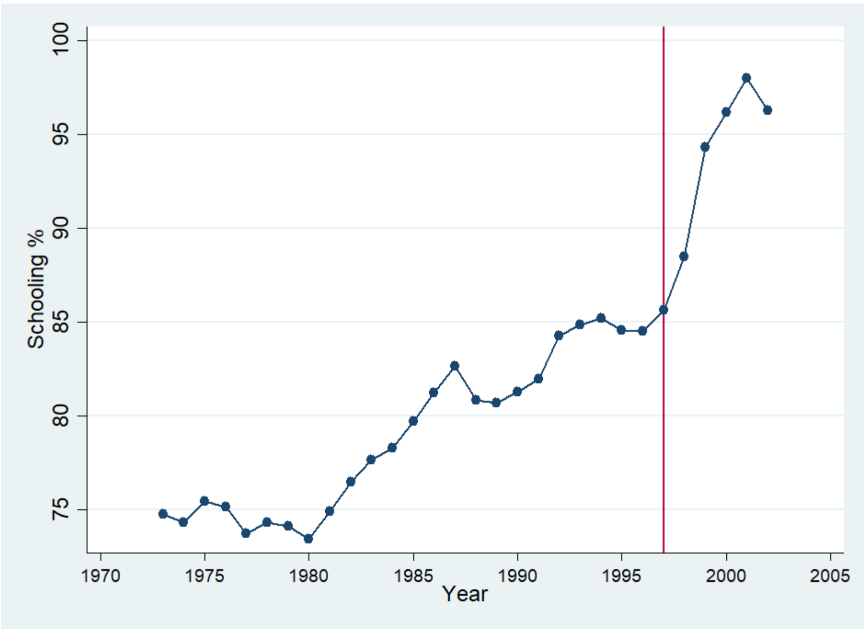

Figure 2.2: Primary Schooling Rates. Source: Dulger (2004)

Due to several characteristics of CSL implemented in 1997, Turkey provides a notable case study while investigating the causal effects of CSL as an instrument of education. Firstly, as a developing country, further externalities can be expected from compulsory schooling rather than the cases in developed countries. Secondly, policy impacted a sufficiently high proportion of children and significantly increased enrolment rates, so it provides a large treatment group. This effect can be seen in Figure 2.2. Similarly, before the CSL, there was a significant gap between compulsory and noncompulsory education levels (Dulger, 2004; Kırdar et al., 2016), which may be considered as available and observable room for improvement and its effects. Finally, another crucial aspect is the documented existence of the gender disparities in school enrolment rates (Tansel, 2002; Dayıoğlu et al., 2009; Kırdar et al., 2016). Even CSL has an insignificant effect on closing that gap, it still improved women's educational attainment significantly, especially in rural areas (Kırdar et al., 2016). Correspondingly, Caner et al. (2016) states that reform significantly reduced the dropout rates for both female and male children, even their mothers considering the son's education more important than the daughter, so the gender gap persists. According to Erten and Keskin (2018) while reform increases the schooling of women growing up in rural areas 1.2 years, they observed no significant impact of reform for the women raised in urban regions. They also document a comparatively higher effect for women with children raised in a rural area than for all women. Hence, the substantial impact on women who suffer from the most disadvantaged conditions presents an advantage while investigating women education outcomes.

Another related point is that the period CSL enabled us to analyze also coincides with the health transformation that occurred in Turkey in the 2000s. Starting with the 2003 Health Transformation Program, politically-prioritized healthcare coverage and accessibility have been remarkably improved with the influx of expended public health funds during that era (Özen, 2018). Therefore, the significantly more open health system set in the 2000s allowed people to demand diverse health utilization levels, potentially creating various outcomes and behaviors. This contributes to our research setup since although the availability and accessibility of healthcare services were already expanded, the health utilization and health outcomes were still low, especially for women in rural areas before the education reform (Güneş, 2015). So if education altered women's decisions and increased their low demand for healthcare, the health system was better positioned to meet the need.

Overall, in line with the reviewed literature, it is almost certain that the impact of education is visible throughout a person's whole life. However, some parts of it are still missing, especially for developing countries such as Turkey. Further investigations can be beneficial to understand these linkages in a more comprehensive way. In this sense, this study claims that it is possible to take a snapshot of a period in a woman's life from her marriage to her role as a mother. Then, we want to trace the impact of education; theoretically, we go from exogenous education effect to human capital, to change in health needs and utilization profile, to greater access and changed health behavior, to final health outcomes related to primarily on her children's health, and self-health. Moreover, we also need to restate that Turkey is appropriate geography for this kind of study for the following reasons. To begin with, the low amount of education levels, especially in the rural areas, accompanied a significant set of education reforms that resulted in a substantial and exogenous effect on the individual education level. Also, enlarged accessibility of the health system accompanied by the low health utilization and outcome levels may ease to capture and analyze the results of the diverging decisions of more educated people. Lastly, increasing data has been available at the individual level for both the education and the health sphere, and we will be bringing together these dimensions to analyze the strength of the health education relationship. The advantages and disadvantages of the data we have will be further discussed in Chapter 3.

CHAPTER 3

DATA AND METHODOLOGY

3.1 Data

In this study, Turkey Demographic and Health Surveys (TDHS) and Turkish Health Surveys (THS) are used for individual-level data sets since they provide information on women education and their decisions in various subjects, including marriage, fertility, and health. Both of the surveys are nation-wide representative and conducted in multiple rounds. The rounds of 2008 and 2013 are used for Turkey Demographic and Health Surveys (TDHS), and 2008, 2010, 2012, 2014, and 2016 are used for Turkish Health Surveys. Additionally, the effect of the 1997 compulsory education reform can be identified in both survey samples. Its effect on middle school graduation rates for the first exposed birth cohort, 1986, and the rest of the treatment group can be seen in the Figure 3.1, Figure 3.2, and Figure 3.3 for both surveys.

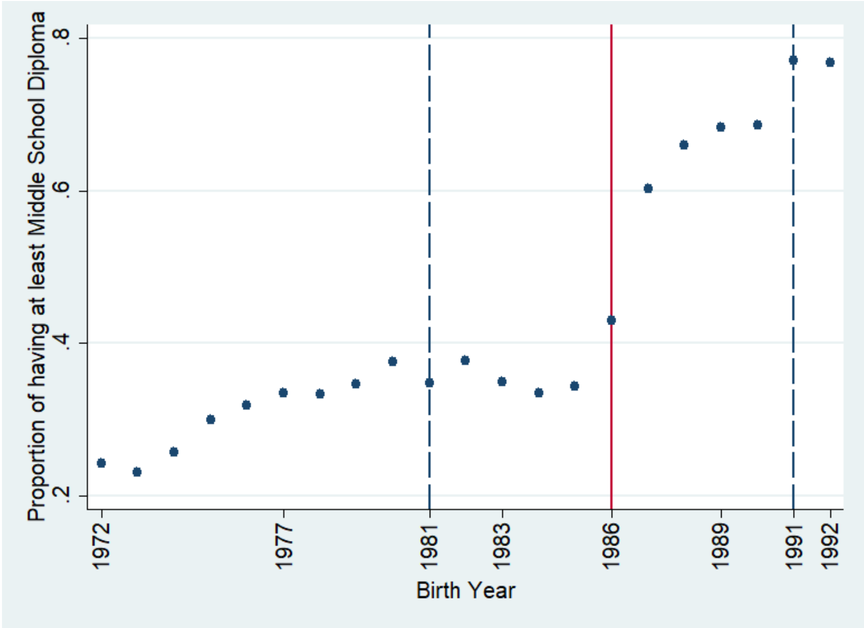

Figure 3.1: Female Middle School Graduation Rates. Source: TDHS

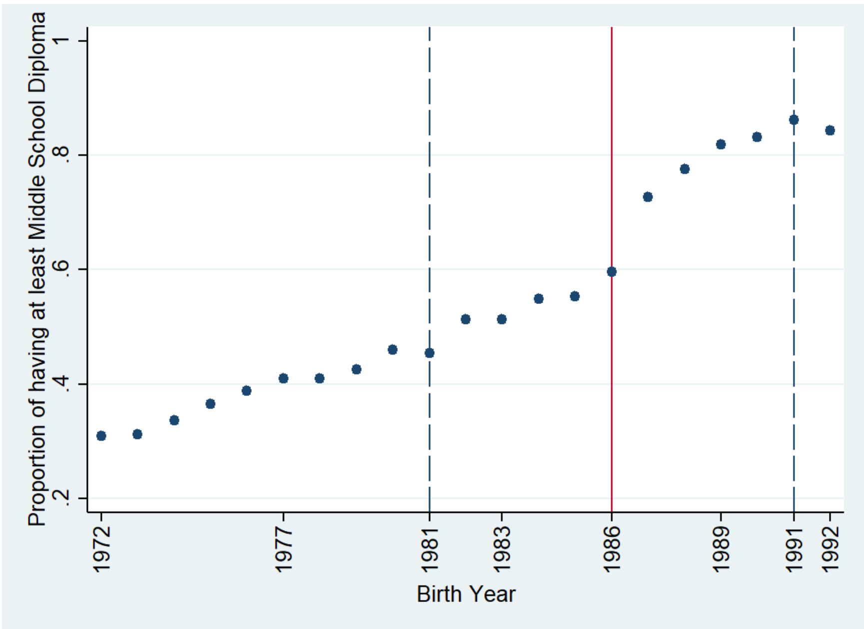

Figure 3.2: Female Middle School Graduation Rates. Source: THS

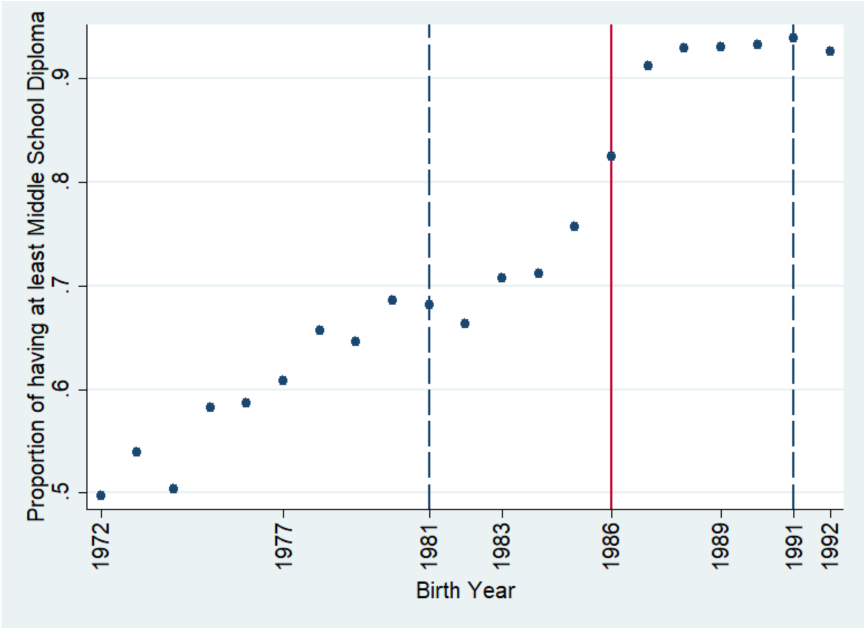

Figure 3.3: Male Middle School Graduation Rates. Source: THS

Turkey Demographic and Health Surveys (TDHS) have been conducted by Hacettepe University Institute of Population Studies (HUIPS). HUIPS has carried out quinquennial nationally representative demographic surveys since 1968. In the beginning, the surveys were modeled by "World Fertility Surveys, the Contraceptive Prevalence Surveys, and the Family and Fertility Surveys, and previous demographic surveys in Turkey" (Ministry of Health (Turkey) et al., 1994) under various names. By 1993, surveys have been done under the context of the worldwide Demographic and Health Surveys (DHS), which are the most widespread surveys used in population studies while enabling comparable studies with similar study designs for many countries with a large number of participants. The purpose of the DHS program is collecting, examining, and disseminating demographic information, especially on family planning, fertility, and child and maternal health (Hacettepe University Institute of Population Studies, 2014). Henceforth, the surveys conducted by HUIPS provide primary demographic data source that is highly reliable, comparable across years -almost five-decade- and countries for related fields. Therefore datasets are frequently used for demographic and health studies for Turkey (see Atun et al. (2013) for health policy effects, Baltagi et al. (2019) for health outcomes, Özer et al. (2018) for childhood immunization, Erten and Keskin (2016), Gulesci and Meyersson (2013) for gender roles, Güneş (2015) Dursun et al. (2017) for child health, Dinçer et al. (2014) Güneş (2016) Kırdar et al. (2018) for fertility, Dayıoğlu et al. (2009), Kırdar et al. (2016) for gender equality in schooling). Moreover, they have constituted the basis for many population and health policies in Turkey and monitoring their effects (Hacettepe University Institute of Population Studies, 2004).

TDHS contains two data sets for the household and ever-married women sample, and they are formed by face-to-face interviews. The household data set provides information on socioeconomic characteristics such as age, sex, education, region and province of birth and current residence, and marital status for each household member. The second data set consists of a sample of ever-married women aged 15-49, which is the main focus group. It provides detailed data on women's marriage histories, and preferences, opinions related to gender roles, fertility preferences, birth histories, maternal healthcare utilization, use of family planning methods, and maternal and child health. Hence, it is a frequently used dataset, especially for fertility and gender-related studies for Turkey.

Turkey Health Surveys (THS) have been conducted biannually by the Turkish Statistical Institute (TURKSTAT) to meet the need for nationwide data on health and health utilization since 2008. Hence survey was designed to fill in missing information, starting with the most lacking ones such as the 0-14 age group's data, and be a nationally representative and nationally and internationally comparable dataset. For these purposes, the survey contained modules offered by the European Union Statistics Office for the candidate and member countries as well (Turkish Statistical Institute, 2008). Moreover, by collecting data on health indicators and the health profile of individuals, which are elements of the development indicators, THS also has intended to contribute the assessment for the country's degree of development.

As mentioned before, the survey aims to profile the health and healthcare utilization in Turkey by face to face interviews. Together with socioeconomic characteristics such as age, sex, education, region for province, THS provides detailed health information specified for three different age groups. Data on infant and child health conditions, diseases and accidents, and child health utilization can be obtained for the 0-6 age group and 7-14 age group samples. Additionally, the 15+ age group sample provides information about the use of healthcare services, health determinants (i.e., body mass index, physical activities, tobacco and alcohol consumption), and health status, including self-defined health, diseases, disabilities (see Cesur et al. (2014), Baltagi et al. (2019) for health outcomes, Tansel and Karaoglan (2016) for health behaviors, Sözmen and Ünal (2016) for health utilization.

Both surveys have their strengths and weaknesses. Since our research interest is the effects of women education on health and health behaviors, both surveys ensure the proper setting for the research method by including education data of women and conducted before and after the cutoff year, the year of education reform. Moreover, even a few indicators overlap, such as BMI for women, surveys mostly offer diverse and complementary data for individuals' health and health behaviors. Whereas TDHS provides the advances of the detailed marriage and fertility-related information by focusing on ever-married women, THS provides a more broad health profile of the country by the data on health utilization, medication behavior, and health status for men, women, and children. Therefore, when the overlapped indicators allow controlling our results by different samples under the same circumstances, the additional variables enable us to study broader aspects of health. For instance, TDHS allows studying fertility preferences, antenatal care, birth weight, and child's anthropometric measures, whereas THS allows going further by adding on the child's current health and health usage. Hence, we will use both surveys to take advantage of their strengths and increase our perception while investigating women education impact on various outcome variables obtained from them.

For the analyses, the ever-married women sample used for TDHS, and all of the age group samples are used for THS. The total pooled TDHS sample obtained from 2008 and 2013 rows contains 25,226 women's answers, and the pooled THS sample obtained from 2008, 2010, 1012, 2014, and 2016 contains 128,484 observations of people in different age groups and gender, that includes 67,052 women who were over the age of 14 years. However, we do not include all of these observations in our analyzes. Our primary sample is restricted to female adults between 17 and 35 years old and their children due to the empirical strategy. Therefore, 16 percent of the TDHS ever-married women sample and 14 percent of the THS women (aged over 14 years) sample are included in the subjected sample. Furthermore, the subjected sample sizes differ for the children related analyzes according to the number of children. In Table 3.1 and 3.2, observation numbers can be seen in detail for each variable.

Notably, the relationship between the mother and her children is clearly observable in TDHS, but the mother of the children is not directly identified in the THS dataset. This may be the reason that THS was not used in a study that analyzes the effect of maternal education on her children's health outcomes previously. To form this missing link, we use "the relation to the head of the family" variable, which includes answers such as "spouse", "son/daughter", "father/mother", "brother/sister". Then, to define the mother, firstly, households are divided by sex of the head of the family. If the head of the family is female, she is assigned as the mother for her children, realized by the relation variable. If the head of the family is male, we assign his spouse as the mother to their children. Correspondingly, the households in which the relationship between mother and child cannot be identified are excluded from the sample for the child-related analyses in THS. Also, the households in which there are multiple wives are excluded from the sample.

3.1.1 Selected Variables and Their Measurements

Both of the surveys include information on many dimensions, which are valuable to measure various health behaviors and outcomes. However, we restrict our interest in the variables that answer our research question more effectively. We plan to focus on the interaction between certain variables and dimensions in producing the health outcomes and health behaviors for the Turkish population in the period 2008-2016. The data analyse structure followed can be seen from Figure 3.4, consistent with the flowchart we have represented at Chapter 2 (see Figure 2.1),

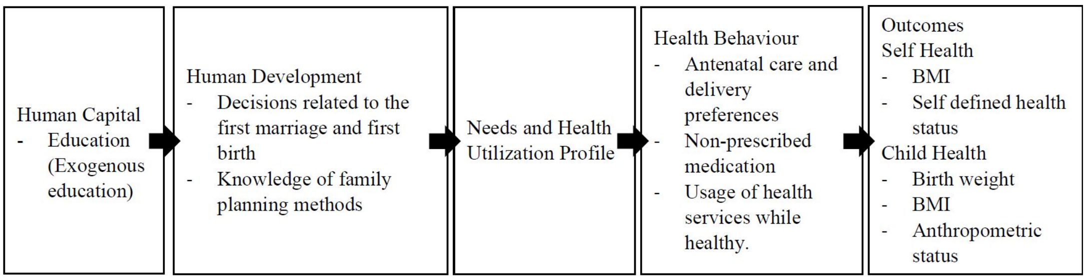

Figure 3.4: Structure of Data Analysis

***/// Since the core of the study is the changes caused by women education in decisions and behaviors associated with the dimensions shown in Figure 3.4, selected variables should represent their beliefs, knowledge, or mostly the personal choices that they can control. Ideally, we want to identify the impact of education on more specific aspects, such as creating a greater level of discernment or health investment for themselves and their children, leading to better choices, trust or distrust, or more continuous healthy behaviors. However, surveys do not provide many variables that offer a precise relationship to investigate these aspects. Still, our selection aims to enable us to approach from these perspectives as much as possible.

In this purpose, we start with the human capital gains of women education measured with enlarged middle school graduations. Then we search for the education impacts on human development expected to be captured by changes in marital and maternal decisions, and knowledge and usage of family planning methods. Our next step is measuring the educational impact on health utilization estimated by the individual decisions that reveal the patterns of health service usage such as timing, frequency, or usage without an urgency. Finally, we examine the health outcomes represented by the available variables that directly or indirectly describe health status such as BMI, self-defined health status for women's self-health and birth weight, anthropometric status for children. ***///

3.1.1.1 Dependent Variables

The summary statistics of the selected variables are presented in Table 3.1 for TDHS and Table 3.2 for THS. The statistics are given separately for the treatment and the control groups. Most of the variables are obtained directly from the available data in the surveys. However, few of them are used after some modifications and need further clarification.

Firstly, it will be beneficial to clarify the variables used for determining health utilization from THS. Firstly, both of the 0-6 and 7-14 age samples include the following question: "In the past 12 months, although there hasn't been any health problem for your child, have you ever visited a health institution for control?". The possible answers are yes and no. Hence, the relevant variables are binary variables that represent these answers. Secondly, to reflect primary healthcare utilization, two questions are used "Do you know your family doctor? (if family doctor service system is available in her/his locality)" and "When was the last time you consulted a GP (general practitioner) or family doctor on your own behalf?". The first question only available for the 2010 and 2012 rounds of THS, but the second one is available for all rounds (2008-2010-2012-2014-2016). The variable reflects the second question, just considers whether s/he has ever consulted or not and does not include the information about the last visit's time. Thirdly, *Ever had a flu shot* variable is driven by the "When was the last time you've been vaccinated against flu?" question. We derive a binary variable that takes the value of 1 if s/he had a vaccination regardless of the time, and 0 if s/he has never had a vaccination. Lastly, only in the 2014 and 2016 waves of the THS diverges the intake of non-prescribed drugs into medication and food supplements/vitamins. Hence, together with their separate classification for given rounds, we also define a united variable *Use of non-prescribed medication, food supplements, or vitamins*, to make equivalent for all survey rounds.

As another important variable for the self-health, self-defined health status is available in THS. During the survey, the question of "How is your health in general?" is asked to the respondents, and the answers can be very good, good, fair, bad, very bad. Using this data, we form the variable *Good health*, which takes the value of 1 if the answer is very good or good and takes 0 otherwise. Moreover, a *Redefined health status* variable is created by using further questions. In THS, the following two questions are also asked about the health status of respondents: "Do you have any long-standing illness or [long-standing] health problems (lasted or expected to last for six months)?" and "For at least the past six months, to what extent have you been limited because of a health problem in activities people usually do?". The potential answers for these questions are; yes and not for the first one and severely limited, limited but not severely, and not limited at all for the second one. Notably, these questions are more objective than the first one, and feeling good with having a long-standing illness and feeling good without it might not mean the same thing. Hence, to identify a health status that also considers the long-standing health problems and limitations, we unite three of these questions and create a ranking according to their answers. For instance, the lowest rank means the respondent declared that s/he is severely limited, has a long-standing illness or health problem, and defined her/his health status as very bad. On the other hand, the first rank means s/he is not limited at all, does not have a long-standing illness or health problem, and defined her/his health as very good. Secondly, BMI is directly provided in TDHS, but it is calculated as weight in kilograms divided by height in meters squared in the THS sample.

Also, we define *Underweight* (BMI < 18.5) and *Overweight* (BMI ≥ 25) as additional self health-related variables.

Lastly, as a child health indicator *Birth Weight* is given in the TDHS, but additional variables are created to further comparison with the literature. *Low birth weight* is a binary variable that indicate whether the birth weight is lower than 2500 grams. Notably, together with the BMI and anthropometric status for children is provided in TDHS, the thresholds used are consistent with the global child development metrics and literature. They represents the standard deviations from the mean on the World Health Organization Child Growth Standards.

3.1.1.2 Independent Variable

The main independent variable is education, which is identified by a binary indicator that displays whether someone has at least a middle school degree mandated after the 1997 CSL. This variable is formed by the data of the highest education level completed. Even the classifications of education are different from each other in TDHS and THS, middle-school completion information can be obtained from both surveys. Hence, the schooling variable is defined as following: completing the first level primary, incomplete primary or no schooling takes the value of 0, whereas completing middle school (second level primary), high school, or higher degrees takes the value of 1. The proportion of at least middle school graduates by birth cohort is displayed in the Figure 3.1, Figure 3.2, and Figure 3.3 for TDHS ever-married women, THS female and THS male samples, respectively. The 1997 CSL was firstly implemented for the 1986 birth cohort children, but the first fully exposed group is the 1987 birth cohort. Hence, its positive effect on the proportion of having at least middle school education can be observable starting with 1986 from the figures. For instance, Figure 3.1 shows that less than 40 percent of the women had a middle school or higher degree before the education reform. After the reform, this proportion raised to 60 percent for the 1987 cohort and kept rising for subsequent birth cohorts.

Even the 1986 birth cohort is the earliest cohort affected by the 1997 CSL, not all of the children were subject to the law. As mentioned previously, 1986 is not a clear cut point since the children born before September in 1986 might start first grade earlier than those born after September, so they might not be exposed to the law. However, even we know the month of birth like in TDHS, it still does not provide enough information because the cut age to start first grade defined in the law for schooling is not strictly enforced. Hence, due to this uncertainty of whether they are exposed, the 1986 cohort is omitted from the sample. Moreover, samples are restricted to include only the 1981 and 1991 birth cohorts for both surveys. The purpose of that is to create a treatment and a control group for the impact of CSL. The five birth cohorts born after 1986 and exposed to the CSL constitute the treatment group, and the five birth cohorts born before 1986 and did not exposed to law constitute the control group.

Table3.1: Descriptive Statistics | Turkey Demographic and Health Survey (TDHS)

VARIABLES	Control			Treated		
	# of Obs.	Mean	Std. Dev	# of Obs.	Mean	Std. Dev
Age	2603	27.679	2.829	1411	22.669	2.561
Middle School	2603	0.361	0.48	1411	0.602	0.49
First marriage and birth age						
Age at first marriage	2603	20.141	3.513	1411	18.763	2.591
Age at first birth	2313	21.303	3.413	1023	19.708	2.353
Contraceptive use						
Use of modern contraceptive methods	2603	0.432	0.495	1411	0.315	0.465
Does not intend to use any method	2603	0.068	0.251	1411	0.096	0.294
Ever used a contraceptive method	2603	0.91	0.287	1410	0.784	0.412
Antenatal care						
Timing of 1st antenatal check (months)	1660	1.996	1.626	911	1.868	1.496
Number of antenatal visits during pregnancy	1787	8.049	5.607	961	8.909	6.205
During pregnancy, given or bought iron tablets/syrup	1771	0.822	0.383	955	0.808	0.394
Preferred antenatal care institution						
Private institutions	1662	0.59	0.492	912	0.511	0.5
Private hospital/clinic	1662	0.338	0.473	912	0.359	0.48
Private doctor	1662	0.23	0.421	912	0.144	0.351
Private polyclinic	1662	0.043	0.204	912	0.026	0.16
Public institutions	1662	0.652	0.476	912	0.697	0.46
Government hospital	1662	0.332	0.471	912	0.387	0.487
Maternity house	1662	0.164	0.37	912	0.156	0.363
MCHFP center	1662	0.004	0.065	912	0.005	0.074
Health center	1662	0.279	0.448	912	0.294	0.456
Health house	1662	0.084	0.278	912	0.063	0.242
SSK hospital	1662	0.021	0.144	912	0.019	0.135
Research hospital	1662	0.014	0.119	912	0.012	0.109
University hospital	1662	0.016	0.126	912	0.019	0.135
Family doctor	1662	0.011	0.106	912	0.011	0.104
Place of delivery						
Delivery in a health facility	2337	0.917	0.276	1297	0.948	0.221
Delivery in a private institutions	2337	0.223	0.416	1297	0.236	0.425
Private hospital/clinic	2337	0.217	0.413	1297	0.234	0.424
Private doctor	2337	0.003	0.051	1297	0.001	0.028
Private midwife	2337	0.003	0.055	1297	0.001	0.028
Delivery in a public institutions	2337	0.694	0.461	1297	0.712	0.453
Government hospital	2337	0.439	0.496	1297	0.453	0.498
Maternity house	2337	0.131	0.337	1297	0.085	0.279
Health center	2337	0.101	0.301	1297	0.151	0.358
Research hospital	2337	0.004	0.065	1297	0.002	0.048
University hospital	2337	0.016	0.125	1297	0.021	0.143
Self Health						
Body mass index (BMI)	2323	2623.034	496.135	1278	2518.967	482.062
Underweight (BMI < 1850)	2323	0.022	0.147	1278	0.041	0.198
Overweight (BMI $\geq$ 2500)	2323	0.547	0.498	1278	0.448	0.497
Child Health						
Birth weight	2016	3187.803	670.07	1172	3138.782	684.837
Low birth weight (birth weight<2500 grams)	2016	0.156	0.363	1172	0.166	0.373
Log birth weight	2016	8.04	0.252	1172	8.022	0.261
BMI standard deviation for child	1695	64.881	108.6	957	56.874	123.005
Height/Age standard deviation	1695	-55.861	142.146	957	-39.392	139.764
Weight/Age standard deviation	1695	9.134	105.679	957	14.696	110.929
Weight/Height standard deviation	1695	58.242	106.313	957	51.713	119.754

Table3.2: Descriptive Statistics | Turkey Health Survey (THS)

VARIABLES	Control			Treated		
	# of Obs.	Mean	Std. Dev	# of Obs.	Mean	Std. Dev
Age	5302	29.258	2.943	4384	23.133	3.094
Middle School	5302	0.514	0.5	4384	0.802	0.399
Health Utilization						
Taking child to a health institution while s/he is healthy (Age 0-6)	1913	0.389	0.488	967	0.411	0.492
Taking child to a health institution while s/he is healthy (Age 7-14)	1416	0.213	0.41	200	0.23	0.422
Knowing family physician (only for the 2010 - 2012 survey waves)	1841	0.85	0.358	1407	0.788	0.409
Ever received service from (general practitioner) or family doctor	1562	0.872	0.334	1105	0.862	0.346
Ever had a flu shot	5286	0.113	0.316	4364	0.113	0.317
Use of non-prescribed medication, supplements or vitamins	5297	0.233	0.423	4378	0.211	0.408
Use of non-prescribed medication (2014-2016 survey waves)	2008	0.092	0.289	1677	0.085	0.278
Use of non-prescribed supplements or vitamins (2014-2016 waves)	2008	0.334	0.472	1677	0.312	0.463
Self Health						
Body mass index (BMI)	4967	24.217	4.44	4101	22.774	4.143
Underweight (BMI < 18.5)	4967	0.057	0.232	4101	0.111	0.315
Overweight (BMI ≥ 25)	4967	0.367	0.482	4101	0.237	0.425
Good health (Self Defined)	5301	0.769	0.421	4384	0.831	0.375
Redefined health status (Self Defined)	5287	24.441	7.636	4376	25.499	6.847

3.2 Methodology

This study aims to investigate the causal effect of women education on health and related decisions through the variables explained in Section 3.1. To achieve this goal, we first have to overcome the endogeneity problem described previously in Section 2.5. The suitable method has to have the statistical power to identify the causal effect of education by weeding out the possible impacts that come from the reverse causality and the other characteristics that simultaneously affect both education and dependent variables.

For instance, as a common statistical method, OLS is expected to produce biased results under the risk of an endogeneity problem since it is designed to capture education's overall effect on the dependent variable. Moreover, Card (2001) provides proof of that statement. According to his work, the OLS estimates that reflect the schooling outcomes are proven to be upward-biased, primarily due to the endogeneity bias.

Therefore, in this study, a Fuzzy Regression Discontinuity Design (FRDD) is used to deal with this empirical identification issue. We will next clarify Regression Discontinuity Design (RDD), why FRDD is suitable for our research, and its additional benefits in the rest of the section.

3.2.1 Regression Discontinuity Design (RDD)

Validating the causal relationship between a treatment variable and outcome variable would be straightforward under an experimental set-up where identifying a randomly selected treatment and control group is possible. However, randomly assigned treatment of interest that creates such comparable groups is not generally the case for population studies as in our research. In that case, Regression Discontinuity Design (RDD) stands out as a credible strategy to analyze the causal effect under such non-experimental settings. Moreover, if the research design is suitable for RDD, it can be analyzed and tested like a randomized experiment.

RDD was firstly introduced by Thistlethwaite and Campbell (1960), but it did not gain importance until the late 1990s (Lee and Lemieux, 2010). After the theoretical contributions from economics (Imbens and Lemieux (2008), Lee et al. (2009), Angrist and Pischke (2009), Imbens and Kalyanaraman (2012)) it gained popularity in economic and education studies (i.e. Meyersson (2014), Ozier (2015), Porter et al. (2017) , Zhang et al. (2016)) and started to be considered one of the strongest non-experimental designs to expose causal relationships (Thoemmes et al., 2017).

RDD lies in the idea of using an arbitrary change, such as a new rule that creates an instant and significant difference to mimic an experimental setting. The design contains three requisite components, which are a score, a cutoff, and a treatment. To apply RDD, data should include scores assigned for all units, and treatment is received if their score exceeds a known cutoff. This exogenously defined threshold significantly increases the probability of receiving the treatment, which creates an instant and substantial difference between the units below and above the cutoff. Therefore, while the units below the cutoff score form the control group, the ones above generate the treatment group.

One of the crucial implications of that design is local randomization of the treatment, which also responds to our primary problem, endogeneity. It is explained with the help of the following simplified formulation of the RDD by Lee and Lemieux (2010).

$$
\begin{aligned}
Y &= T\tau + W\beta_1 + U \\
T &= 1[X \geq c] \\
X &= W\beta_2 + V
\end{aligned}
\tag{3.1}
$$

where Y is the outcome, T is the binary treatment indicator, takes the value 1 when the score or running variable X is above the cutoff point c and 0 otherwise. W represents the vector of all predetermined and observable factors that might impact Y and X.

According to Lee and Lemieux (2010), since X is known in this model, most of the assumptions are not required, unlike similar models. For instance, W can be determined endogenously as long as it is determined before V, β_1 and β_2 can be nonzero, and there can be correlations between W, U, and V. Even these may reflect the endogeneity in the model; they claim that these are irrelevant for the analysis as long as we can observe X and individuals have imprecise control over the running variable, X.

When the individuals have imprecise control over the X, it is expected that the density of X (and hence V) conditional on observable and unobservable variables(W and U) to be continuous. In other words, discontinuity occurs only for the outcome of interests with respect to X, while the densities of the other factors are continuous with respect to X in the neighborhood of the cutoff point. This also implies that the treatment status can be considered randomly selected near the cutoff point so that the treatment effect can be analyzed without concern about the other factors' effects. For that purpose, the treatment effect can be derived from the gap generated by the discontinuity at the cutoff, and it can be formalized as follows:

$$
\tau = \lim_{x \to c^+} E[Y|X = x] - \lim_{x \to c^-} E[Y|X = x] \tag{3.2}
$$

It is important to realize that the model 3.1 assumes that the probability of receiving treatment equals one after the threshold. However, this is not necessarily the case. For instance, in our case, we may assign the years as the score variable, X, and the year 1986 is the cutoff point due to the implication of the compulsory schooling law that year. Although, we know that even the compulsory schooling law increased the probability of having a middle school diploma, there is no certainty. There are still people who are born after the threshold but do not have a middle school diploma. Fuzzy Regression Discontinuity Design allows that heterogeneity in treatment. Rather than $T = 1[X \geq c]$, FRDD introduces

$$Pr(T = 1|X = x) = \begin{cases} g_1(x) & \text{if } x \geq c \\ g_2(x) & \text{if } x < c \end{cases} \tag{3.3}$$

where $g_1(c) \neq g_2(c)$

The discontinuity around the threshold persists because of the jump in the probability of receiving the treatment.

$$\lim_{x \to c^+} Pr(T = 1|X = x) \neq \lim_{x \to c^-} Pr(T = 1|X = x) \tag{3.4}$$

By taking advantage of this gap, the treatment effect can still be calculated. However, one cannot directly assign the difference between Y and X as the average treatment effect since the gap is lessened due to the lower probability of the treatment than the case where probability equals one. Instead of that, the discontinuity is used as an instrumental variable for treatment status. Hahn et al. (2001) firstly suggests that the treatment effect can be derived by using a simple two-stage least-squares (2SLS) strategy in the FRDD setting. Therefore, the average treatment effect can be formulated by the following equating.

$$\tau_F = \frac{\lim_{x \to c^+} E[Y|X = x] - \lim_{x \to c^-} E[Y|X = x]}{\lim_{x \to c^+} E[T|X = x] - \lim_{x \to c^-} E[T|X = x]} \tag{3.5}$$

It implies that the ratio of the differences calculated by the relationship between Y and X, and the relationship between T and X provides the average treatment effect, τ_F.

Notably, such characteristics of RDD (and FRDD) lead to its label as a design. It is considered as a "description of a particular data generating process rather than a method" (Lee and Lemieux, 2010). It introduces a setting while identifying the advantages gained by the exogenously determined discontinuity and requires a specific process to analyze the data (Lee and Lemieux, 2010). Hence, the primary interest should be ensuring the validity of the RDD or FRDD for the research by comparing its setting with the design's requirements. For instance, as mentioned before, three components should be demonstrable: a score, a cutoff, and a treatment. Then, the jump at the cutoff should be observable and sufficient. Further, the intervention at the cutoff should be exogenous, so individuals should not have precise control over that.

With these in mind, it can be stated that the implication of a rule enforced by an exogenous source creates a convenient setting for RDD and FRDD. Then, as mentioned before, it provides the three components by its nature, and more importantly, individuals do not have any control over enacting the law, so they had imprecise control over whether they receive or not the treatment as required by design. Consequently, compulsory schooling laws are used commonly in the literature as an instrument to measure the causal effect of education (i.e. Acemoglu and Angrist (2000); Oreopoulos (2006,0); Fort et al. (2011); Clark and Royer (2013); Brunello et al. (2016); Ozier (2015)). By the same token, Turkey's 1997 compulsory schooling law also provides a feasible instrument. Moreover, according to the evidence discussed in sections 2.5.1 and 3.1 the law's effectiveness was high, and the difference created by it was sufficiently large, which enhance the strength of the methodology.

Besides, while Figure 3.5 displays CSL's significant impact, it also demonstrates why to use FRDD instead of RDD. Given that the first subject for the 1997 CSL was the 1986 birth cohort, the middle school completion rates for the later birth cohorts seem to have raised, but not everyone received the diploma even after the law. In other words, even the 1997 CSL might increase the probability of receiving treatment, namely the likelihood of having a middle school diploma, receiving the treatment is not a certainty. This fuzziness created by this characteristic of the law necessitates approaching the empirical strategy as a fuzzy regression discontinuity design. Furthermore, a considerable number of studies provide examples of the use of FRDD for similar contexts, which investigate the causal education effect on various topics in Turkey, such as Cesur et al. (2014); Dursun and Cesur (2016); Dursun et al. (2017); Güneş (2015); Erten and Keskin (2016,0,0); Baltagi et al. (2019); Dinçer et al. (2014).

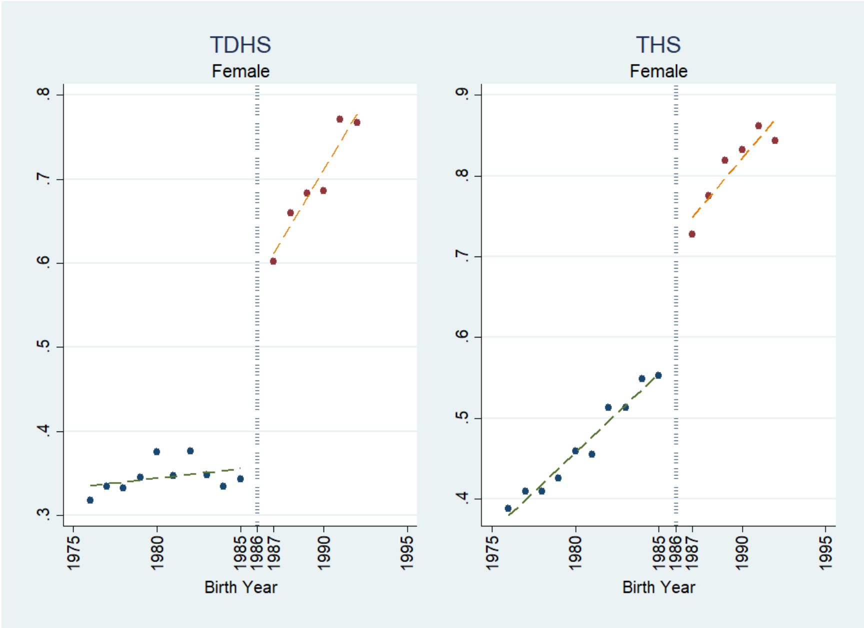

Figure 3.5: Middle School Completion Rate by Birth Year, Female

3.2.2 The Model

Before addressing the potential endogeneity problem and implementing the main empirical strategy, the relationship between education and expected outcomes is formed by the Equation 3.6 to follow the prior literature.

$$Y_{irs} = \alpha_0 + \alpha_1 Mid_{irs} + \alpha_1 T_i + \alpha_2 T_i R_i + \alpha_3 (1 - T_i) R_i + \alpha_2 X'_{irs} + \varepsilon_{irs} \tag{3.6}$$

where Y_{irs} is the outcome for individual i in region r observed in the survey year s. Mid_{irs} reflects schooling as a binary variable that takes the value of 1 if the individual has at least a middle school diploma and 0 otherwise. When we analyse the children's health outcomes, Mid_{irs} indicates parental education, mainly the mother education. R is the normalized birth years calculated as $R_i = BirthYear_i - 1986$ so that the discontinuity occurs at $R_i = 0$ and people exposed from the reform associated with positive R_i values and negative otherwise. T_i is a dummy variable that represents the individuals that are subjected to the reform, so

$T_i = 1$ if $R_i > 0$ and $T_i = 0$ if $R_i < 0$. Again, when we analyse the effect of mother education on children's outcomes, the variables related to the birth cohort and exposure of reform correspond to their mother's information. X'_{irs} is a matrix representing the other individual characteristics and the region, survey year fixed effects. It also includes interaction terms that allow birth year trends differ by region. Standard errors are clustered on the region by birth year as suggested by Lee and Card (2008) and implemented in Dursun et al. (2018). Additionally, survey weights provided in both surveys are used in estimations.

As previously discussed, the estimates obtained by the application of OLS to Equation 3.6 may be biased due to the endogeneity problems that can arise from reverse causality or the correlations with the unobserved factors. In response to this issue, we use the FRDD approach to estimate the education effect on the selected outcomes. According to the Imbens and Lemieux (2008), we know that the causal effect of having at least a middle school diploma on the outcomes derived by FRDD equals to τ_f given by the equation 3.7.

$$\tau_f = \frac{\lim_{x \to 0^+} E[Y|R = x] - \lim_{x \to 0^-} E[Y|R = x]}{\lim_{x \to 0^+} E[Mid|R = x] - \lim_{x \to 0^-} E[Mid|R = x]} \tag{3.7}$$

Additionally, it is suggested that the estimation obtained from an instrumental variable approach is equivalent to the estimation of τ_f. Hence, we estimate the following 2 stage model by using the exposure of the schooling law as an instrument.

$$Mid_{irs} = \theta_0 + \theta_1 T_i + \theta_2 T_i R_i + \theta_3(1 - T_i)R_i + \alpha_2 X'_{irs} + \eta_{irs} \tag{3.8}$$

$$Y_{irs} = \beta_0 + \beta_1 \widehat{Mid}_{irs} + \beta_2 T_i R_i + \beta_3(1 - T_i)R_i + \beta_2 X'_{irs} + \upsilon_{irs} \tag{3.9}$$

Equation 3.8 is the first stage that seizes the impact of schooling law on graduation from middle school, and θ_1 displays this impact. Then, the parameter of the interest in the second stage equation 3.9, β_1, captures the effect of middle school graduation determined by the CSL on the outcomes. To account for the trends in education and interested outcomes, linear trends for post-reform and pre-reform cohorts, $T_i R_i$ and $(1-T_i)R_i$, are also included in the equation as implemented in several papers (Fort et al., 2011; Dursun and Cesur, 2016; Ozier, 2015).

It should be emphasized that bandwidth selection plays a crucial part in RDD since both wide or narrow sample selection may have drawbacks. Notably, the similarity between the post-reform and pre-reform cohort forms one of the main assumptions of our identification strategy, since we expect that the cohorts dramatically differ only in their education levels, and the rest of the observable and unobservable characteristics are similar. Accordingly, selecting a wide interval before and after cutoff may fail to capture the treatment effect, and the risk of being affected by other observable or unobservable factors increases. Hence the assumption of being as good as a random experiment depends on being close enough to the threshold, but a too-narrow sample may result in highly imprecise estimates (Lee and Lemieux, 2010). As a result, a sufficiently small interval around the pivotal cohort is favored in the literature to assure this assumption (Fort et al., 2011; Dursun and Cesur, 2016; Baltagi et al., 2019; Güneş, 2015; Ozier, 2015). In the meantime, to assess certain optimality, different methods or algorithms are suggested, such as ad-hoc approaches, cross-validation methods, or fully data-driven IK and CCT algorithms based on the optimality of the mean square error. Furthermore, in the case of FRDD, optimal bandwidths for two separate regressions associated with outcome variables and the treatment variable are also in question.

Therefore, since we expect that the discontinuity of the treatment variable, middle school graduation, has a significant effect on outcomes, we select our bandwidth according to the first stage regression's optimality for the baseline results by using Imbens-Kalyanaraman (IK) algorithm offered by Imbens and Kalyanaraman (2012). We find 4.7 and 3.3 years optimal bandwidths for the treatment regressions (the first-stage regressions) in TDHS and THS samples, respectively. Thus, we employ 5 and 3 years static bandwidths to be consistent with the optimal bandwidth estimations for both survey samples, so our baseline results are for the individuals born between 1981-1991 and 1983-1989. Additionally, as strongly recommended in literature (Imbens and Kalyanaraman, 2012; Imbens and Lemieux, 2008; Xu, 2016; Angrist and Pischke, 2009), to check the sensitivity of our results for various ranges of bandwidths, we employ additional bandwidths of 2, 4, and 6 years to accompany the reported optimal bandwidth estimated for each outcome variables. Together with the IK algorithm, the method suggested by Calonico, Cattaneo, and Titiunik (CCT) (Calonico et al., 2014) also used to estimate the optimal bandwidths. All of the bandwidth estimations done by using the Stata command "rdbwselect" defined by Calonico et al. (2014). Notably, the pivotal cohort 1986 is dropped from the samples since we cannot identify whether individuals are subjected to the reform or not.

In the next chapter, we review the empirical results obtained from the FRDD approach discussed in detail so far. Besides, the OLS estimates are also provided in accordance with the literature.

CHAPTER 4

RESULTS

***/// The findings of the empirical study conducted to evaluate the maternal education effect are reported in the following sections. In line with the flow-chart represented (see 3.4), we begin with examining the human capital gains of the schooling reform and report the impact of the 1997 CSL on female education in the Section 4.1. These estimates also represent the firs-stage of our empirical strategy. Then, by following the order of steps shown in the chart, the estimates of the causal education effect on variables represent human development, healthcare utilization, and health outcomes are reported respectively in the later sections. As stated in the previous chapter, firstly, the simple OLS results are provided while keeping in mind that they are expected to be biased. Then, to address this issue the more credible IV results derived in accordance with the FRDD are reported within these sections (Section 4.2, 4.3, 4.4). After exhibiting the results, we endeavour to discuss them with the interpretational lenses that seek to capture the alterations let by education in various dimensions such as the level of knowledge, discernment, health investment for themselves and their children, and the structure of choice, trust, and continuity in healthy behaviors. Lastly, in Section 4.5 we will review the sensitivity analyses employed related to the bandwidth selection, gender of the parent, and income. ***///

4.1 Human Capital

Our initial concern is to prove the education impact of the 1997 CSL, on which we construct our empirical strategy. The exogenous effect captured from the reform forms the first stage results of the 2SLS methodology used. Table 4.1 demonstrates the results estimated by the equation 3.8 which regresses the dummy variable of having at least a middle school diploma on the dummy variables represents the exposure of the reform and the other depicted covariates. Columns (1) and (2) display the samples constituted from the birth cohort windows of 1981-1991 and 1983-1989, respectively, in accordance with the optimal bandwidths estimated by the IK algorithm. Panel A contains the TDHS ever-married women sample results. Panel B includes THS sample results for all women born in the given birth cohort range and separately for the women specified as mothers of the children included in the analyses.

Table 4.1 provides strong evidence that the 1997 schooling reform had a statistically significant positive impact on female middle school graduations, supported by the different survey and cohort samples. Panel A shows that exposure to the schooling reform increased middle school graduation by around 24-27 percentage points for women represented in the TDHS data. The effect of exposure of CSL is relatively small for the THS all-female sample, about 7-11 percentage points, but gets larger for its subsample consisting only the mothers where the impact is estimated about 13-15 percentage points (see Table 4.1, Panel B).

Table4.1: The effect of compulsory schooling law on middle school graduations (First-Stage)

	(1) **81-91**	(2) **83-89**
Panel A: DHS		
Education Reform	0.265***	0.242***
	(0.041)	(0.046)
Mean	0.445	0.447
Observation	3962	2428
Panel B: THS		
B.1: All Female Sample		
Education Reform	0.115***	0.072**
	(0.025)	(0.032)
Mean	0.644	0.65
Observation	9686	5655
B.2: Mother Sample		
Education Reform	0.150***	0.128**
	(0.043)	(0.051)
Mean	0.532	0.553
Observation	2875	1684

Notes: Standard errors in parentheses,
* p<0.1, ** p<.05, *** p<.01.

The highly statistically significant human capital gains reported in Table 4.1 validates the use of the CSL effect as an instrumental variable for education regardless of the sample we use. Significantly positive reform effect on women middle school graduations is similar with the previous literature (see Dursun et al. (2018); Baltagi et al. (2019); Güneş (2015), Dincer2014). Furthermore, in panel B, the higher impact captured for the women who have children relative to the all-women sample resembles the findings of Erten and Keskin (2018)'s paper that argues the women with children raised in rural areas faced comparatively higher policy effect. ***/// With this in mind, the higher policy impact captured for the TDHS sample can be explained by sample selection since it contains only the women ever married. These higher effects also serve our interest in maternal education by strengthening the instrument's power for the mother sample.***///

4.2 Human Development

Table 4.2 presents the OLS estimates of the effect of education on variables that, through them, we expect to capture the impact on human development. Results are derived by using the binary variable of middle school completion as a measure of educational attainment. The sample of women born between 1981-1991 is used for all of the simple OLS regression. According to the statistically significant results of Table 4.2, completing at least middle school increases the first marriage and birth ages about two years. Further, the likelihood of using a modern and more complex contraceptive method increases by four percentage points with women education, followed by the two percentage point decrease in the probability of not using any method and a three percentage point increase in the probability of ever using a contraceptive method.

Table4.2: The OLS Estimates of Women Education Effect on Human Development - The TDHS Data

Dependent Variable	OLS	Std Error	Observations
First marriage and birth age			
Age at first marriage	2.196***	(0.164)	3962
Age at first birth	2.044***	(0.174)	3291
Contraceptive use			
Use of modern contraceptive methods	0.040*	(0.020)	3962
Does not intend to use any method	-0.019*	(0.011)	3962
Ever used a contraceptive method	0.028**	(0.012)	3961

Notes: Standard errors in parentheses,
* p<0.1, ** p<.05, *** p<.01.

OLS results provided in 4.2 meet our expectation for human development gains since having a middle school degree seems to delay marriage and first pregnancy and improve contraceptive use. However, since the results claimed to be biased and unreliable, we move on to the IV results to seek causal effects.

Table 4.3 reports the instrumental variable estimates of the women education effect on marriage and birth decision, contraceptive usage. Initially, large F-statistic values confirm that first-stage regressions, so the instruments used, are powerful for all samples. The top panel of Table 4.3 does not provide statistically significant evidence for the education effect on the age of first marriage and birth; even coefficients suggest an adverse impact on the age of first marriage and a positive effect on first birth age. According to the second panel, middle school graduation decrease the likelihood of not considering to use any family planning method by 27 percentage point in the sample of women born between 1983 and 1989 (column 2), which is the only statistically significant education impact observed for contraceptive use.

The insignificance of the coefficients with mixed signs prevents us from making a clear statement for marital and maternal decisions presented in Table 4.3. Contrary to the adverse education effect on the first marriage age, both sample results (columns 1 and 2) support the human capital model's theoretical expectations of delay in pregnancy with positive coefficients, but none of them are reliable. Notably, insignificant results are not unusual in the literature. Erten and Keskin (2016) and 2012 also report insignificant education effects on timing for first marriage and birth. ***/// Moreover, Kırdar et al. (2018)'s work suggests that the impact of middle school completion lasts until the age of 17 and only delay teenage marriages. Likewise, it should be remembered that the sample only contains women aged between 17 and 35 who already decided to marry. Then, insignificant results might be explained by this short-lasting low-level education, and conducting analyses for more specific age groups might produce more insights. ***///

On the other hand, even we have limited evidence, contraceptive use in line with the literature. Our results also imply an improvement in the family planning method's usage and confirm the sign of the findings Erten and Keskin (2016), and Dinçer et al. (2014)'s works. However, our results are not conclusive in terms of statistical power. For instance, Erten and Keskin (2016) reports 7 percentage point statistically significant increase in the probability of using a contraceptive method ever using 72-month bandwidth. Additionally, Dinçer et al. (2014) suggest that women with 8 or more years of education are 80 percentage points more likely to use a modern family planning method than the average. ***/// Nevertheless, even we cannot identify a statistically significant improvement in the knowledge and use of more complex family planning methods, we can argue that bias against contraceptive use decreases with middle school education.***///

Table4.3: The IV Estimates of Women Education Effect on Marital and Maternal Decisions - The TDHS Data

	(1)	(2)
First marriage and birth age	**81-91**	**83-89**
Age at first marriage	-0.097	-0.770
	(0.859)	(1.390)
Mean	19.664	19.530
1st Stage F-stat	41.955	27.271
Obs	3962	2428
Age at first birth	0.219	0.687
	(0.921)	(1.322)
Mean	20.821	20.579
1st Stage F-stat	28.548	13.907
Obs	3291	1990
Contraceptive use		
Use of modern contraceptive methods	0.034	0.236
	(0.134)	(0.148)
Mean	0.390	0.393
1st Stage F-stat	41.955	27.271
Obs	3962	2428
Does not intend to use any method	0.013	-0.265***
	(0.089)	(0.099)
Mean	0.078	0.081
1st Stage F-stat	41.955	27.271
Obs	3962	2428
Ever used a contraceptive method	0.114	0.118
	(0.083)	(0.123)
Mean	0.865	0.865
1st Stage F-stat	42.78	28.352
Obs	3961	2427

Notes: Standard errors in parentheses,
* p<0.1, ** p<.05, *** p<.01.

4.3 Healthcare Utilization

Table 4.4 shows the OLS estimates of maternal education effect on health utilization in the TDHS sample for female and male babies separately. The top panel of the table indicates statistically significant education effects on antenatal care decisions during pregnancy. Middle school graduation incline to go for the first antenatal check earlier by approximately 0.66 months. Schooling also positively influences the number of these antenatal care visits by 2.7 additional times, and raise the probability of taking an iron supplement during pregnancy by 6 percentage points. The middle and bottom panel of the table shows the OLS results for the preferred institutions for antenatal care and delivery, respectively. Both of them indicate that middle school graduation of the women increases the probability of preferring a private institution by 15-20 percentage points and decreases the probability of choosing a public institution by approximately 11-14 percentage points. When we check for the subdivisions of these institutions, we saw a similar pattern with some exceptions. For instance, preferring university hospitals reflect 1-2 percentage points statistically significant positive effect for both antenatal care and delivery. Moreover, preferring a health institution instead of homes during delivery seems to 4 percentage points more likely if the mother has at least a middle school diploma.

Table 4.5 presents the simple OLS estimates of women education impact on health utilization for her children and herself in the THS data sample. Results suggest an increase in the likelihood of taking the child, aged between 0 and 6, to a health institution without a health problem around 20-22 percentage points if the mother graduates from middle school. The magnitude of this positive impact is lower for the children aged between 7 and 14 since it becomes 2 percentage points for female children and loses statistical significance, and 10 percentage points for male children. The male results are larger for both age categories. The second panel indicates a negative but statistically insignificant impact of education on knowing family physician and receiving a service from her family doctor. However, middle school graduation increases the probability of having a flu shot by 7 percentage points. Additionally, according to the sample formed by only 2014 and 2016 survey waves, secondary school education impact is almost zero and statistically insignificant for self-medication. Still, it is positive and statistically significant at one percent level for self-usage of supplements or vitamins by approximately 6 percentage points.

Table4.4: The OLS Estimates of Women Education Effect on Healthcare Utilization - The TDHS Data

	All			Female Children			Male Children		
Dependent Variable	OLS	Std Error	Observations	OLS	Std Error	Observations	OLS	Std Error	Observations
Antenatal care									
Timing of 1st antenatal check (months)	-0.660***	(0.071)	2531	-0.636***	(0.091)	1158	-0.690***	(0.096)	1373
Number of antenatal visits during pregnancy	2.725***	(0.333)	2706	2.935***	(0.446)	1245	2.635***	(0.397)	1461
During pregnancy, given or bought iron tablets/syrup	0.058***	(0.017)	2684	0.066**	(0.026)	1233	0.058***	(0.021)	1451
Preferred antenatal care institution									
Private institutions	0.191***	(0.024)	2534	0.200***	(0.037)	1159	0.188***	(0.029)	1375
Private hospital/clinic	0.152***	(0.026)	2534	0.145***	(0.039)	1159	0.165***	(0.031)	1375
Private doctor	0.079***	(0.019)	2534	0.093***	(0.029)	1159	0.069***	(0.025)	1375
Private polyclinic	-0.018	(0.011)	2534	-0.001	(0.013)	1159	-0.039**	(0.017)	1375
Public institutions	-0.142***	(0.026)	2534	-0.149***	(0.044)	1159	-0.141***	(0.034)	1375
Government hospital	-0.090***	(0.022)	2534	-0.074**	(0.030)	1159	-0.116***	(0.037)	1375
Maternity house	-0.033**	(0.016)	2534	-0.034	(0.028)	1159	-0.032	(0.023)	1375
MCHFP center	-0.001	(0.002)	2534	0.001	(0.003)	1159	-0.003	(0.002)	1375
Health center	-0.044	(0.027)	2534	-0.072*	(0.037)	1159	-0.016	(0.031)	1375
Health house	-0.010	(0.009)	2534	-0.015	(0.016)	1159	-0.006	(0.014)	1375
SSK hospital	-0.007	(0.007)	2534	-0.021*	(0.012)	1159	0.003	(0.008)	1375
Research hospital	0.008	(0.007)	2534	0.011	(0.010)	1159	0.009	(0.008)	1375
Family doctor	0.003	(0.005)	2534	0.003	(0.010)	1159	0.001	(0.004)	1375
University hospital	0.012*	(0.007)	2534	0.022	(0.013)	1159	0.005	(0.008)	1375
Place of delivery									
Delivery in a health facility	0.041***	(0.007)	3580	0.038***	(0.009)	1699	0.045***	(0.011)	1881
Delivery in a private institutions	0.151***	(0.023)	3580	0.132***	(0.031)	1699	0.169***	(0.029)	1881
Private hospital/clinic	0.154***	(0.023)	3580	0.138***	(0.031)	1699	0.169***	(0.029)	1881
Private doctor	-0.001	(0.002)	3580	-0.004	(0.004)	1699	0.000	(0.001)	1881
Private midwife	-0.001**	(0.001)	3580	-0.002*	(0.001)	1699	-0.001	(0.001)	1881
Delivery in a public institutions	-0.110***	(0.022)	3580	-0.094***	(0.031)	1699	-0.124***	(0.029)	1881
Government hospital	-0.090***	(0.022)	3580	-0.106***	(0.034)	1699	-0.078**	(0.030)	1881
Health center	-0.040***	(0.014)	3580	-0.041**	(0.019)	1699	-0.043**	(0.018)	1881
Maternity house	-0.004	(0.014)	3580	0.025	(0.022)	1699	-0.023	(0.016)	1881
University hospital	0.020***	(0.008)	3580	0.021**	(0.009)	1699	0.019	(0.011)	1881
Research hospital	0.001	(0.002)	3580	0.002	(0.005)	1699	0.001	(0.001)	1881

Notes: * p<0.1, ** p<.05, *** p<.01.

Table4.5: The OLS Estimates of Women Education Effect on Healthcare Utilization - The THS Data

Health utilization related to child health			
Dependent Variable	OLS	Std Error	Observations
Female Children			
Taking child to a health institution while s/he is healthy (Age 0-6)	0.207***	(0.029)	1414
Taking child to a health institution while s/he is healthy (Age 7-14)	0.022	(0.035)	744
Male Children			
Taking child to a health institution while s/he is healthy (Age 0-6)	0.228***	(0.028)	1452
Taking child to a health institution while s/he is healthy (Age 7-14)	0.102***	(0.039)	851
Health utilization related to self health			
Knowing family physician (only for the 2010 - 2012 survey waves)	-0.010	(0.022)	3248
Ever received service from (general practitioner) or family doctor	-0.004	(0.018)	2667
Ever had a flu shot	0.069***	(0.008)	9650
Use of non-prescribed medication, supplements or vitamins	0.015	(0.011)	9675
Use of non-prescribed medication (2014-2016 survey waves)	-0.009	(0.020)	3685
Use of non-prescribed supplements or vitamins (2014-2016 waves)	0.059***	(0.010)	3685

Notes: * p<0.1, ** p<.05, *** p<.01.

Again, OLS estimates which indicate positive women education impact for healthcare utilization is broadly in line with theoretical expectations. Results support that antenatal care decisions during pregnancy are improved with middle school graduation (Table 4.6). As expected, the preference for a health institution that ensures a safer delivery instead of homes increases with education. Results also suggest that private institutions gain popularity; correspondingly, public institutions are chosen less for both antenatal care and delivery when the mother has at least a middle school diploma. Moreover, preventative healthcare utilization of children also seems positively affected by mother education regardless of gender and age (Table 4.5). Lastly, even we do not observe a statistically significant impact on primary healthcare utilization, OLS results suggest statistically significant improvements in preventative healthcare usage for herself.

Table 4.6 presents the instrumental variable results of maternal education impact on antenatal care decisions. All IV estimates have the expected signs except the using iron supplement results, but the statistical significance levels differ for gender. The first antenatal care visit seems to occur earlier, around 1-2 months for both genders with education. Besides, the result for all gender and male children in the 1981-1991 birth-cohort sample is statistically significant at a five-percent level (columns 1 and 5). Similarly, the frequency of having antenatal controls increases by around 5 more visits when the mother born between 1981 and 1991 has at least a middle school diploma in all children sample (column 1) at a one percent significance level. The female child sample suggests an even higher effect as 7 to 11 visits more in the female sample at a less reliable significance level (see columns 3 and 4). Lastly, the adverse effect of education on the probability of using an iron supplement during pregnancy is observed by 4 percentage point decrease in the 1983-1989 birth cohort all gender sample (column 3). It should be noted that most of the statistically significant results came from the 1981-1991 birth cohort sample formed according to the optimal bandwidth we estimate for the TDHS data.

Table4.6: The IV Estimates of Women Education Effect on Antenatal Care - The TDHS Data

	All		Female Child		Male Child	
	(1)	(2)	(3)	(4)	(5)	(6)
Antenatal care	**81-91**	**83-89**	**81-91**	**83-89**	**81-91**	**83-89**
Timing of 1st antenatal check (months)	-1.124**	-0.753	-1.069	-2.225	-1.376**	-0.203
	(0.546)	(0.871)	(1.072)	(1.858)	(0.629)	(0.928)
Mean	1.948	1.980	1.921	1.950	1.970	2.006
1st Stage F-stat	28.879	8.829	7.857	3.193	15.082	3.071
Obs	2531	1611	1158	754	1373	857
Number of antenatal visits during pregnancy	5.813***	5.454	7.393*	10.980*	4.874**	1.848
	(2.215)	(3.650)	(3.927)	(6.280)	(2.410)	(4.450)
Mean	8.346	8.282	8.435	8.504	8.270	8.090
1st Stage F-stat	35.109	10.696	8.999	3.382	16.636	3.432
Obs	2706	1716	1245	795	1461	921
During pregnancy, given or bought iron tablets/syrup	-0.133	-0.479*	-0.314	-1.007	0.007	-0.183
	(0.139)	(0.282)	(0.299)	(0.770)	(0.160)	(0.320)
Mean	0.817	0.811	0.808	0.813	0.825	0.809
1st Stage F-stat	32.572	10.339	6.917	2.498	17.875	3.719
Obs	2684	1705	1233	791	1451	914

Notes: * p<0.1, ** p<.05, *** p<.01.

IV estimates shown in Table 4.6, provide evidence for the improvements in antenatal care use created by maternal education in line with the literature for other countries (see Todd Jewell (2009), Navaneetham and Dharmalingam (2002)). ***/// In particular, our results support the idea that middle school education raises the awareness of the importance of early antenatal care check and ensure the continuity of these controls. ***/// Additionally, the explicitly higher and more statistically significant antenatal care demand for female babies may reflect favoring female babies or, more likely, a decrease in the neglect of female babies when the mother receives at least a middle school diploma. ***/// However, relatively low first-stage F statistics make it difficult to rely on these results. ***/// It is hard to depict a similar conclusion for the male babies' better result in the first antenatal care timing since mothers cannot know the gender and act accordingly, at least before the first check. Moreover, coefficients imply almost the same impact for both genders even the female sample results are statistically insignificant.

As the most relevant paper for our work, Güneş (2015) finds a 1.6-month decrease for the first antenatal care visit time, which is a higher value than we find but at a lower statistically significant level. However, unlike our results, she finds insignificant results for antenatal care demand. The differences might be explained by the larger sample we used, which contains women aged between 17-27 and 22-32 by pooled 2008 and 2013 TDHS surveys, while Güneş (2015) uses only the 2008 TDHS survey for women aged between 18-29. Notably, women aged between 22-32 are more likely to give birth until the survey year, which also supports the relevance of our sample. Including a more recent survey might even create a difference with the general trends or the allowance of healthcare services at that time. For instance, while Güneş (2015) reports that women attend the first antenatal care visit when they are averagely 3.2-month pregnant, in our sample the observed average value is approximately 2 months, which is already earlier and has less room for improvement. This difference may also explain the lower coefficient in our study.

Lastly, we detect adverse maternal education effects in using iron supplements during pregnancy, which should be treated with caution. As a nutritional supplement that is significantly important for the mother's and child's health, we may expect that education raises awareness of its importance and benefits and increases its usage. On the other hand, iron overload is also associated with health problems, so it should be taken according to the need (Demuth et al., 2018). Due to the lack of information provided in the data, we cannot control the mother's anemia level. They might not need iron supplements at all, and adverse results might reflect the decreased anemia level with education instead of lack of awareness. Therefore, further investigation is required to interpret the finding correctly.

The statistically insignificant coefficients exhibited in Table 4.7 suggest that private institutions' preference adversely affected by maternal education while preferring a public institution is getting more likely with middle school graduation of the mother in the whole sample.

Likewise, when we check the subdivisions of the institutions which are ordered by usage rate, we have only a few statistically supported results. For instance, according to the statistically significant results, preferring health houses and university hospitals are positively affected by around 20 percent point by maternal education. However, as a public institution, the likelihood of choosing research hospitals seems to decrease with maternal education around 9 percentage points. Notably, most of the statistically significant results are observed from the all-gender sample, columns 1, and 2.

Table4.7: The IV Estimates of Women Education Effect on Preferred Institution for Antenatal Care - The TDHS Data

	All		Female Child		Male Child	
	(1)	(2)	(3)	(4)	(5)	(6)
Preferred antenatal care institution	**81-91**	**83-89**	**81-91**	**83-89**	**81-91**	**83-89**
Private institutions	-0.004	-0.197	0.335	0.415	-0.119	-0.325
	(0.145)	(0.165)	(0.302)	(0.547)	(0.188)	(0.362)
Private hospital/clinic	0.049	-0.120	0.166	0.399	0.060	-0.197
	(0.165)	(0.239)	(0.298)	(0.560)	(0.197)	(0.344)
Private doctor	-0.012	-0.225	0.172	-0.014	-0.139	-0.382
	(0.110)	(0.186)	(0.251)	(0.375)	(0.130)	(0.332)
Private polyclinic	0.043	0.253	0.265	0.304	-0.076	0.185
	(0.131)	(0.280)	(0.288)	(0.460)	(0.077)	(0.195)
Public institutions	0.071	0.282	-0.118	-0.066	0.148	0.377
	(0.177)	(0.268)	(0.378)	(0.602)	(0.155)	(0.286)
Government hospital	0.155	0.133	0.275	-0.266	0.100	0.108
	(0.164)	(0.248)	(0.322)	(0.577)	(0.184)	(0.381)
Maternity house	0.027	0.122	0.096	0.643	0.019	-0.092
	(0.130)	(0.200)	(0.284)	(0.559)	(0.114)	(0.282)
Health center	0.094	0.222	0.037	0.213	0.103	0.299
	(0.150)	(0.238)	(0.332)	(0.559)	(0.132)	(0.224)
Health house	0.215**	0.372*	0.496	0.891	0.081	0.104
	(0.108)	(0.217)	(0.345)	(0.709)	(0.067)	(0.125)
SSK hospital	0.043	0.024	0.091	-0.074	0.029	0.063
	(0.044)	(0.059)	(0.132)	(0.151)	(0.038)	(0.085)
University hospital	0.043	0.171*	0.138	0.465	-0.019	-0.004
	(0.049)	(0.099)	(0.132)	(0.301)	(0.048)	(0.105)
Research hospital	-0.089*	-0.024	-0.248*	-0.202	-0.015	0.078
	(0.047)	(0.046)	(0.148)	(0.151)	(0.058)	(0.073)
Family doctor	0.028	0.017	0.138	0.007	-0.033*	-0.013
	(0.034)	(0.049)	(0.106)	(0.125)	(0.018)	(0.027)
MCHFP center	-0.016	-0.007	-0.071*	-0.131	0.012	0.064
	(0.019)	(0.024)	(0.041)	(0.095)	(0.024)	(0.044)
1st Stage F-stat	29.016	8.829	7.853	3.193	15.245	3.071
Obs	2534	1611	1159	754	1375	857

Notes: Standard errors in parentheses,
* p<0.1, ** p<.05, *** p<.01.

Table 4.8 presents the estimates for the maternal education effect on the preferences for the place of delivery. In a general sense, results are in line with the antenatal care preference over institutions and provide more statistical support. Again we observe an adverse education impact on the probability of preferring a private institution for delivery and a positive educational impact on choosing a public institution. This claim is directly statistically supported with a 40 percentage point positive effect on preferring a public institution in 1981-1991 birth cohort sample of female children (column 3) with a sufficient first-stage F statistic. More evidence found within the subdivisions. For instance, statistically significant results in the second panel indicate that middle school completion decreases the probability of preferring a private hospital for delivery by 10-22 percentage point (column 3, and 4) for female babies and preferring a private doctor and midwife by 5-2 percentage point (column 1) in the whole sample. These results also support the claim of reduced popularity of private institutions with maternal education. Contrary to our general observation, maternal education seems to decrease the likelihood of preferring maternity houses, a public institution, for almost all samples, where statistically significant evidence is observed for 35 percent level decrease in the whole gender sample (column 2) and 64 percentage point decrease in female children sample (column 4). On the other hand, the probability of preferring a health center for delivery seems positively affected by middle school graduation about 46 and 85 percentage points for 1981-1991 and 1983-1989 birth cohort samples, respectively, for female children (columns 3 and 4). Lastly, the coefficients reflect the impact of middle school completion on giving birth in a health institution instead of homes suggest mixed and statistically insignificant results.

IV estimations of preference over institutions for antenatal care and delivery are in contrast to the OLS results. ***/// According to the Table 4.7 and 4.8, we can just claim a tendency of preferring public institutions over private institutions by increase in maternal education with few statistical justifications. The reverse results in OLS might reflect the education effect induced by other possible covariates. For example, higher education might result in better income which can increase private institution usage. On the other hand, IV results are expected to be free from such biases and imply that middle school education causally alters women's health investment-related choices by allowing a greater level of discernment. However, we cannot prove whether the probable shift in preference over institutions results from a rational comparison where the performance of institutions is also evaluated by individuals. For instance, the result might give insight about the better performance of university hospitals and health houses than the research hospitals, so the more educated mothers may recognize and prefer accordingly. Similarly, the performance of private institutions might be also in question or education might simply increase distrust in private institutions or trust in public institutions. Hence further research with controlling for the performances of institutions such as patient load and capacity of hospitals, service quality, mortality rates during childbirth within a regional perspective can uncover the mechanism affected by education more precisely. However, we definitely expect an increase in preferring health institutions instead of giving birth in a home with maternal education since it is directly linked to the mother's and baby's health by ensuring a safer delivery, but IV estimates are statistically insignificant. ***/// However, it should be emphasized that almost 93 percent of the women in our sample preferred giving birth in a health facility, which is already a large proportion. Therefore, we may conclude that awareness of the importance of giving birth in a health facility with professionals is already high regardless of education level. Similarly, Güneş (2015) also reports statistically insignificant OLS and IV estimates for delivery in a health facility and also for delivery by health professionals using the 2008 TDHS survey sample.

Table4.8: The IV Estimates of Women Education Effect on Preferred Institution for Delivery - The TDHS Data

	All		Female Child		Male Child	
	(1)	(2)	(3)	(4)	(5)	(6)
Place of delivery	**81-91**	**83-89**	**81-91**	**83-89**	**81-91**	**83-89**
Delivery in a health facility	0.052	-0.139	0.051	-0.197	0.043	-0.178
	(0.064)	(0.104)	(0.085)	(0.153)	(0.068)	(0.149)
Delivery in a private institutions	-0.227	-0.218	-0.354	-0.413	-0.125	-0.029
	(0.170)	(0.293)	(0.244)	(0.422)	(0.191)	(0.342)
Private hospital/clinic	-0.163	-0.130	-0.104*	-0.222*	-0.020	-0.013
	(0.156)	(0.250)	(0.059)	(0.118)	(0.016)	(0.022)
Private doctor	-0.047*	-0.087	-0.008	0.030	-0.024**	-0.023
	(0.027)	(0.057)	(0.016)	(0.030)	(0.012)	(0.022)
Private midwife	-0.017*	-0.001	-0.051	0.197	-0.043	0.178
	(0.009)	(0.017)	(0.085)	(0.153)	(0.068)	(0.149)
Delivery in a public institutions	0.279	0.078	0.404*	0.216	0.169	-0.149
	(0.180)	(0.346)	(0.244)	(0.458)	(0.201)	(0.394)
Government hospital	0.102	-0.089	0.125	-0.190	0.049	-0.108
	(0.244)	(0.440)	(0.313)	(0.602)	(0.096)	(0.202)
Health center	0.198	0.356	0.461*	0.849*	0.012	-0.004
	(0.151)	(0.251)	(0.241)	(0.443)	(0.009)	(0.004)
Maternity house	-0.079	-0.351**	-0.245	-0.636*	-0.006	0.017
	(0.098)	(0.172)	(0.156)	(0.335)	(0.123)	(0.273)
University hospital	0.059	0.140	-0.001	0.057	-0.010	-0.012
	(0.043)	(0.087)	(0.033)	(0.075)	(0.010)	(0.019)
Research hospital	-0.002	0.026	-0.242	-0.221	-0.082	0.007
	(0.015)	(0.031)	(0.200)	(0.328)	(0.190)	(0.337)
1st Stage F-stat	33.846	11.619	16.352	5.022	21.291	5.562
Obs	3580	2293	1699	1092	1881	1201

Notes: Standard errors in parentheses,
* p<0.1, ** p<.05, *** p<.01.

The instrumental variable estimates given in Table 4.9 indicates that middle school graduation of the mother increases the likelihood of taking her children to a health facility without a necessity since the coefficient has a positive sign in almost all samples for children aged between 0 and 6. However, only the education impact in the whole children sample for mothers born between 1983-1989 birth cohort (column 2) is statistically significant. It suggests that mothers with middle school diplomas are 130 percent more likely to take their children to a health facility while s/he is healthy but the first stage F statistics are low and fail to support findings. Notably, this sample of 1983-1989 birth cohorts reflects the estimated optimal bandwidth from the THS data. When we pool the female and male samples, we observe a higher impact around 94-130 percentage points (columns 8 and 9). However, the statistical significance of the maternal education impact disappears for the children aged between 7 and

14, and the signs of the coefficients get ambiguous. Additionally, the first stage F-statistic values also indicate that the results are not reliable for the children aged between 7-14.

Table 4.10 displays mixed IV results for the analyses of woman education effect on healthcare utilization. The table indicates that secondary level education decreases the probability of knowing her family physician by approximately 70-80 percentage points in both birth-cohort samples with a high statistical significance at one percent level for columns 1 and 2. Notably, first-stage F statistic values for these results are also remarkably high. The coefficients assigned for the education impact on using family health services, having a flu shot, and the self-medication behavior have negative signs across the birth-cohort samples, whereas the usage of the non-prescribed supplement or vitamins exhibits inconsistent behavior but all of them statistically insignificant.

Table4.9: The IV Estimates of Women Education Effect on Healthcare Utilization for Children - The THS Data

	All		Female Child		Male Child	
	(1)	(2)	(3)	(4)	(5)	(6)
	81-91	**83-89**	**81-91**	**83-89**	**81-91**	**83-89**
Taking child to a health institution while	0.119	1.313*	0.155	0.740	-0.064	2.199
s/he is healthy (Age 0-6)	(0.340)	(0.789)	(0.336)	(0.477)	(0.768)	(3.336)
Mean	0.397	0.417	0.383	0.400	0.411	0.433
1st Stage F-stat	9.381	3.257	11.310	5.815	2.037	0.440
Obs	2866	1825	1414	881	1452	944
Taking child to a health institution while	-1.628	-2.103	-2.991	0.174	-0.009	-0.051
s/he is healthy (Age 7-14)	(4.054)	(20.259)	(9.549)	(0.856)	(1.291)	(3.238)
Mean	0.216	0.239	0.200	0.225	0.229	0.251
1st Stage F-stat	0.202	0.014	0.107	0.756	0.753	0.134
Obs	1595	760	744	346	851	414

Notes: Standard errors in parentheses,
* p<0.1, ** p<.05, *** p<.01.

As suggested in the literature, IV estimates for the well-child visits provide evidence for an improvement created by the mother's middle school graduation (Table 4.9). In line with previous works (Prickett and Augustine, 2016), maternal education seems to influence advantageous health care utilization behavior for the child only at the early development phase, aged between 0-6, which is the most sensitive and vulnerable period for the child. The statistically significant positive effect disappears in the later ages of children. Hence, we can conclude that education may increase mothers' awareness about the importance of early childhood health checks in response to possible complications and better health outcomes.

Table4.10: The IV Estimates of Women Education Effect on Healthcare Utilization for Self Health - The THS Data

	(1)	(2)
	81-91	**83-89**
Knowing family physician (only for the 2010 - 2012 survey waves)	-0.718***	-0.796***
	(0.179)	(0.193)
Mean	0.823	0.826
1st Stage F-stat	47.242	53.934
Obs	3248	1906
Ever received service from general practitioner or family doctor	-0.086	-0.104
	(0.124)	(0.115)
Mean	0.868	0.877
1st Stage F-stat	52.074	43.482
Obs	2667	1573
Ever had a flu shot	-0.151	-0.239
	(0.150)	(0.371)
Mean	0.113	0.115
1st Stage F-stat	21.020	5.034
Obs	9650	5634
Use of non-prescribed medication, supplements or vitamins	-0.144	0.027
	(0.141)	(0.285)
Mean	0.223	0.225
1st Stage F-stat	21.378	4.989
Obs	9675	5651
Use of non-prescribed medication (2014-2016 survey waves)	-0.038	-3.868
	(0.764)	(13.660)
Mean	0.324	0.323
1st Stage F-stat	1.059	0.086
Obs	3685	2197
Use of non-prescribed supplements or vitamins (2014-2016 waves)	-1.055	5.960
	(1.049)	(21.182)
Mean	0.089	0.092
1st Stage F-stat	1.059	0.086
Obs	3685	2197

Notes: Standard errors in parentheses,
* p<0.1, ** p<.05, *** p<.01.

When we move to the healthcare utilization for self-health, firstly note that the insignificant results observed for "ever receiving a service from a general practitioner" reflect the sample that contains all survey rounds (see Table 4.10). Hence, it includes the time period where the family medicine system fully settled [1]. Hence ever receiving the service might be too rough to see an effect of education on primary care usage. However, the adverse impact of education on knowing family physicians estimated for the relatively earlier period of the system (2010

[1] Family medicine system was firstly introduced in 2005 and reached full coverage in 2010 in Turkey

and 2012), might reflect the women's response rate and direction adjusted by middle school education. Then, it can be claimed this lack of interest in family medicine might confirm some of the previous findings for different countries that predict a decrease in primary care usage with education (e.g., Schellhorn et al. (2000)) and contradicts with some others (e.g., Dunlop et al. (2000)). ***/// It might be also argued that middle school education increase scepticism about newly introduced policies and family medicine program failed to get the trust of at least middle-school educated women.

The insignificant results found for the probability of ever having a flu shot as preventative health behavior are consistent with Cesur et al. (2014), in which a similar IV methodology used with 2008, 2010, and 2012 THS surveys. Even they find positive coefficients contrary to us; both analyses indicate that flu shot is affected insignificantly by women's education. Abandoning the use of medication without a doctor's prescription is expected with more schooling as rational behavior; however, results do not provide statistical proof for that observation. Moreover, the ambiguous signs and lack of statistical power in self-use of supplements or vitamins might reflect our inability to control the need. Since, if their use only reflects the basic importance given to sustain health, we expect a higher demand with the improved knowledge and awareness gained by education. However, similar to the iron supplement case, maybe they need fewer supplements at the same time, so it should be controlled for the possible decrease in malnutrition due to education.

4.4 Health Outcomes

The OLS estimates for the women education effect on health outcomes are represented by the Table 4.11 and Table 4.12 for the woman's children's health outcomes and her own health outcomes , respectively. The OLS estimates presented in Table 4.11 indicate a statistically significant positive effect of maternal education on birth weight only in the male sample about 108 grams. Still, the likelihood of being born with a low birth weight seems to be reduced for both gender samples when the mother has at least a middle school diploma. Positive but statistically insignificant coefficients associated with the BMI and weight/height standard deviations. Yet, height/age and weight/age standard deviations seem to improve by approximately 42 points and 30 points, respectively, for both female and male children with more maternal schooling.

According to Table 4.12, having at least a middle school diploma leads to a statistically significant reduction in body mass index in both the TDHS and THS data samples. In the TDHS sample, the OLS estimate predicts a 160 point decrease in BMI due to middle school education, where the dependent variable's mean is 2587 points. Similarly, the OLS estimate derived from the THS data set predicts a 1.3 point decrease in BMI where its mean is 23.6 points. Whereas both of the samples suggest an increase in the likelihood of being underweight around 1-2 percentage points, the probability of being overweight seems to reduce by 13 percentage points with middle school education. Further, OLS estimates imply that having a secondary school education increases the likelihood of defining health as good or excellent by 11 percentage points. Education also leads to a 1.4 point improvement in the redefined health status that considers having an illness and physical constraint together with the self-defined health status.

Table4.11: The OLS Estimates of Maternal Education Effect on Child Health - The TDHS Data

	Female Children			Male Children		
Dependent Variable	OLS	Std Error	Obs	OLS	Std Error	Obs
Birth weight	39.053	(49.797)	1472	108.383**	(42.431)	1664
Low birth weight (birth weight<2500 grams)	-0.056**	(0.025)	1472	-0.067***	(0.022)	1664
Log birth weight	0.021	(0.018)	1472	0.041**	(0.017)	1664
BMI standard deviation for child	7.232	(7.604)	1228	1.721	(9.045)	1379
Height/Age standard deviation	41.643***	(13.501)	1228	41.296***	(10.375)	1379
Weight/Age standard deviation	30.357***	(9.153)	1228	27.660***	(8.869)	1379
Weight/Height standard deviation	8.507	(7.507)	1228	6.409	(8.877)	1379

* p<0.1, ** p<.05, *** p<.01.

The impact of women education estimated by OLS matches with theoretical expectations. Table 4.11 shows signs for better health outcomes for children as a result of middle school graduation of their mother. The advancing impact of maternal education is observed for babies' birth weight reflecting enhanced attention and care during the pregnancy and children's anthropometric measures regardless of gender. Likewise, the self health-related health outcomes represented in Table 4.12 indicate middle school graduation positively influences protective health behavior. For instance, women with middle school diplomas are closer to having a healthy BMI where the corresponding range is 18.5 - 24.5 (or 1850 - 2450 in the TDHS data). Although, OLS results may imply a further decrease in the women's weight since the probability of being underweight gets slightly higher with middle school education. Besides, middle school education also seems to improve the health status of women significantly.

Table4.12: The OLS Estimates of Women Education Effect on Self Health

Panel A: The DHS Data	OLS	Std Error	Observations
Body mass index (BMI)	-160.863***	-25.225	3551
Underweight (BMI < 1850)	0.013*	-0.007	3551
Overweight (BMI $\geq$ 2500)	-0.129***	-0.026	3551
Panel B: The THS Data			
Body mass index (BMI)	-1.317***	-0.132	9068
Underweight (BMI < 18.5)	0.024***	-0.007	9068
Overweight (BMI $\geq$ 25)	-0.128***	-0.012	9068
Good health (Self Defined)	0.109***	-0.009	9685
Redefined health status (Self Defined)	1.426***	-0.163	9663

* p<0.1, ** p<.05, *** p<.01.

Table 4.13 refers to the instrumental variables estimates for the maternal education effect on the female and male children's health outcomes. The top panel shows the birth weight-related outcome results. It indicates a statistically significant positive maternal education effect on female babies' birth weight by around 1077 for only the 1983-1989 mother birth-cohort sample with low level of first stage F-statistics. The results for the natural logarithm of the birth weight also supports the results in the female sample. Moreover, the probability of having a female baby born with low birth weight, lower than 2500 grams, decreases by 54 percentage points, and the impact is lower for the pooled sample, about 26 percentage points (column 2) but with a sufficiently high first stage F-statistic. These advances in the birth weights came from maternal education weakens for the male children sample.

The second panel in Table 4.13 provides little statistical proof for the impact of maternal education on the children's anthropometric measurements. Both female and male children samples provide statistically insignificant results except the suggested 135 point increase in male children's height/age standard deviation with more maternal schooling. Pooling the female and male samples increases the significance level of the positive educational impact for BMI and weight/height standard deviation (see column 2) and suggests 80 points and

90 point improvement, respectively, for the 1983-1989 sample. ***/// Then, these results indicate that some of the anthropometric measures of children get much higher compared to the calculated standard means by World Health Organization if their mothers have at least a middle school diploma. ***/// Further, the sufficiently high first-stage F statistic values also support the reliability of the findings.

Table4.13: The IV Estimates of Maternal Education Effect on Child Health - The TDHS Data

	All		Female Child		Male Child	
	(1) **81-91**	(2) **83-89**	(3) **81-91**	(4) **83-89**	(5) **81-91**	(6) **83-89**
Birth weight	197.935	384.480	402.251	1076.976**	-0.903	-416.632
	(176.741)	(257.382)	(273.817)	(442.550)	(231.383)	(469.412)
Mean	3169.236	3174.325	3116.537	3110.066	3215.855	3232.461
Low birth weight	-0.083	-0.256*	-0.125	-0.542*	-0.062	0.011
(birth weight<2500 grams)	(0.097)	(0.140)	(0.172)	(0.297)	(0.099)	(0.191)
Mean	0.160	0.159	0.181	0.179	0.142	0.142
Log birth weight	0.078	0.097	0.140	0.349*	0.010	-0.203
	(0.067)	(0.100)	(0.115)	(0.190)	(0.078)	(0.174)
Mean	8.033	8.035	8.017	8.013	8.048	8.054
1st Stage F-stat	42.174	13.201	21.553	6.529	21.451	4.68
Obs	3136	2019	1472	959	1664	1060
BMI std for child	-16.073	80.521*	36.676	104.129	-65.137	48.359
	(35.352)	(45.564)	(62.005)	(123.232)	(49.856)	(79.808)
Mean	62.300	59.309	56.390	55.307	67.563	62.902
Height/Age std	84.168	-21.821	18.207	-113.622	134.925*	52.026
	(67.970)	(99.029)	(81.170)	(147.883)	(71.172)	(104.413)
Mean	-50.993	-50.124	-50.217	-48.482	-51.685	-51.599
Weight/Age std	46.004	50.140	41.513	9.926	43.222	70.440
	(38.815)	(49.426)	(63.610)	(124.982)	(49.115)	(69.090)
Mean	10.741	9.231	7.466	7.815	13.657	10.503
Weight/Height std	-5.271	89.808**	30.267	114.649	-43.587	59.016
	(34.190)	(45.324)	(63.885)	(137.681)	(47.962)	(76.407)
Mean	56.110	53.118	51.357	50.265	60.342	55.680
1st Stage F-stat	25.431	13.522	11.280	3.194	12.383	4.475
Obs	2607	1689	1228	799	1379	890

Notes: Standard errors in parentheses,
* p<0.1, ** p<.05, *** p<.01.

Results of IV estimates for child health are mostly consistent with the literature and our expectations. ***/// Statistically significant results indicate improvements in child health when the mother has at least a middle school diploma so with the previous findings also in mind, education seems to improve health investment levels and choice structure related to their children which results in better health outcomes. ***/// When we compare our results with literature, even Güneş (2015) does not use a continuous birth weight like us, she reports middle school education decreases the probability of having a baby born lower than 1500 grams by 17 percentage points. She also states statistically significant improvements in children's anthropometric measures, height for age z-scores, and weight for age z score, with the mother's middle school education. However, we observe statistically significant results for equivalent variables for only the male sample. Additionally, we also report an increase in weight/height standard deviation for all gender samples. In consistence with our findings, Dursun et al. (2017) also observe the statistically significant positive influence of mother's middle school graduation on the natural logarithm of birth weight and adverse maternal education impact on probabilities of born with low birth weight and high birth weight with using a similar methodology but a different dataset, Ministry of Health Birth Outcomes Data (MHBOD).

Table 4.14 shows the IV estimates of the schooling impact on the own health outcomes in the TDHS and THS data samples. In the table, the first panel fails to provide statistical proof for the middle school impact on women's body mass index for the TDHS sample (columns 1 and 2). However, even BMI results are statistically insignificant, according to the THS sample, women are less likely to be underweight or overweight if they have a middle school diploma (columns 3 and 4). While middle school education seems to reduce the probability of being underweight by 26-50 percentage points, the effect is higher on being overweight, so it is 40-90 percentage points less likely than the mean of 0.3. The last panel suggests that middle school completions have a positive effect on health status. However, the coefficients are statistically insignificant for both the probability of defining her health status as good or excellent and the value of redefined health.

Table4.14: The IV Estimates of Women Education Effect on Self Health

	The TDHS Data		**The THS Data**	
	(1)	(2)	(3)	(4)
	81-91	**83-89**	**81-91**	**83-89**
Body mass index (BMI)	12.572	155.195	-0.511	-0.568
	(154.317)	(242.297)	(1.658)	(3.361)
Mean	2586.551	2561.329	23.564	23.555
Underweight (BMI < 18.5)	-0.007	0.011	-0.255**	-0.493*
	(0.044)	(0.057)	(0.124)	(0.296)
Mean	0.029	0.031	0.082	0.077
Overweight (BMI $\geq$ 2500)	-0.052	-0.021	-0.412**	-0.905*
	(0.182)	(0.271)	(0.207)	(0.517)
Mean	0.512	0.489	0.308	0.302
1st Stage F-stat	39.689	27.054	19.206	4.135
Obs	3551	2185	9068	5313
Good health			0.009	0.270
			(0.140)	(0.291)
Mean			0.797	0.799
1st Stage F-stat			21.098	4.876
Obs			9685	5654
Redefined health status			1.981	10.756
			(2.897)	(6.667)
Mean			24.920	25.032
1st Stage F-stat			21.415	5.135
Obs			9663	5647

Notes: Standard errors in parentheses,
* p<0.1, ** p<.05, *** p<.01.

The coefficients associated with BMI exhibit different results for TDHS and THS samples. While TDHS suggests a positive relationship, THS provides evidence for adverse education impact on body mass index, but results are unreliable due to a lack of statistical proof. Still, our results are partly consistent with Cesur et al. (2014), and Baltagi et al. (2019). Both of the papers report statistically insignificant education effects for women's BMI. Like our analyses, Baltagi et al. (2019) uses both TDHS surveys (2008 and 2013 survey) and THS surveys (2008, 2010, and 2012 rounds) and report a statistically insignificant positive impact on BMI with middle school graduations. Moreover, when the analyses are redone without using 2014 and 2016 rounds of THS survey data, we observe positive but again statistically insignificant coefficients like in Cesur et al. (2014)'s findings. Hence, this may indicate that the direction of the education impact on BMI changes during the time since it is known that literature on BMI exhibits mixed results that may depend on countries' development level. Besides, Cesur et al. (2014) 23 percentage point reduction in the probability of being underweight with increasing women education for the 1983-1989 birth cohort, which is a lower but consistent result compared to our findings, while they find statistically insignificant adverse education impact on probability on being overweight. Hence the strengthened protective behavior for body mass index might reflect the available information or trends in later survey years that middle school graduates respond more than the less educated women. The positive coefficient for TDHS data collected in 2008 and 2013 may also support that suggestion, and significance might be lost due to such discrepancies.

Again the results found for stating a good health status in complete agreement with Cesur et al. (2014)'s findings. They also report statistically insignificant positive education impact on female health statements. Similarly, we cannot document solid evidence for better health status with middle school education when using a redefined health status indicator. This indicator fractionates self-defined health status into multiple groups according to having a long-lasting illness and physical limitations due to a health problem and presents less subjective information for health status.

4.5 Robustness

This section will explore the sensitivity of our results according to bandwidth selection and parental education. Firstly we will extend our study with three additional birth-cohort intervals. Then, we will test our analysis with father education to see whether or not the impacts on children's health are unique for maternal education.

4.5.1 Bandwidth Selection

Table A.1 exhibits IV estimates for the marital and pregnancy decisions calculated using symmetric 6, 5, 4, 3, and 2 years birth cohort intervals before and after the cutoff point, 1986. The last two columns report the suggested bandwidth for each outcome variable by using IK and CCT algorithms. Results for timing in marriage and first pregnancy are still insignificant for all samples, even for the samples supported by the optimal bandwidths assigned for the outcomes. On the other hand, the positive effect of women education on contraceptive use seems highly statistically significant for the narrowest cohort, supported by the CCT optimal bandwidths.

Table A.2 indicates that when the birth cohort interval broadens, the impact of maternal education on antenatal care timing and frequency gets larger and more statistically significant. The effect on pregnancy may be strengthened when we include older women with possibly experience more pregnancy. However, the analysis for the usage of iron supplement responds reversely and gets more statistical significance at the narrower cohort sample. Moreover, the effect gets larger when the interval gets smaller. We do not observe a significant difference in the preference of the health facility for delivery across samples. However, the 2-year bandwidth sample, the 1984-1988 birth cohort sample (column 5), provides evidence for our claim of favoring public institutions over private ones for antenatal care according to our baseline results. Panel B indicates that again the smallest cohort support with a better statistical significance level that maternal education has a positive effect on taking the children to a health facility even they are healthy (column 5), and we do not observe any statistically supported effect on the children aged between 7-14. When we move to the healthcare utilization for self health-related variables, most of the results provided in table A.3 are similar to our baseline results. The adverse effect of education on knowing family physician seems robust for all cohorts with high statistical significance levels and the magnitude of the coefficients gets larger when the interval shrinks. Additionally, the negative impact observed in most of the samples in self-use of supplements or vitamins becomes statistically significant at the narrowest sample however both IK and CCT suggest at least 5 years interval before and after the pivotal cohort.

The women education effect on the self-health outcomes presented in Table A.4 is mostly consistent with our baseline results even there are differences in statistical significance levels. For instance, again the narrowest sample supports our claims on the positive education effect on self-health in the THS sample, yet, it should be noted that 2-year bandwidth is not supported by the optimal bandwidth estimation for outcomes suggestions (averagely 9 or 5 years) and the treatment variable estimated by approximately 3 years.

Lastly, the IV estimations for the maternal education impact on children's health outcomes seems mostly consistent for the birth weight dimension but highly bandwidth dependent for the children's anthropometric measures. The first panel in Table A.5 supports our findings of the positive maternal education effect. Markedly, for the female children outcomes, 4 and lower bandwidth samples exhibit highly statistically significant positive results for female babies. On the other hand, there are sharp differences between the coefficient associated with the children's BMI and weight/height standard deviations but the few statistically significant results are consistent with each other and in theory.

Altogether, we observe that part of our results is independent of bandwidth selection but some are dependent as suggested in the literature.

4.5.2 Father Education

Additional to maternal education it can be expected that similar gains may be accomplished by father education as well. Even the birth weight of the babies may be affected by the decisions made by the father on behalf of the household such as health behaviors or consumption patterns. Hence we check this possibility using the same methodology with the reform exposure of the father used as an instrumental variable. According to Table A.6 and A.7, the middle school graduation of the father does not have a statistically significant effect on children's healthcare utilization and health outcomes. The results stay the same if we use different birth-cohort samples. Therefore, we can conclude that maternal education has a much more significant influence on positively influencing children's health decisions and health outcomes compared to improvements to father's education. Although we plan to study these effects further with a fully fleshed intra-family model, we suggest at this stage that our results do not suggest a pure education-to-health effect, but is influenced by the gender that is receiving the education shock.

4.5.3 Income

***/// As discussed in Section , our methodology claims to deal with the possible heterogeneous effects that can create bias, such as income. However, since income is commonly considered one of the most important socio-economic factors that can significantly impact both education and health, controlling the results for it will benefit the robustness.

In this sense, we repeat the analyses by including income and its interaction terms in the model. The results for marital and maternal decisions are almost identical with our baseline results (see Table A.8); we can capture statistically proven education impact only on the contraceptive use bias. Again we observe similar outcomes for healthcare utilization. The results in Table A.9 exhibits similar coefficients with the baseline results, but the statistical significance level seems to less favourable for some variables. For instance, still, mothers with middle school education seem to go the first antenatal care check one month earlier and more frequently almost six times more but at a ten percent significance level. On the other hand, first stage F-statistics seem improved by including income controls in the model. The more profound findings for female babies for antenatal care demand were statistically questionable in the baseline results due to the associated low first-stage F-statistics. Yet, 1981-1991 cohort results in Table A.9 for antenatal care demand can be supported by the associated sufficiently high first-stage F statistic.

Likewise, when we move the preference over institutions for antenatal care and delivery, we observe similar coefficients and overall interpretation that signals a shift in preferences from private to public institutions even statistically significant level changes for few cases (see A.10 and A.11). The self-health related health utilization exhibited in Table A.13 also indicate almost similar conclusions with baseline results. Additional to the observed adverse education impact on acknowledging their family doctor, Table A.13 also displays a statistically significant adverse influence on self-medication and supplement usage. The children-related health utilization rendered from the THS data set fails to exhibit a statistically reliable outcome due to the narrowed sample resulting from the missing information in household income (see Table A.12).

The maternal education effect on children's health outcomes is represented in Table A.14. The positive impacts on birth weights are very alike with the baseline results. Moreover, again the effects become more statistically significant, and associated first stage F-statistics are higher for female babies when the income is fixed. However, even the coefficients do not change much the maternal education impact on anthropometric measures, which became statistically insignificant except the height age standard deviation for male children. Lastly, middle school education's effect on women's health outcomes results in similar coefficients when income is fixed. However, results related to the probability of underweight and overweight lose their statistical power except for the reduction in the likelihood of overweight for the 1983-1989 birth cohort sample (see Table A.15).

All together, we can conclude that findings exhibit mostly similar implications even when we fix the income. Notably, the statistical power seems to increase for the female babies in antenatal care and birth weights. In contrast, the educational impact on children's anthropometric measures and women's BMI partly lose its statistical power. ***///

CHAPTER 5

CONCLUSION

In this study, we test the power of middle school education to alter women's healthcare decisions and health outcomes for themselves and their children. As the initial step towards this objective, we prove that the 1997 compulsory education reform had a statistically significant effect on women's middle school graduations, and the impact seems larger for the subsample of women who have children. This exogenous education shock is utilized the fuzzy regression discontinuity design, which is adapted as an instrumental variable methodology and allowed us to investigate the causal effects of middle school education.

We find little evidence for the educational impact on the subjects linked with human development. The decisions related to the timing of first marriage and first birth are associated with statistically insignificant education impact and fail to meet our expectations. While education effect on using modern contraceptive methods is also insignificant, it is shown that middle school education reduces the intention of not using a contraceptive method at all.

Our findings reveal that education alters health behavior and utilization patterns, especially for antenatal care. According to the statistically significant IV estimates, having at least a middle school diploma prompts women to make the first antenatal care visits earlier and attend antenatal care checks more frequently during pregnancy. On the other hand, taking iron supplements seems adversely affected by middle school graduation, which may indicate a reduction of need and requires further investigation. We also examine the patterns in institution choices for antenatal care and delivery with additional education and find some evidence indicating a shift from private to public health institutions in both cases. Additionally, we also observe that mothers with middle school diplomas are more likely to take their children aged between 0-6 to a health facility even a health problem does not necessitate it. ***/// Still, the associated low first stage F-statistic fails to support this finding. ***/// Despite the health utilization related to children, we could not find profound evidence for self health-related behaviors such as flue shot, self-medication, and use of nonprescribed supplements and vitamins. Yet, we reveal that middle school education adversely affects knowing their family doctor, so it delayed responding to the family medicine program during the relatively early stages of the primary health care reform. However, the pooled data includes all survey waves between 2008-2016 shows that the value of the adverse education effect does not persist on the probability of ever receiving a service from a family doctor, and statistical significance fades out.

Our analysis for the children's health outcomes, we find that secondary school education has a positive impact on the birth weight of female children but associated with lower first-stage F-statistics. The observed reduction in the probability of low birth weight (lower than 2500 grams)for all children supports this finding. Similarly, we find some evidence that shows the enhancing effect of maternal education on the children's anthropometric measures such as BMI and weight for height standard deviation in all children sample and height for age standard deviation only for male children. When we move to the self-related health outcomes unveils that even the education effect on BMI lacked statistical power, the likelihood of being within a healthy interval of BMI rises with middle school education for women. Besides, there is a possibility that the norms for weight may change for women during the time, which produces the mixed results in continuous BMI for different survey waves. As another self-health related outcome, the results fail to detect an educational impact on the self-defined health status of women.

Altogether these findings contribute to answering our main questions; even there are some points to be clarified further, we have managed to provide evidence to confirm that women's education has the power to alter health decisions and outcomes in various aspects. More importantly, they can transfer the gains that came from education to their children through their decisions and health-seeking behaviors in the household. By starting the pregnancy stage, the better decision made by more educated women enhances children's health and possibly their future outcomes.

Despite the fact that our findings offer insights into the improvements led by women education, there are some limitations due to our methodology. Even FRDD assures to identify the causal impact of education, it requires a point of exogenous shock that leads to a clear discontinuity with treatment. This requirement restricts us to using middle school reform, which is a relatively low level of education. While even the discrepancies in the quality of the education and its contributions in health literacy may be in question for the higher level of education, restricting the analyses for middle school graduation might be the reason for the weak results. Further researches that can investigate higher levels of women education effect might result in more profound findings.

Still, our results substantiate that promoting women education has the capacity to generate benefits for themselves and also for their family. Hence, enforcing education for women will also ensure the best use of the spill-over effect for generations.

This study can also be considered as a baseline for future research. Firstly, the structure we proposed for the impact flow can be tested further to capture stronger interactions. For instance, we can change the set of decisions analyzed to uncover the aspects that are more open to educational influence.

Moreover, the recent survey waves of TDHS conducted in 2018 and THS conducted in 2019 provides promising additional features to improve our study. The Syrian women sample provided by 2018 TDHS will allow us to analyze the case for women refugees in Turkey. It is also possible to the interactions between Syrian and local women lead to alterations in our results and may create different patterns worth exploring. Besides, both survey rows are suitable to consider the possible impacts of refugee crises on the burden of healthcare service while analyzing the healthcare utilization. Notably, 2019 THS also includes direct information on the relationship between children and their mothers, which can prevent possible data loss due to our identification strategy.

Meanwhile, our results signal that usage of health facilities needs further attention in the sense of its types and spatial intensities. Education influence may vary for different healthcare levels, such as primary, secondary, or tertiary care. Hence following our interest in primary health care, education impact on it can be analyzed within the consideration of spatial distributions of other levels of care can be valuable.

REFERENCES

Acemoglu, D. and Angrist, J. (2000). How large are human-capital externalities? Evidence from compulsory schooling laws. *NBER macroeconomics annual*, 15:9–59.

Adams, S. J. (2002). Educational attainment and health: evidence from a sample of older adults. *Education Economics*, 10(1):97–109.

Agüero, J. M. and Bharadwaj, P. (2014). Do the More Educated Know More about Health? Evidence from Schooling and HIV Knowledge in Zimbabwe. *Economic Development and Cultural Change*, 62(3):489–517.

Akee, R., Simeonova, E., Copeland, W., Angold, A., and Costello, J. (2010). Does More Money Make You Fat? The Effects of Quasi-Experimental Income Transfers on Adolescent and Young Adult Obesity. *IZA Discussion Paper*.

Alderman, H., Hentschel, J., and Sabates, R. (2003). With the help of one's neighbors: externalities in the production of nutrition in Peru. *Social Science & Medicine*, 56(10):2019–2031.

Andersen, R. M. (1995). Revisiting the Behavioral Model and Access to Medical Care : Does it Matter ? *Journal of Health and Social Behavior*, 36(1):1–10.

Angrist, J. D. and Pischke, J.-S. (2009). *Mostly Harmless Econometrics: An Empiricist's Companion*. Princeton University Press, Princeton, NJ.

Arendt, J. N. (2005). Does education cause better health? A panel data analysis using school reforms for identification. *Economics of Education Review*, 24(2):149–160.

Atun, R., Aydin, S., Chakraborty, S., Sümer, S., Aran, M., Gürol, I., Nazlioğlu, S., Özgülcü, e., Aydoğan, Ü., Ayar, B., Dilmen, U., and Akdağ, R. (2013). Universal health coverage in Turkey: Enhancement of equity. *The Lancet*, 382(9886):65–99.

Baltagi, B. H., Flores-Lagunes, A., and Karatas, H. M. (2019). The effect of education on health: Evidence from the 1997 compulsory schooling reform in Turkey. *Regional Science and Urban Economics*, 77(May):205–221.

Becker, G. S. (1992). Nobel Lecture: The Economic Way of Looking at Life. *Journal of Political Economy*, 101(3):385–409.

Becker, G. S. and Lewis, H. G. (1973). On the Interaction between the Quantity and Quality of Children. *Journal of Political Economy*, 81(2):S279–S288.

Becker S., G. (1964). *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education*. National Bureau of Economic Research,, New York, third edit edition.

Blossfeld, H.-P. and Huinink, J. (1991). Human Capital Investments or Norms of Role Transition? How Women's Schooling and Career Affect the Process of Family Formation. *American Journal of Sociology*, 97(1):143–168.

Braakmann, N. (2011). The causal relationship between education, health and health related behaviour: Evidence from a natural experiment in England. *Journal of Health Economics*, 30(4):753–763.

Bracher, M. and Santow, G. (1998). Economic independence and union formation in Sweden.

Breierova, L. and Duflo, E. (2004). The Impact of Education on Fertility and Child Mortality: Do Fathers Really Matter Less Than Mothers? Technical report, National Bureau of Economic Research, Cambridge, MA.

Brock, C. (2011). *Education as a global concern*. Bloomsbury Publishing.

Brunello, G., Fabbri, D., and Fort, M. (2013). The causal effect of education on body mass: Evidence from Europe. *Journal of Labor Economics*, 31(1):195–223.

Brunello, G., Fort, M., Schneeweis, N., and Winter-Ebmer, R. (2016). The Causal Effect of Education on Health: What is the Role of Health Behaviors? *Health Economics*, 25(3):314–336.

Brunello, G., Fort, M., and Weber, G. (2009). Changes in compulsory schooling, education and the distribution of wages in Europe. *Economic Journal*, 119(536):516–539.

Caldwell, J. C. (1979). Education as a factor in mortality decline: An examination of Nigerian data. *Population Studies*, 33(3):395–413.

Caldwell, J. C. (1997). Mass Education as a Determinant of the Timing of Fertility Decline. *Population and Development Review*, 23(4):803–812.

Calonico, S., Cattaneo, M. D., and Titiunik, R. (2014). Robust Data-Driven Inference in the Regression-Discontinuity Design. *The Stata Journal: Promoting communications on statistics and Stata*, 14(4):909–946.

Caner, A., Guven, C., Okten, C., and Sakalli, S. O. (2016). Gender Roles and the Education Gender Gap in Turkey. *Social Indicators Research*, 129(3):1231–1254.

Card, D. (2001). Estimating the return to schooling: Progress on some persistent econometric problems. *Econometrica*, 69(5):1127–1160.

Case, A. and Paxson, C. (2008). Stature and status: Height, ability, and labor market outcomes. *Journal of Political Economy*, 116(3):499–532.

Celik, Y. and Hotchkiss, D. R. (2000). The socio-economic determinants of maternal health care utilization in Turkey. *Social Science and Medicine*, 50(12):1797–1806.

Cesur, R., Dursun, B., and Mocan, N. (2014). The Impact of Education on Health and Health Behavior in a Middle-Income, Low-Education Country. Technical report, National Bureau of Economic Research, Cambridge, MA.

Checchi, D. (2006). *The Economics of Education*. Cambridge University Press, Cambridge.

Chou, S.-Y., Liu, J.-T., Grossman, M., and Joyce, T. (2010). Parental Education and Child Health: Evidence from a Natural Experiment in Taiwan. *American Economic Journal: Applied Economics*, 2(1):33–61.

Clark, D. and Royer, H. (2013). The effect of education on adult mortality and health: Evidence from Britain. *American Economic Review*, 103(6):2087–2120.

Currie, J. and Moretti, E. (2003). Mother's Education and the Intergenerational Transmission of Human Capital: Evidence from. *The Quarterly Journal of Economics*, 118(4):1495–1532.

Cutler, D. and Lleras-Muney, A. (2006). Education and Health: Evaluating Theories and Evidence. *Working Paper Series*, 12352:1689–1699.

Cutler, D. M. and Lleras-Muney, A. (2012). Education and Health: Insights from International Comparisons. *NBER Working Papers*.

Dayıoğlu, M., Kırdar, M. G., and Tansel, A. (2009). Impact of sibship size, birth order and sex composition on school enrolment in urban Turkey. *Oxford Bulletin of Economics and Statistics*, 71(3):399–426.

Demuth, I. R., Martin, A., and Weissenborn, A. (2018). Iron supplementation during pregnancy - A cross-sectional study undertaken in four German states. *BMC Pregnancy and Childbirth*, 18(1):1–10.

Dinçer, M. A., Kaushal, N., and Grossman, M. (2014). Women's Education: Harbinger of Another Spring? Evidence from a Natural Experiment in Turkey. *World Development*, 64:243–258.

Duflo, E. (2003). Grandmothers and granddaughters: old-age pensions and intrahousehold allocation in South Africa. *The World Bank Economic Review*, 17(1):1–25.

Duflo, E. (2012). Women empowerment and economic development. *Journal of Economic Literature*, 50(4):1051–1079.

Duflo, E., Dupas, P., and Kremer, M. (2015). Education, HIV, and early fertility: Experimental evidence from Kenya. *American Economic Review*, 105(9):2757–2797.

Duflo, E. and Udry, C. (2004). Intrahousehold Resource Allocation in Cote d'Ivoire: Social Norms, Separate Accounts and Consumption Choices. Technical report, National Bureau of Economic Research, Cambridge, MA.

Dulger, I. (2004). Turkey - rapid coverage for compulsory education: the 1997 basic education program. *Scaling Up Poverty Reduction: A Global Learning Process and Conference, Shanghai*, pages 1–30.

Dunlop, S., Coyte, P. C., and McIsaac, W. (2000). Socio-economic status and the utilisation of physicians' services: Results from the Canadian National Population Health Survey. *Social Science and Medicine*, 51(1):123–133.

Dursun, B. and Cesur, R. (2016). Transforming lives: the impact of compulsory schooling on hope and happiness. *Journal of Population Economics*, 29(3):911–956.

Dursun, B., Cesur, R., and Kelly, I. R. (2017). The Value of Mandating Maternal Education in a Developing Country. Technical report, National Bureau of Economic Research, Cambridge, MA.

Dursun, B., Cesur, R., and Mocan, N. (2018). The Impact of Education on Health Outcomes and Behaviors in a Middle-Income, Low-Education Country. *Economics and Human Biology*, 31:94–114.

Elo, I. T. (1992). Utilization of maternal health-care services in Peru: the role of women's education. *Health Transition Review*, 2(1):49–69.

Erten, B. and Keskin, P. (2016). For better or for worse? Education and the prevalence of domestic violence in Turkey. *American Economic Journal: Applied Economics*, 10(1):64–105.

Erten, B. and Keskin, P. (2018). Breaking the cycle? Education and the intergenerational transmission of violence. *Review of Economics and Statistics*, 102(2):252–268.

Erten, B. and Keskin, P. (2019). Compulsory schooling for whom? The role of gender, poverty, and religiosity. *Economics of Education Review*, 72(June):187–203.

Ertürk, Y. and Dayıoğlu, M. (2004). *Gender, education and child labour in Turkey. International Labour Organization*. International Labour Office, Ankara.

Eswaran, M. (2014a). How Do Women Fare in the Institution of Marriage? In *Why Gender Matters in Economics*, pages 203–247. Princeton University Press, Oxford.

Eswaran, M. (2014b). *Why Gender Matters in Economics*. Princeton University Press.

Feinstein, B. L., Sabates, R., Anderson, T. M., Sorhaindo, A., and Hammond, C. (2006). What are the effects of education on health ? In Desjardins, R. and Schuller, T., editors, *Measuring The Effects Of Education On Health And Civic Engagement: Proceedings Of The Copenhagen Symposium*, pages 171–354. OECD.

Fort, M., Schneeweis, N. E., and Winter-Ebmer, R. (2011). More Schooling, More Children: Compulsory Schooling Reforms and Fertility in Europe. *SSRN Electronic Journal*.

Fyfe, A. (2005). Compulsory Education and Child Labour: Historical Lessons, Contemporary Challenges and Future Directions. In *Working Draft. International Programme on the Elimination of Child Labor (IPEC)*. International Labor Organization (ILO), Geneva.

Glewwe, P. (1999). Why Does Mother's Schooling Raise Child Health in Developing Countries? Evidence from Morocco. *Journal of Human Resources*, 34(1):124–159.

Goddard, M. and Smith, P. (2001). Equity of access to health care services: Theory and evidence from the UK. *Social Science and Medicine*, 53(9):1149–1162.

Goldin, C. (2016). Human Capital. In Diebolt, C. and Haupert, M., editors, *Handbook of Cliometrics*, pages 55–86. Springer Berlin Heidelberg, Berlin, Heidelberg.

Goldstein, J. R. and Kenney, C. T. (2001). Marriage Delayed or Marriage Forgone? New Cohort Forecasts of First Marriage for U.S. Women. *American Sociological Review*, 66(4):506.

Grabner, M. (2009). The Causal Effect of Education on Obesity: Evidence from Compulsory Schooling Laws. *SSRN Electronic Journal*.

Grossman, M. (1972). *The Demand for Health: A Theoretical and Empirical Investigation*. NBER.

Grossman, M. (2005). Education and Nonmarket Outcomes. Technical Report August, National Bureau of Economic Research, Cambridge, MA.

Grossman, M. and Kaestner, R. (1997). Effects of Education on Health. In Behrman, J. R. and Stacey, N., editors, *The Social Benefits of Education*, chapter 4, pages 69–124. University of Michigan Press.

Gulesci, S. and Meyersson, E. (2013). 'For the Love of the Republic' Education, Secularism, and Empowerment. *IGIER WP*, 490.

Güneş, P. M. (2015). The role of maternal education in child health: Evidence from a compulsory schooling law. *Economics of Education Review*, 47:1–16.

Güneş, P. M. (2016). The Impact of Female Education on Teenage Fertility: Evidence from Turkey. *B.E. Journal of Economic Analysis and Policy*, 16(1):259–288.

Hacettepe University Institute of Population Studies (2004). Turkey Demographic and Health Survey 2003. Technical report, Hacettepe University Institute of Population Studies, Ministry of Health General Directorate of Mother and Child Health and Family Planning, State Planning Organization and European Union.

Hacettepe University Institute of Population Studies (2014). 2013 Turkey Demographic and Health Survey. Technical report, Hacettepe University Institute of Population Studies, T.R. Ministry of Development and TÜBİTAK, Ankara, Turkey.

Hahn, J., Todd, P., and Van Der Klaauw, W. (2001). Identification and Estimation of Treatment Effects with a Regression-Discontinuity Design Author (s): Jinyong Hahn , Petra Todd and Wilbert Van der Klaauw Published by : The Econometric Society Stable URL : http://www.jstor.org/stable/2692190 Accessed :. *Econometrica*, 69(1):201–209.

Hoffmann, A. M. (2006). HOFFMAN, A. M. The Capability Approach and educational policies and strategies: Effective life skills education for sustainable development. Technical report, AFD, Paris.

Imbens, G. and Kalyanaraman, K. (2012). Optimal bandwidth choice for the regression discontinuity estimator. *Review of Economic Studies*, 79(3):933–959.

Imbens, G. W. and Lemieux, T. (2008). Regression discontinuity designs: A guide to practice. *Journal of Econometrics*, 142(2):615–635.

Jacobsen, J. P. (2007). *The Economics of Gender*. Blackwell publishing, third edition.

Jepson, R., Clegg, A., Forbes, C., Lewis, R., Sowden, A., and Kleijnen, J. (2000). The Determinants of Screening Uptake and Interventions for Increasing Uptake: A Systematic Review. *Health Technol Assess*, 4(14).

Jürges, H., Kruk, E., and Reinhold, S. (2013). The effect of compulsory schooling on health: evidence from biomarkers. *Journal of Population Economics volume*, 26:645–672.

Keats, A. (2018). Women's schooling, fertility, and child health outcomes: Evidence from Uganda's free primary education program. *Journal of Development Economics*, 135(May 2016):142–159.

Kemptner, D., Jürges, H., and Reinhold, S. (2011). Changes in compulsory schooling and the causal effect of education on health: Evidence from Germany. *Journal of Health Economics*, 30(2):340–354.

Khandker, S. R. (1998). Fighting poverty with microcredit : experience in Bangladesh (English). Technical report, World Bank Group, Washington, D.C.

Kim, J. (2016). Female education and its impact on fertility. *IZA World of Labor*, pages 1–10.

Klepinger, D., Lundberg, S., and Plotnick, R. (1999). How does adolescent fertility affect the human capital and wages of young women? *Journal of Human Resources*, 34(3):421–448.

Kırdar, M. G., Dayıoglu, M., and Koç, I. (2016). Does longer compulsory education equalize schooling by gender and rural/urban residence? *World Bank Economic Review*, 30(3):549–579.

Kırdar, M. G., Dayıoğlu, M., and Koç, I. (2018). The effects of compulsory-schooling laws on teenage marriage and births in Turkey. *Journal of Human Capital*, 12(4):640–668.

Lam, D. and Duryea, S. (1999). Effects of Schooling on Fertility, Labor Supply, and Investments in Children, with Evidence from Brazil. *Journal of Human Resources*, 34(1).

Lang, K. and Kropp, D. (1986). Human capital versus sorting: the effects of compulsory attendance laws. *The Quarterly Journal of Economics*, 101(3):609–624.

Lavy, V. and Zablotsky, A. (2011). Mother Schooling , Fertility and Children s Education : Evidence from a Natural Experiment. *NBER Working Paper No. 16856*.

Law Number 4603 (1997). Resmi Gazete (Official Paper). *Issue: 23084*.

Lee, D. S. and Card, D. (2008). Regression discontinuity inference with specification error. *Journal of Econometrics*, 142(2):655–674.

Lee, D. S. and Lemieux, T. (2010). Regression Discontinuity Designs in Economics. *Journal of Economic Literature*, 20(1):281–355.

Lee, D. S., Lemieux, T., Alexander, D., Buchsbaum, E., Debraggio, E., Gjeci, E., Hodgson, A., Lau, Y., Leung, P., and Niu, X. (2009). Regression Discontinuity Designs in Economics. *Nber Working Paper Series*.

Lindeboom, M., Llena-Nozal, A., and van der Klaauw, B. (2009). Parental education and child health: Evidence from a schooling reform. *Journal of Health Economics*, 28(1):109–131.

Lleras-Muney, A. (2002). Were Compulsory Attendance and Child Labor Laws Effective? An Analysis from 1915 to 1939. *Journal of Law and Economics*, 45(2):401–435.

Lleras-Muney, A. (2005). The relationship between education and adult mortality in the United States. *Review of Economic Studies*, 72(1):189–221.

Lochner, L. (2011). Nonproduction Benefits of Education. *NBER Working Paper Series*, pages 183–282.

Makate, M. and Makate, C. (2016). The causal effect of increased primary schooling on child mortality in Malawi: Universal primary education as a natural experiment. *Social Science & Medicine*, 168:72–83.

Mason, A. D. and King, E. M. (2001). Engendering development through gender equality in rights, resources, and voice (English). Technical report, World Bank Group, Washington, D.C.

Mason, K. O. (1986). The Status of Women: Conceptual and Methodological Debates in Demographic Studies. *Sociological Forum*, 1(2):284–300.

Mazumder, B. (2008). Does education improve health: a reexamination of the evidence from compulsory schooling laws. *Economic Perspectives*, 33(2):1–15.

McCrary, J. and Royer, H. (2011). The effect of female education on fertility and infant health: Evidence from school entry policies using exact date of birth. *American Economic Review*, 101(1):158–195.

Meara, E. (2001). Why Is Health Related to Socioeconomic Status? The Case of Pregnancy and Low Birth Weight. *No. w8231*.

Mensch, B. S., Chuang, E. K., Melnikas, A. J., and Psaki, S. R. (2019). Evidence for causal links between education and maternal and child health: systematic review. *Tropical Medicine and International Health*, 24(5):504–522.

Meyersson, E. (2014). Islamic Rule and the Empowerment of the Poor and Pious. *Econometrica*, 82(1):229–269.

Ministry of Health (Turkey), Hacettepe University Institute of Population Studies, and Macro International Inc. (1994). Turkish Demographic and Health Survey 1993. Technical report, Hacettepe University Institute of Population Studies, Ankara, Turkey.

Mocan, N. and Altindag, D. T. (2014). Education, cognition, health knowledge, and health behavior. *European Journal of Health Economics*, 15(3):265–279.

Mocan, N. H. and Cannonier, C. (2012). Empowering Women Through Education: Evidence from Sierra Leone. *NBER Working Paper No. 18016*.

Navaneetham, K. and Dharmalingam, A. (2002). Utilization of maternal health care services in Southern India. *Social Science & Medicine*, 55(10):1849–1869.

Orazem, P. F. and King, E. M. (2007). Schooling in Developing Countries: The Roles of Supply, Demand and Government Policy. In *Handbook of Development Economics*, volume 4, pages 3475–3559. Elsevier B.V, 1 edition.

Oreopoulos, P. (2006). Estimating average and local average treatment effects of education when compulsory schooling laws really matter. *American Economic Review*, 96(1):152–175.

Oreopoulos, P. (2007). Do dropouts drop out too soon? Wealth, health and happiness from compulsory schooling. *Journal of Public Economics*, 91(11-12):2213–2229.

Özen, I. C. (2018). Early riser, late bloomer: Contextualizing Turkish health achievements in the last 50 years vis-à-vis China and the global picture of development. *New Perspectives on Turkey*, 58:35–92.

Özer, M., Fidrmuc, J., and Eryurt, M. A. (2018). Maternal education and childhood immunization in Turkey. *Health Economics*, 27(8):1218–1229.

Ozier, O. (2015). The Impact of Secondary Schooling in Kenya: A Regression Discontinuity Analysis. Technical report, World Bank Group.

Paul Schultz, T. (2002). Why governments should invest more to educate girls. *World Development*, 30(2):207–225.

Pitt, M. M. and Khandker, S. R. (1998). The impact of Group-Based Credit Programs on Poor Households in Bangladesh: Does the Gender of Participants Matter? *Journal of Political Economy*, 106(5):958–996.

Porter, K. E., Reardon, S. F., Unlu, F., Bloom, H. S., and Cimpian, J. R. (2017). Estimating Causal Effects of Education Interventions Using a Two-Rating Regression Discontinuity Design: Lessons From a Simulation Study and an Application. *Journal of Research on Educational Effectiveness*, 10(1):138–167.

Powdthavee, N. (2010). Does education reduce the risk of hypertension? Estimating the biomarker effect of compulsory schooling in England. *Journal of Human Capital*, 4(2).

Prickett, K. C. and Augustine, J. M. (2016). Maternal Education and Investments in Children's Health. *Journal of Marriage and Family*, 78(1):7–25.

Raymo, J. M. and Iwasawa, M. (2005). Marriage Market Mismatches in Japan: An Alternative View of the Relationship between Women's Education and Marriage. *AMERICAN SOCIOLOGICAL REVIEW*, 70:801–822.

Rosenzweig, B. M. R. and Schultz, T. P. (1985). The Demand for and Supply of Births : Fertility and its Life Cycle Consequence. *The American Economic Review*, 75(5):992–1015.

Rosenzweig, M. R. . and Schultz, T. . P. (1989). Schooling , Information and Nonmarket Productivity : Contraceptive Use and Its Effectiveness Author (s): and Published by : Blackwell Publishing for the Economics Department of the University of Pennsylvania and Inst. *International Economic Review*, 30(2):457–477.

Sabates, R. and Feinstein, L. (2004). *Education, Training and the Take-up of Preventative Health Care [Wider Benefits of Learning Research Report No. 12].* Centre for Research on the Wider Benefits of Learning; Institute of Education; University of London, London.

Schellhorn, M., Stuck, A. E., Minder, C. E., and Beck, J. C. (2000). Health services utilization of elderly swiss: Evidence from panel data. *Health Economics*, 9(6):533–545.

Schultz, T. P. (1990). Returns to Women's Education. Technical report, Yale University, Economic Growth Center, New Haven, CT.

Sen, A. (1992). *Inequality Reexamined*. Oxford University Press.

Sen, A. (1999). *Development as freedom*. Oxford University Press, Oxford.

Sözmen, K. and Ünal, B. (2016). Explaining inequalities in Health Care Utilization among Turkish adults: Findings from Health Survey 2008. *Health Policy*, 120(1):100–110.

Spasojević, J. (2010). Chapter 9 Effects of Education on Adult Health in Sweden: Results from a Natural Experiment. In *Current Issues in Health Economics (Contributions to Economic Analysis, Vol. 290)*, pages 179–199. Emerald Group Publishing Limited, Bingley.

Stephens, M. and Yang, D. Y. (2014). Compulsory education and the benefits of schooling. *American Economic Review*, 104(6):1777–1792.

Tansel, A. (2002). Determinants of school attainment of boys and girls in Turkey: Individual, household and community factors. *Economics of Education Review*, 21(5):455–470.

Tansel, A. and Karaoglan, D. (2016). The causal effect of education on Health Behaviors: Evidence from Turkey. *Working Paper, No. 1606*, pages 1–32.

Thistlethwaite, D. L. and Campbell, D. T. (1960). Regression-discontinuity analysis: An alternative to the ex post facto experiment. *Journal of Educational Psychology*, 51(6):309–317.

Thoemmes, F., Liao, W., and Jin, Z. (2017). The Analysis of the Regression-Discontinuity Design in R. *Journal of Educational and Behavioral Statistics*, 42(3):341–360.

Thomas, D. (1990). Intra-Household Resource Allocation: An Inferential Approach. *The Journal of Human Resources*, 25(4):635.

Thomas, D., Strauss, J., and Henriques, M.-H. (1991). How Does Mother's Education Affect Child Height? *The Journal of Human Resources*, 26(2):183–211.

Todd Jewell, R. (2009). Demand for prenatal health care in South America. *Applied Economics*, 41(4):469–479.

Torr, B. M. (2011). The changing relationship between education and marriage in the United States, 1940-2000. *Journal of Family History*, 36(4):483–503.

Turkish Statistical Institute (2008). Turkey Health Survey Micro Data Set. Retrieved from http://www.turkstat.gov.tr/MicroVeri/sagAr_2008/english/index.html.

Vila, L. E. . (2000). The Non-Monetary Benefits of Education. *European Journal of Education*, 35(1):21–32.

Vygotski, L. S. and Cole, M. (1978). *L.S. Vygotsky: Mind in society: the development of higher psychological processes*. Harvard University Press.

Weale, M. (1992). Education , Externalities , Fertility , and Economic Growth. *Policy Research Working Paper*.

Xu, K.-L. (2016). Regression Discontinuity with Categorical Outcomes. *SSRN Electronic Journal*, pages 1–51.

Zhang, L., Hu, S., Sun, L., and Pu, S. (2016). The Effect of Florida's Bright Futures Program on College Choice: A Regression Discontinuity Approach. *The Journal of Higher Education*, 87(1):115–146.

APPENDIX A

ADDITIONAL TABLES

TableA.1: The IV Estimates of Women Education Effect on Human Development Using Additional Bandwidths - The TDHS Data

	(1)	(2)	(3)	(4)	(5)	$\widehat{h}$	$\widehat{h}$
First marriage and birth age	**80-92**	**81-91**	**82-90**	**83-89**	**84-88**	IK	CCT
Age at first marriage	-0.474	-0.097	0.372	-0.770	-1.403	6.15	3.58
	(0.803)	(0.859)	(0.897)	(1.390)	(2.014)		
Mean	19.701	19.664	19.573	19.530	19.531		
1st Stage F-stat	56.99	41.955	52.81	27.271	19.772		
Obs	4711	3962	3198	2428	1636		
Age at first birth	-0.302	0.219	0.747	0.687	0.047	9.27	3.76
	(0.839)	(0.921)	(0.814)	(1.322)	(2.020)		
Mean	20.897	20.821	20.685	20.579	20.536		
1st Stage F-stat	40.445	28.548	33.914	13.907	8.479		
Obs	3945	3291	2637	1990	1341		
Contraceptive use							
Use of modern contraceptive methods	0.045	0.034	0.081	0.236	0.863***	8.19	2.21
	(0.115)	(0.134)	(0.140)	(0.148)	(0.237)		
Mean	0.399	0.390	0.391	0.393	0.403		
1st Stage F-stat	56.99	41.955	52.81	27.271	19.772		
Obs	4711	3962	3198	2428	1636		
Does not intend to use any method	0.076	0.013	-0.133	-0.265***	-0.489***	5.15	2.31
	(0.082)	(0.089)	(0.082)	(0.099)	(0.155)		
Mean	0.080	0.078	0.080	0.081	0.072		
1st Stage F-stat	56.99	41.955	52.81	27.271	19.772		
Obs	4711	3962	3198	2428	1636		
Ever used a contraceptive method	0.006	0.114	0.082	0.118	0.516***	5.26	2.25
	(0.083)	(0.083)	(0.087)	(0.123)	(0.192)		
Mean	0.870	0.865	0.863	0.865	0.869		
1st Stage F-stat	57.483	42.78	54.764	28.352	18.796		
Obs	4709	3961	3197	2427	1635		

Notes: Standard errors in parentheses,
* p<0.1, ** p<.05, *** p<.01.

TableA.2: The IV Estimates of Women Education Effect on Child Related Healthcare Utilization Using Additional Bandwidths

	All					Female Child					Male Child						
Panel A: The TDHS Data	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	$\widehat{h}$	$\widehat{h}$
Antenatal care	**80-92**	**81-91**	**82-90**	**83-89**	**84-88**	**80-92**	**81-91**	**82-90**	**83-89**	**84-88**	**80-92**	**81-91**	**82-90**	**83-89**	**84-88**	IK	CCT
Timing of 1st antenatal check	-1.170**	-1.124**	-1.016*	-0.753	0.512	-0.956	-1.069	-0.844	-2.225	-1.318	-1.408**	-1.376**	-1.287*	-0.203	-20.191	5.02	1.82
(months)	(0.476)	(0.546)	(0.520)	(0.871)	(0.971)	(0.714)	(1.072)	(1.078)	(1.858)	(0.903)	(0.616)	(0.629)	(0.689)	(0.928)	(91.635)		
1st Stage F-stat	38.757	28.879	26.704	8.829	6.604	11.748	7.857	7.757	3.193	20.645	19.344	15.082	11.216	3.071	0.048		
Obs	2975	2531	2061	1611	1118	1375	1158	945	754	527	1600	1373	1116	857	591		
Number of antenatal visits during	4.888***	5.813***	5.472**	5.454	2.972	4.266	7.393*	7.062*	10.980*	4.254	5.036**	4.874**	4.603*	1.848	20.154	5.31	2.42
pregnancy	(1.764)	(2.215)	(2.227)	(3.650)	(4.000)	(2.596)	(3.927)	(4.046)	(6.280)	(3.779)	(2.180)	(2.410)	(2.532)	(4.450)	(108.182)		
1st Stage F-stat	45.982	35.109	32.984	10.696	10.999	13.430	8.999	7.777	3.382	21.656	20.849	16.636	13.431	3.432	0.039		
Obs	3183	2706	2203	1716	1182	1479	1245	1011	795	550	1704	1461	1192	921	632		
During pregnancy, given or bought	-0.157	-0.133	-0.201	-0.479*	-0.759**	-0.257	-0.314	-0.498	-1.007	-0.436**	-0.034	0.007	-0.046	-0.183	9.798	4.99	2.19
iron tablets/syrup	(0.113)	(0.139)	(0.130)	(0.282)	(0.316)	(0.203)	(0.299)	(0.330)	(0.770)	(0.220)	(0.148)	(0.160)	(0.157)	(0.320)	(105.213)		
1st Stage F-stat	43.747	32.572	31.238	10.339	11.231	11.16	6.917	5.937	2.498	15.613	22.474	17.875	14.364	3.719	0.008		
Obs	3160	2684	2184	1705	1172	1466	1233	1001	791	546	1694	1451	1183	914	626		
Preferred antenatal care institution																	
Private institutions	-0.090	-0.004	0.042	-0.197	-0.773***	0.112	0.335	0.240	0.415	-0.129	-0.182	-0.119	-0.044	-0.325	7.939	6.11	2.11
	(0.122)	(0.145)	(0.154)	(0.165)	(0.215)	(0.214)	(0.302)	(0.329)	(0.547)	(0.121)	(0.180)	(0.188)	(0.203)	(0.362)	(34.802)		
Public institutions	0.138	0.071	-0.048	0.282	0.438**	-0.082	-0.118	-0.132	-0.066	0.420**	0.237	0.148	-0.024	0.377	-1.404	4.51	2.20
	(0.141)	(0.177)	(0.183)	(0.268)	(0.214)	(0.261)	(0.378)	(0.393)	(0.602)	(0.163)	(0.148)	(0.155)	(0.142)	(0.286)	(6.338)		
1st Stage F-stat	39.028	29.016	26.502	8.829	6.604	11.81	7.853	7.726	3.193	20.645	19.514	15.245	11.079	3.071	0.048		
Obs	2979	2534	2063	1611	1118	1377	1159	946	754	527	1602	1375	1117	857	591		
Place of delivery																	
Delivery in a health facility	0.050	0.052	0.005	-0.139	-0.100	0.070	0.051	-0.063	-0.197	-0.047	0.019	0.043	0.047	-0.178	-0.296	2.63	-
	(0.050)	(0.064)	(0.052)	(0.104)	(0.119)	(0.062)	(0.085)	(0.076)	(0.153)	(0.069)	(0.055)	(0.068)	(0.063)	(0.149)	(0.427)		
Delivery in a private institutions	-0.156	-0.227	-0.253	-0.218	-0.458	-0.098	-0.354	-0.431	-0.413	-0.471*	-0.175	-0.125	-0.116	-0.029	-0.500	5.88	2.23
	(0.134)	(0.170)	(0.195)	(0.293)	(0.311)	(0.190)	(0.244)	(0.281)	(0.422)	(0.270)	(0.181)	(0.191)	(0.196)	(0.342)	(0.933)		
Delivery in a public institutions	0.207	0.279	0.258	0.078	0.358	0.169	0.404*	0.369	0.216	0.424	0.194	0.169	0.163	-0.149	0.204	6.17	2.27
	(0.141)	(0.180)	(0.208)	(0.346)	(0.363)	(0.183)	(0.244)	(0.280)	(0.458)	(0.290)	(0.190)	(0.201)	(0.220)	(0.394)	(0.959)		
1st Stage F-stat	44.298	33.846	32.149	11.619	11.605	20.625	16.352	12.547	5.022	14.926	27.48	21.291	21.145	5.562	1.631		
Obs	4204	3580	2923	2293	1579	2008	1699	1391	1092	751	2196	1881	1532	1201	828		
Panel B: The THS Data																	
Taking child to a health institution while	0.216	0.119	0.514	1.313*	0.937**	0.217	0.155	0.384	0.740	0.629**	-0.003	-0.064	0.590	2.199	2.273	7.15	2.83
s/he is healthy (Age 0-6)	(0.278)	(0.340)	(0.349)	(0.789)	(0.407)	(0.347)	(0.336)	(0.322)	(0.477)	(0.317)	(0.457)	(0.768)	(0.827)	(3.336)	(3.070)		
1st Stage F-stat	11.817	9.381	11.798	3.257	10.336	8.973	11.310	13.348	5.815	15.032	4.798	2.037	1.871	0.440	0.563		
Obs	3338	2866	2369	1825	1279	1648	1414	1176	881	631	1690	1452	1193	944	648		
Taking child to a health institution while	-1.264	-1.628	-0.640	-2.103	2.229	-2.005	-2.991	-12.311	0.174	-0.139	-0.032	-0.009	0.486	-0.051	0.259	7.00	3.63
s/he is healthy (Age 7-14)	(5.170)	(4.054)	(1.963)	(20.259)	(7.050)	(5.072)	(9.549)	(155.081)	(0.856)	(0.374)	(1.309)	(1.291)	(5.060)	(3.238)	(0.608)		
1st Stage F-stat	0.085	0.202	0.405	0.014	0.122	0.183	0.107	0.006	0.756	3.019	0.567	0.753	0.052	0.134	4.590		
Obs	2108	1595	1140	760	515	994	744	508	346	234	1114	851	632	414	281		

Notes: Standard errors in parentheses,
* p<0.1, ** p<.05, *** p<.01.

TableA.3: The IV Estimates of Women Education Effect on Healthcare Utilization for Self Health Using Additional Bandwidths - The THS Data

	(1)	(2)	(3)	(4)	(5)	$\widehat{h}$	$\widehat{h}$
	80-92	**81-91**	**82-90**	**83-89**	**84-88**	IK	CCT
Knowing family physician	-0.512***	-0.718***	-0.770***	-0.796***	-0.799**	10.43	4.35
(2010 - 2012 survey waves)	(0.145)	(0.179)	(0.170)	(0.193)	(0.311)		
Mean	0.822	0.823	0.823	0.826	0.828		
1st Stage F-stat	59.200	47.242	55.364	53.934	35.035		
Obs	3935	3248	2560	1906	1302		
Ever received service from general	-0.128	-0.086	0.005	-0.104	-0.369	21.78	3.23
practitioner or family doctor	(0.116)	(0.124)	(0.114)	(0.115)	(0.307)		
Mean	0.867	0.868	0.868	0.877	0.879		
1st Stage F-stat	55.079	52.074	47.622	43.482	25.339		
Obs	3226	2667	2102	1573	1076		
Ever had a flu shot	-0.170	-0.151	-0.084	-0.239	0.399	12.79	6.07
	(0.126)	(0.150)	(0.160)	(0.371)	(0.264)		
Mean	0.115	0.113	0.112	0.115	0.115		
1st Stage F-stat	33.573	21.020	19.347	5.034	7.060		
Obs	11733	9650	7567	5634	3781		
Use of non-prescribed medication,	-0.073	-0.144	0.021	0.027	-0.055	8.75	4.27
supplements or vitamins	(0.112)	(0.141)	(0.142)	(0.285)	(0.199)		
Mean	0.222	0.223	0.220	0.225	0.229		
1st Stage F-stat	34.081	21.378	19.503	4.989	6.807		
Obs	11760	9675	7586	5651	3792		
Use of non-prescribed medication	0.040	-0.038	6.381	-3.868	-0.130	11.13	5.76
(2014-2016 survey waves)	(0.539)	(0.764)	(26.680)	(13.660)	(0.173)		
Mean	0.323	0.324	0.322	0.323	0.327		
1st Stage F-stat	2.221	1.059	0.055	0.086	6.749		
Obs	4424	3685	2910	2197	1491		
Use of non-prescribed supplements or	-0.665	-1.055	-4.993	5.960	-0.670***	12.88	5.34
vitamins (2014-2016 waves)	(0.579)	(1.049)	(19.716)	(21.182)	(0.167)		
Mean	0.086	0.089	0.091	0.092	0.095		
1st Stage F-stat	2.221	1.059	0.055	0.086	6.749		
Obs	4424	3685	2910	2197	1491		

Notes: Standard errors in parentheses,
* p<0.1, ** p<.05, *** p<.01.

TableA.4: The IV Estimates of Women Education Effect on Self Health Using Additional Bandwidths

	(1)	(2)	(3)	(4)	(5)	$\widehat{h}$	$\widehat{h}$
Panel A: The TDHS Data	**80-92**	**81-91**	**82-90**	**83-89**	**84-88**	IK	CCT
Body mass index (BMI)	110.630	12.572	63.665	155.195	86.953	9.58	4.34
	(142.373)	(154.317)	(162.381)	(242.297)	(250.607)		
Mean	2599.204	2586.551	2573.014	2561.329	2556.952		
Underweight (BMI < 18.5)	0.021	-0.007	0.028	0.011	-0.044	6.83	2.50
	(0.039)	(0.044)	(0.043)	(0.057)	(0.064)		
Mean	0.027	0.029	0.028	0.031	0.032		
Overweight (BMI > 25)	-0.019	-0.052	0.015	-0.021	-0.007	7.44	3.21
	(0.168)	(0.182)	(0.201)	(0.271)	(0.313)		
Mean	0.522	0.512	0.501	0.489	0.496		
1st Stage F-stat	51.234	39.689	43.914	27.054	17.237		
Obs	4226	3551	2865	2185	1472		
Panel B: The THS Data							
Body mass index (BMI)	0.871	-0.511	-0.277	-0.568	-4.821**	9.43	4.95
	(1.447)	(1.658)	(1.958)	(3.361)	(2.349)		
Mean	23.620	23.564	23.542	23.555	23.529		
Underweight (BMI < 18.5)	-0.149	-0.255**	-0.206	-0.493*	-0.253	8.07	5.74
	(0.094)	(0.124)	(0.129)	(0.296)	(0.194)		
Mean	0.081	0.082	0.079	0.077	0.075		
Overweight (BMI > 25)	-0.232	-0.412**	-0.369	-0.905*	-0.751***	9.88	5.13
	(0.165)	(0.207)	(0.227)	(0.517)	(0.289)		
Mean	0.312	0.308	0.304	0.302	0.295		
1st Stage F-stat	32.179	19.206	17.215	4.135	7.276		
Obs	10999	9068	7112	5313	3567		
Good health	-0.032	0.009	0.001	0.270	0.384	11.09	5.12
	(0.113)	(0.140)	(0.145)	(0.291)	(0.284)		
Mean	0.794	0.797	0.799	0.799	0.799		
1st Stage F-stat	33.642	21.098	19.360	4.876	6.867		
Obs	11773	9685	7592	5654	3795		
Redefined health status	-0.089	1.981	1.072	10.756	14.647**	8.65	4.61
	(2.378)	(2.897)	(2.729)	(6.667)	(6.514)		
Mean	24.882	24.920	24.979	25.032	25.034		
1st Stage F-stat	33.826	21.415	19.687	5.135	6.840		
Obs	11745	9663	7579	5647	3789		

Notes: Standard errors in parentheses,
* p<0.1, ** p<.05, *** p<.01.

TableA.5: The IV Estimates of Maternal Education Effect on Child Health Additional Bandwidths - The TDHS Data

	All					Female Child					Male Child						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	$\widehat{h}$	$\widehat{h}$
Dependent Variable	**80-92**	**81-91**	**82-90**	**83-89**	**84-88**	**80-92**	**81-91**	**82-90**	**83-89**	**84-88**	**80-92**	**81-91**	**82-90**	**83-89**	**84-88**	IK	CCT
Birth weight	192.247	197.935	346.424**	384.480	532.016**	340.144	402.251	922.254***	1076.976**	898.280***	30.169	-0.903	-28.706	-416.632	-434.904	6.39	2.05
	(163.455)	(176.741)	(173.737)	(257.382)	(225.118)	(222.584)	(273.817)	(322.084)	(442.550)	(201.525)	(212.249)	(231.383)	(234.203)	(469.412)	(780.979)		
Mean	3171.338	3169.236	3174.493	3174.325	3188.262	3114.047	3116.537	3122.316	3110.066	3109.163	3222.829	3215.855	3221.200	3232.461	3260.608		
Low birth weight	-0.064	-0.083	-0.112	-0.256*	-0.210	-0.080	-0.125	-0.135	-0.542*	-0.363**	-0.051	-0.062	-0.124	0.011	-0.000	6.84	2.28
(birth weight<2500 grams)	(0.081)	(0.097)	(0.099)	(0.140)	(0.128)	(0.136)	(0.172)	(0.196)	(0.297)	(0.151)	(0.090)	(0.099)	(0.104)	(0.191)	(0.321)		
Mean	0.160	0.160	0.160	0.159	0.155	0.181	0.181	0.179	0.179	0.184	0.140	0.142	0.143	0.142	0.129		
Log birth weight	0.060	0.078	0.129*	0.097	0.186**	0.102	0.140	0.302**	0.349*	0.308***	0.012	0.010	0.019	-0.203	-0.162	6.62	2.07
	(0.062)	(0.067)	(0.066)	(0.100)	(0.084)	(0.094)	(0.115)	(0.139)	(0.190)	(0.091)	(0.071)	(0.078)	(0.081)	(0.174)	(0.275)		
Mean	8.033	8.033	8.035	8.035	8.042	8.015	8.017	8.018	8.013	8.014	8.050	8.048	8.050	8.054	8.067		
1st Stage F-stat	51.495	42.174	39.122	13.201	14.577	24.042	21.553	16.15	6.529	18.405	27.238	21.451	19.878	4.68	1.614		
Obs	3676	3136	2549	2019	1413	1740	1472	1204	959	675	1936	1664	1345	1060	738		
BMI std for child	-0.075	-16.073	-16.991	80.521*	86.080	29.072	36.676	35.460	104.129	76.462	-34.375	-65.137	-59.092	48.359	44.238	4.23	2.21
	(30.794)	(35.352)	(35.554)	(45.564)	(54.148)	(42.101)	(62.005)	(65.273)	(123.232)	(55.886)	(42.694)	(49.856)	(46.372)	(79.808)	(294.512)		
Mean	62.554	62.300	60.052	59.309	56.941	55.924	56.390	53.144	55.307	56.655	68.527	67.563	66.257	62.902	57.195		
Height/Age std	51.361	84.168	13.632	-21.821	-146.243	32.107	18.207	-68.249	-113.622	-79.987	66.828	134.925*	84.155	52.026	-440.134	7.22	2.34
	(49.411)	(67.970)	(69.864)	(99.029)	(135.257)	(58.798)	(81.170)	(102.411)	(147.883)	(88.146)	(55.863)	(71.172)	(64.285)	(104.413)	(1138.015)		
Mean	-51.447	-50.993	-50.093	-50.124	-47.354	-50.254	-50.217	-48.378	-48.482	-51.828	-52.522	-51.685	-51.632	-51.599	-43.395		
Weight/Age std	36.420	46.004	2.148	50.140	-29.806	43.575	41.513	-14.931	9.926	-2.343	23.001	43.222	16.659	70.440	-222.991	5.10	2.30
	(28.239)	(38.815)	(36.841)	(49.426)	(68.279)	(45.304)	(63.610)	(69.443)	(124.982)	(57.530)	(36.411)	(49.115)	(40.886)	(69.090)	(568.157)		
Mean	10.559	10.741	9.698	9.231	9.559	6.997	7.466	6.358	7.815	7.136	13.768	13.657	12.698	10.503	11.704		
Weight/Height std	4.765	-5.271	-7.139	89.808**	84.802*	27.787	30.267	31.777	114.649	75.538	-25.358	-43.587	-39.688	59.016	38.406	4.29	2.18
	(29.206)	(34.190)	(34.103)	(45.324)	(51.304)	(43.259)	(63.885)	(68.993)	(137.681)	(55.629)	(40.329)	(47.962)	(43.749)	(76.407)	(260.414)		
Mean	56.315	56.110	53.883	53.118	51.184	51.207	51.357	48.190	50.265	51.640	60.918	60.342	58.997	55.680	50.781		
1st Stage F-stat	39.156	25.431	27.576	13.522	12.726	16.247	11.280	8.926	3.194	13.108	17.596	12.383	11.592	4.475	0.270		
Obs	3070	2607	2128	1689	1178	1455	1228	1007	799	553	1615	1379	1121	890	625		

Notes: Standard errors in parentheses,
* p<0.1, ** p<.05, *** p<.01.

TableA.6: The IV Estimates of Father Education Effect on Healthcare Utilization for Children - The THS Data

	All		Female Child		Male Child	
	(1)	(2)	(3)	(4)	(5)	(6)
	81-91	**83-89**	**81-91**	**83-89**	**81-91**	**83-89**
Taking child to a health institution while	0.570	-0.142	0.069	-0.303	1.052	-0.313
s/he is healthy (Age 0-6)	(0.360)	(0.493)	(0.328)	(0.362)	(0.851)	(1.968)
Mean	0.441	0.458	0.401	0.429	0.477	0.483
1st Stage F-stat	10.814	5.698	18.561	13.246	1.747	0.416
Obs	1303	922	621	431	682	491

Notes: Standard errors in parentheses,
* p<0.1, ** p<.05, *** p<.01.

TableA.7: The IV Estimates of Father Education Effect on Child Health - The DHS Data

	All		Female Child		Male Child	
	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable	**81-91**	**83-89**	**81-91**	**83-89**	**81-91**	**83-89**
Birth weight	118.333	-3066.502	1240.401	-107.262	1877.130	-278.466
	(1150.048)	(13795.754)	(5194.085)	(3074.038)	(3610.242)	(1474.459)
Mean	3142.699	3117.408	3089.990	3054.531	3188.665	3170.800
Low birth weight	0.515	3.112	2.655	2.478	-0.692	0.243
(birth weight<2500 grams)	(0.922)	(13.375)	(9.810)	(6.793)	(1.302)	(0.865)
Mean	0.168	0.174	0.188	0.198	0.151	0.154
Log birth weight	0.245	-0.204	1.355	0.761	0.750	-0.141
	(0.486)	(1.991)	(4.489)	(2.167)	(1.380)	(0.539)
Mean	8.026	8.017	8.008	7.996	8.042	8.035
1st Stage F-stat	0.822	0.055	0.079	0.134	0.295	0.566
Obs	1522	1091	709	501	813	590
BMI std for child	-86.455	-2629.048	-3152.437	-64.238	-293.555	162.166
	(237.635)	(44562.332)	(92256.271)	(1236.864)	(1098.462)	(297.664)
Mean	57.851	55.059	54.133	48.580	61.172	60.730
Height/Age std	-221.242	-1.11e+04	-469.686	2271.006	-610.160	457.054
	(384.299)	(1.87e+05)	(16214.953)	(12095.030)	(2164.252)	(488.016)
Mean	-44.042	-44.692	-42.933	-41.043	-45.033	-47.886
Weight/Age std	-203.030	-8684.294	-3150.543	1335.332	-656.179	408.061
	(300.801)	(1.46e+05)	(92639.172)	(7072.656)	(2127.489)	(431.431)
Mean	12.084	9.904	10.334	7.656	13.646	11.871
Weight/Height std	-187.014	-4649.347	-3812.272	142.825	-765.190	306.722
	(297.481)	(78685.455)	(1.12e+05)	(1287.868)	(2443.671)	(365.029)
Mean	52.329	49.379	50.064	44.173	54.352	53.936
1st Stage F-stat	0.945	0.003	0.001	0.031	0.103	0.981
Obs	1257	902	593	421	664	481

Notes: Standard errors in parentheses,
* p<0.1, ** p<.05, *** p<.01.

TableA.8: The IV Estimates of Women Education Effect on Marital and Maternal Decisions - Controlling for Income - The TDHS Data

	(1)	(2)
First marriage and birth age	**81-91**	**83-89**
Age at first marriage	-0.735	-1.191
	(1.023)	(1.429)
Mean	19.664	19.530
1st Stage F-stat	42.695	41.004
Obs	3962	2428
Age at first birth	-0.135	0.874
	(1.047)	(1.272)
Mean	20.821	20.579
1st Stage F-stat	31.310	22.541
Obs	3291	1990
Contraceptive use		
Use of modern contraceptive methods	-0.017	0.249
	(0.158)	(0.169)
Mean	0.390	0.393
1st Stage F-stat	42.695	41.004
Obs	3962	2428
Does not intend to use any method	0.047	-0.252**
	(0.108)	(0.110)
Mean	0.078	0.081
1st Stage F-stat	42.695	41.004
Obs	3962	2428
Ever used a contraceptive method	0.138	0.157
	(0.104)	(0.140)
Mean	0.865	0.865
1st Stage F-stat	43.128	42.466
Obs	3961	2427

Notes: Standard errors in parentheses,
* p<0.1, ** p<.05, *** p<.01.

TableA.9: The IV Estimates of Women Education Effect on Antenatal Care - Controlling for Income - The TDHS Data

	All		Female Child		Male Child	
	(1)	(2)	(3)	(4)	(5)	(6)
Antenatal care	**81-91**	**83-89**	**81-91**	**83-89**	**81-91**	**83-89**
Timing of 1st antenatal check (months)	-1.164*	-1.143	-1.592	-2.848	-1.173*	0.144
	(0.645)	(1.091)	(1.132)	(1.841)	(0.699)	(1.285)
Mean	1.948	1.980	1.921	1.950	1.970	2.006
1st Stage F-stat	32.492	11.312	9.281	4.619	14.655	2.113
Obs	2531	1611	1158	754	1373	857
Number of antenatal visits during pregnancy	6.056**	6.900*	7.402*	9.801*	4.689	4.806
	(2.567)	(4.125)	(4.019)	(5.535)	(3.065)	(6.954)
Mean	8.346	8.282	8.435	8.504	8.270	8.090
1st Stage F-stat	41.755	16.936	11.774	6.777	15.729	2.122
Obs	2706	1716	1245	795	1461	921
During pregnancy, given or bought iron tablets/syrup	-0.174	-0.416	-0.291	-0.660*	0.052	-0.243
	(0.158)	(0.264)	(0.256)	(0.346)	(0.198)	(0.491)
Mean	0.817	0.811	0.808	0.813	0.825	0.809
1st Stage F-stat	40.722	17.291	10.240	5.417	17.061	2.442
Obs	2684	1705	1233	791	1451	914

Notes: * p<0.1, ** p<.05, *** p<.01.

TableA.10: The IV Estimates of Women Education Effect on Preferred Institution for Antenatal Care - Controlling for Income - The TDHS Data

	All		Female Child		Male Child	
	(1)	(2)	(3)	(4)	(5)	(6)
Preferred antenatal care institution	**81-91**	**83-89**	**81-91**	**83-89**	**81-91**	**83-89**
Private institutions	-0.096	-0.283	0.409	0.395	-0.240	-0.662
	(0.179)	(0.204)	(0.374)	(0.649)	(0.209)	(0.624)
Private hospital/clinic	-0.015	-0.111	0.148	0.202	0.066	-0.149
	(0.191)	(0.260)	(0.348)	(0.543)	(0.208)	(0.401)
Private doctor	-0.044	-0.379**	0.210	0.062	-0.251*	-0.850
	(0.132)	(0.191)	(0.264)	(0.397)	(0.150)	(0.595)
Private polyclinic	0.076	0.307	0.332	0.406	-0.051	0.300
	(0.152)	(0.314)	(0.295)	(0.416)	(0.078)	(0.247)
Public institutions	0.117	0.268	-0.308	-0.268	0.124	0.289
	(0.209)	(0.309)	(0.414)	(0.624)	(0.201)	(0.438)
Government hospital	0.249	0.032	0.178	-0.288	0.231	0.187
	(0.196)	(0.296)	(0.324)	(0.538)	(0.238)	(0.608)
Maternity house	0.007	0.141	0.140	0.587	-0.097	-0.309
	(0.152)	(0.237)	(0.277)	(0.376)	(0.166)	(0.549)
Health center	0.136	0.226	-0.170	-0.067	0.087	0.241
	(0.173)	(0.266)	(0.311)	(0.497)	(0.185)	(0.339)
Health house	0.253**	0.410*	0.474	0.706	0.104	0.141
	(0.122)	(0.220)	(0.315)	(0.474)	(0.082)	(0.198)
SSK hospital	0.061	0.039	0.125	-0.168	0.045	0.045
	(0.055)	(0.068)	(0.148)	(0.160)	(0.048)	(0.128)
University hospital	0.037	0.143	0.148	0.398*	-0.028	-0.024
	(0.053)	(0.092)	(0.132)	(0.242)	(0.055)	(0.136)
Research hospital	-0.102*	-0.024	-0.313*	-0.263	-0.031	0.107
	(0.053)	(0.049)	(0.182)	(0.176)	(0.053)	(0.111)
Family doctor	0.007	-0.007	0.041	-0.040	-0.046*	-0.032
	(0.031)	(0.049)	(0.057)	(0.086)	(0.027)	(0.048)
MCHFP center	-0.020	-0.013	-0.080*	-0.128	0.019	0.102
	(0.022)	(0.027)	(0.045)	(0.084)	(0.029)	(0.078)
1st Stage F-stat	32.572	11.312	9.280	4.619	14.777	2.113
Obs	2534	1611	1159	754	1375	857

Notes: Standard errors in parentheses,
* p<0.1, ** p<.05, *** p<.01.

TableA.11: The IV Estimates of Women Education Effect on Preferred Institution for Delivery - Controlling for Income - The TDHS Data

	All		Female Child		Male Child	
	(1)	(2)	(3)	(4)	(5)	(6)
Place of delivery	**81-91**	**83-89**	**81-91**	**83-89**	**81-91**	**83-89**
Delivery in a health facility	0.087	-0.083	0.037	-0.101	0.093	-0.151
	(0.070)	(0.080)	(0.086)	(0.086)	(0.071)	(0.153)
Delivery in a private institutions	-0.265	-0.171	-0.284	-0.113	-0.132	-0.097
	(0.174)	(0.254)	(0.230)	(0.337)	(0.189)	(0.395)
Private hospital/clinic	-0.197	-0.111	-0.184	-0.013	-0.092	-0.092
	(0.161)	(0.218)	(0.202)	(0.296)	(0.188)	(0.390)
Private doctor	-0.053*	-0.076	-0.096**	-0.136**	-0.018	-0.005
	(0.032)	(0.050)	(0.047)	(0.061)	(0.016)	(0.025)
Private midwife	-0.015	0.016	-0.005	0.036	-0.022*	-0.000
	(0.010)	(0.022)	(0.016)	(0.029)	(0.013)	(0.030)
Delivery in a public institutions	0.353*	0.088	0.322	0.013	0.226	-0.055
	(0.181)	(0.306)	(0.232)	(0.380)	(0.202)	(0.465)
Government hospital	0.197	-0.098	0.095	-0.366	0.195	0.036
	(0.249)	(0.409)	(0.308)	(0.505)	(0.267)	(0.623)
Health center	-0.107	-0.333**	-0.285*	-0.496**	0.008	-0.185
	(0.110)	(0.161)	(0.156)	(0.218)	(0.121)	(0.289)
Maternity house	0.205	0.356	0.444*	0.702**	-0.034	-0.077
	(0.164)	(0.255)	(0.237)	(0.299)	(0.130)	(0.380)
University hospital	0.058	0.144*	0.046	0.105	0.074*	0.223
	(0.044)	(0.075)	(0.070)	(0.096)	(0.044)	(0.152)
Research hospital	-0.002	0.026	0.006	0.057	-0.010	-0.026
	(0.018)	(0.031)	(0.033)	(0.052)	(0.010)	(0.027)
1st Stage F-stat	45.889	21.757	20.584	9.797	29.852	6.732
Obs	3580	2293	1699	1092	1881	1201

Notes: Standard errors in parentheses,
* p<0.1, ** p<.05, *** p<.01.

TableA.12: The IV Estimates of Women Education Effect on Healthcare Utilization for Children - The THS Data

	All	
	(1)	(2)
	81-91	**83-89**
Taking child to a health institution while	0.294	125.565
s/he is healthy (Age 0-6)	(0.371)	(6797.007)
Mean	0.378	0.398
1st Stage F-stat	6.279	0.000
Obs	1706	1102
Taking child to a health institution while	-0.134	-11.399
s/he is healthy (Age 7-14)	(2.598)	(172.504)
Mean	0.221	0.243
1st Stage F-stat	0.169	0.004
Obs	1101	577

Notes: Standard errors in parentheses,
* p<0.1, ** p<.05, *** p<.01.

TableA.13: The IV Estimates of Women Education Effect on Healthcare Utilization for Self Health - Controlling for Income - The THS Data

	(1)	(2)
	81-91	**83-89**
Knowing family physician	-1.000**	-0.929***
(2010 - 2012 survey waves)	(0.437)	(0.323)
Mean	0.805	0.813
1st Stage F-stat	8.272	17.244
Obs	1201	690
Ever received service from general	-0.064	-0.295
practitioner or family doctor	(0.263)	(0.259)
Mean	0.859	0.878
1st Stage F-stat	9.145	12.91
Obs	964	559
Ever had a flu shot	-0.4	-0.532
	(0.278)	(0.699)
Mean	0.114	0.117
1st Stage F-stat	17.199	5.163
Obs	6012	3515
Use of non-prescribed medication,	-0.353*	-0.22
supplements or vitamins	(0.214)	(0.453)
Mean	0.28	0.284
1st Stage F-stat	16.547	4.483
Obs	6023	3522
Use of non-prescribed medication	0.044	1.68
(2014-2016 survey waves)	(0.446)	(1.632)
Mean	0.324	0.323
1st Stage F-stat	3.57	1.115
Obs	3685	2197
Use of non-prescribed supplements or	-0.589	-1.547
vitamins (2014-2016 waves)	(0.452)	(1.36)
Mean	0.089	0.092
1st Stage F-stat	3.57	1.115
Obs	3685	2197

Notes: Standard errors in parentheses,
* p<0.1, ** p<.05, *** p<.01.

TableA.14: The IV Estimates of Maternal Education Effect on Child Health - Controlling for Income - The TDHS Data

	All		Female Child		Male Child	
	(1) **81-91**	(2) **83-89**	(3) **81-91**	(4) **83-89**	(5) **81-91**	(6) **83-89**
Birth weight	223.279	400.300	573.642*	932.062***	-55.917	-328.405
	(185.523)	(255.200)	(295.906)	(351.105)	(241.896)	(541.599)
Mean	3169.236	3174.325	3116.537	3110.066	3215.855	3232.461
Low birth weight	-0.057	-0.234*	-0.102	-0.465**	-0.065	-0.058
(birth weight<2500 grams)	(0.108)	(0.134)	(0.184)	(0.220)	(0.103)	(0.211)
Mean	0.160	0.159	0.181	0.179	0.142	0.142
Log birth weight	0.079	0.098	0.191	0.320**	-0.010	-0.181
	(0.068)	(0.093)	(0.120)	(0.144)	(0.082)	(0.186)
Mean	8.033	8.035	8.017	8.013	8.048	8.054
1st Stage F-stat	53.454	21.377	22.851	10.304	31.215	5.998
Obs	3136.000	2019.000	1472.000	959.000	1664.000	1060.000
BMI std for child	-11.091	64.684	35.379	89.886	-26.717	69.697
	(40.126)	(49.719)	(66.234)	(107.475)	(51.966)	(95.231)
Mean	62.300	59.309	56.390	55.307	67.563	62.902
Height/Age std	84.966	-15.756	43.046	-25.302	129.167*	23.093
	(71.404)	(93.010)	(97.217)	(137.764)	(67.704)	(145.857)
Mean	-50.993	-50.124	-50.217	-48.482	-51.685	-51.599
Weight/Age std	50.015	43.342	55.689	56.231	66.378	69.199
	(42.948)	(54.922)	(72.786)	(112.805)	(47.704)	(93.405)
Mean	10.741	9.231	7.466	7.815	13.657	10.503
Weight/Height std	-0.649	81.826	33.734	112.208	-5.654	101.595
	(39.406)	(51.193)	(68.866)	(118.793)	(49.908)	(96.835)
Mean	56.110	53.118	51.357	50.265	60.342	55.680
1st Stage F-stat	35.078	27.638	10.031	5.352	15.137	2.783
Obs	2607.000	1689.000	1228.000	799.000	1379.000	890.000

Notes: Standard errors in parentheses,
* p<0.1, ** p<.05, *** p<.01.

TableA.15: The IV Estimates of Women Education Effect on Self Health - Controlling for Income

	The DHS Data		The THS Data	
	(1)	(2)	(3)	(4)
	81-91	**83-89**	**81-91**	**83-89**
Body mass index (BMI)	131.510	254.238	-0.895	-3.993
	(177.699)	(257.141)	-2.712	-5.265
Mean	2586.551	2561.329	23.882	23.837
Underweight (BMI < 18.5)	-0.007	-0.008	-0.341	-0.584
	(0.054)	(0.065)	-0.242	-0.587
Mean	0.029	0.031	0.073	0.07
Overweight (BMI $\geq$ 2500)	0.007	0.038	-0.464	-1.292*
	(0.210)	(0.299)	-0.306	-0.666
Mean	0.512	0.489	0.337	0.329
1st Stage F-stat	40.636	33.831	14.42	4.75
Obs	3551	2185	5674	3342
Good health			0.152	0.996
			-0.24	-0.691
Mean			0.778	0.782
1st Stage F-stat			16.347	4.575
Obs			6027	3524
Redefined health status			7.712	29.018**
			-4.845	-14.345
Mean			24.483	24.623
1st Stage F-stat			16.485	4.575
Obs			6023	3524

Notes: Standard errors in parentheses,
* p<0.1, ** p<.05, *** p<.01.

APPENDIX B

TURKISH SUMMARY

Eğitim iktisadi teori içinde her zaman önemli bir yere sahip olsa da (Becker S., 1964)'in eğitim ve beşeri sermaye arasında kurduğu ilişkiyle beraber daha sağlam bir teorik temel kazanmıştır. Beşeri sermayeye yatırım olarak görülen eğitim, her bireyin bilgi, yetenek ve verimliliğini genişletmenin yanı sıra, kadın eğitimi yoluyla toplum için ek faydalar sağlıyor. Hem kadınların hem de erkeklerin refahını arttırabilecek "sosyal dönüşümün dinamik bir destekleyicisi" olarak büyük bir potansiyel atfedilen kadınların, eğitimle beraber güçlendirilebileceği ortaya konmuş (Sen, 1999). Dahası, kadınların daha özgür ve ev içinde daha fazla söz hakkına sahip olmasının aile için daha iyi kararlar alınmasını sağladığı da savunuluyor (Sen, 1999; Duflo and Udry, 2004). Dolayısıyla bir kadının bilgi ve yetenekleri gelişirken, bu kazanımların hane halkı içinde özellikle çocuklarının için sağlık kararlarında ve sağlık çıktılarında kendini göstermesi muhtemeldir. Çalışmalar ayrıca anne eğitiminin diğer sosyoekonomik faktörler arasında çocuk ölümlerini azaltmada en önemli faktör olduğuna işaret etmektedir (Caldwell, 1979). Kadın eğitimi, eğitimde toplumsal cinsiyet eşitsizliğinin varlığını sürdürmeye devam ettiği ve toplumdaki kadınların potansiyelinden tam olarak yararlanmakta başarısız olan gelişmekte olan ülkeler için daha da önem arz ediyor. Benzer şekilde Türkiye'de de kadın eğitiminde iyileştirmeler yapılması gerekiyor ve öneminin ispatlanması ilgili politikaların uygulanmasına teşvik edebilir. Ek olarak Türkiye'de 2000'li yıllarda uygulamaya konulan sağlık reformları, sağlık hizmetlerinin erişilebilirliğini artırarak sağlıkla ilgili çalışmalar için daha uygun bir ortam sunmaktadır. Dahası kadın eğitiminin sağlık hizmetleri üzerindeki etkisinin araştırılması, kadınların, ailelerinin ve nihayetinde toplumun sağlık kullanımını ve sağlığını iyileştiren eğitim programlarının tasarlanmasına da yardımcı olabilir. Bu bağlamda, bu çalışmanın amacı, Türkiye'de kadın eğitiminin hem kendi hem de çocuk sağlığına ilişkin kararlar ve sonuçlar üzerindeki etkisini incelemektir. Çalışma özellikle bir ortaokuldan mezun olmanın, kadınların üzerinde kontrole sahip oldukları sağlıkla ilgili kararlar ve hem kendilerinin hem de çocuklarının sağlık sonuçları üzerindeki nedensel etkisini belirlemeyi amaçlamaktadır. Eğitimin olumlu etkilerini gözlemsel ve teorik delillerle açıklamak görece kolay olsa da nedensel bağlantılar kurmak içsellikten doğabilecek yanıltıcı etkilerden dolayı zorlaşıyor. Bunun sebebi eğitim ve sağlık arasındaki korelasyonun farklı kanallardan da gelme ihtimali. Örneğin, Grossman and Kaestner (1997) eğitimin sağlık arasındaki ilişkinin üç farklı kanaldan kaynaklanabileceğini belirtiyor. Birinci olarak nedensellik eğitimden sağlığa doğru olabilir. Çalışmanın tanımlamayı amaçladığı bu kanal, daha yüksek eğitimden kaynaklanan bilgi artışı, iyileşen muhakeme yetenekleri ve karar mekanizmaları, değişen tercih ve ihtiyaçlarının sağlık üzerindeki etkisini ifade ediyor. İkinci olarak sağlıktan eğitime doğru bir ilişki de mümkün. Bu kanal daha sağlıklı öğrencilerin okulda daha verimli olabileceği ve daha yüksek eğitim seviyelerine sahip olmalarının daha olası olduğunu öngörüyor. Üçüncü olarak da hem eğitim hem de sağlık ailenin sosyo-ekonomik yapısından, çevreden, fiziksel ve zihinsel yetkinliklerden aynı anda etkilenebilir. Sadece eğitim artışından kaynaklanan etkileri yakalamak için ikinci ve üçüncü etkilerden doğabilecek bağlantılardan mümkün olduğunca kurtulmak önemli bir hal alıyor. Bunu gerçekleştirebilmek için 1997 yılında uygulamaya konulan temel eğitim reformunun oluşturduğu doğal deney koşullarından faydalanarak Süreksiz Regresyon Tasarımı (Regression Discontunity Design)'nın argümanlarını takip ederek Araç Değişkenler (Instrumental Variable) yöntemini kullandık.

1997 Zorunlu Eğitim Kanunu, Türkiye'de zorunlu eğitim süresini 5 yıldan 8 yıla çıkartıp ortaokul mezuniyetleri üzerinde ani ve belirgin bir artışa sebep oldu. Reform kadın ve erkek mezuniyet oranları arasındaki farkı azaltmakta başarısız olsa da kadınların, özellikle de dezavantajlı kadınların mezuniyet oranlarını ciddi biçimde etkilendi. Reform ilk olarak 1986 yılında doğan ve 1997 yılı sonbaharında ortaokula geçecek olan kadınlar üzerinde uygulandı. Ancak Türkiye'deki ilkokula başlama yaşının tam olarak belirgin olmaması dolayısıyla 1986'da doğduğu halde reforma maruz kalmamış çocuklar da oldu. Bu belirsizlikten dolayı 1987 doğumlu çocuklar reformdan ilk tamamen etkilenmiş grup oldu. Reformun etki boyutunun yüksekliği, eğitimdeki ani artışın, eğitim yerine bir araç değişken olarak kullanılmasını geçerli kılıyor. Bu doğal deney koşullarının yanı sıra, sağlık hizmetlerine erişim genişletildiği halde sağlık kullanım ve sağlık düzeyinin de düşük seviyelerde seyrettiği Türkiye, bu çalışmanın amacı için uygun bir ortam sağlıyor. Çalışmada Hacettepe Üniversitesi Nüfus Etütleri Enstitüsü (HÜİPS) tarafından 2008 ve 2013 yıllarında yapılan Türkiye Nüfus ve Sağlık Araştırmalarından (TNSA) ve Türkiye İstatistik Kurumu (TÜİK) tarafından 2008, 2010, 2012, 2014 ve 2016 yıllarında yapılan Türkiye Sağlık Araştırmalarından (TSA) elde edilen mikro veri setleri kullanıldı. Ülke genelini yansıtan bu anketler kadınların eğitimi, evliliği, doğurganlık kararları ve sağlık dahil çeşitli konularda mikro veri sağlamaktadır. Araştırmada bu veri setlerinden TNSA'nın evlenmiş kadın örneklemi ve TSA'daki 0-6 yaş grubu, 7-14 yaş grubu ve 15 üstü yetişkin yaş grubu örneklemleri kullanıldı. Kullanılan metottan dolayı örneklem sadece 17 ve 35 yaş arasındaki kadınlardan oluşacak şekilde daraltıldı. Ayrıca çocuklarla ilgili analizlerde TNSA'da anne doğrudan belirlenebiliyor olsa da TSA örnekleminde bu bağlantı doğrudan kurulamıyor. Bu sebeple anne ve çocuk arasındaki ilişkinin "hanehalkı sorumlusuna yakınlık durumunu" sorusu aracılığıyla belirlenebildiği durumlar haricindeki veriler de örneklemden çıkartıldı. Her iki ankette birçok konuda geniş çapta bilgi içerse de araştırma sorusunu en etkin şekilde incelemek için belli bağlantı ve boyutları temsil eden, bilgi, bakış açıları veya kişisel tercihlerini gösteren veriler seçildi. Eğitim etkisinin sağlık karar ve çıktıları üzerine etkisini takip ederken, reformun eğitim üzerine etkisini ispatlamakla başlıyor ve insani gelişmişlik üzerindeki etkisini ifade etmek için ilk evlilik ve doğum yaşı, aile planlama metotlarıyla ilgili bilgi ve bakış açısını test ediyoruz. Sonrasında eğitim artışıyla beraber kadınların kendi ve çocukları için sağlık hizmetlerini kullanımlarındaki olası değişiklikleri gözlemlemek için doğum öncesi bakım ve doğumla ilgili tercihlerini, reçetesiz ilaç veya takviye kullanımlarını ve korunma amaçlı sağlık hizmet kullanımlarını gösteren veriler kullanıldı. Son olarak da ortaokul eğitiminin sağlık çıktıları üzerine etkisini belirleyebilmek için çocukların antropometrik ölçümleri ve kadınların vücut kitle endeksiyle kendi sağlıklarını nasıl tanımladıklarını ifade eden verilen kullanıldı. Bu verilerin analizi sırasında önceden bahsedilen içsellik kaynaklı endişelerin dikkate alınmaması durumunda sonuçların yanıltıcı olması bekleniyor. Örneğin Card (2001) eğitimin etkisi hesaplanırken basit doğrusal regresyon kullanarak elde edilen sonuçların hatalı olduğunu ampirik olarak da ispatlıyor. Bu olasılıktan kurtulmak ve nedenselliğim eğitimden sağlığa olduğu etkileri yakalayabilmek için Süreksiz Regresyon Tasarımı doğrultusunda bir metot kullanıldı. Bu tasarımın belli şartlar altında analizler için neredeyse seçimin tamamen rasgele olduğu, kontrollü bir deney ortamı sunduğu savunulmaktadır. Bu özelliği ile nedensel ilişkilerin araştırılmasında kullanılan deneysel olmayan, en güçlü tasarımlardan biri olarak görülüyor. Süreksiz Regresyon Tasarımı temel olarak eğitim reformu gibi bir uygulamayla ortaya çıkan ani ve belirgin farkın kullanılması üzerine inşa ediliyor. Tasarımın kullanılabilmesi için öncelikle üç temel bileşenin tanımlanabiliyor olması gerekiyor. Bu bileşenler etki oluşturan bir uygulamanın olmasından, uygulamanın başlatıldığı noktanın ve uygulamadan etkilenmeyi belirleyen her birey için bir skor verisinin bilinmesinden oluşuyor. Eğitim reformu bu üç bileşeni sağlamasının yanında, reformunun uygulanması üzerinde bireylerin doğrudan bir etkisi de olmadığı için tasarım için kullanışlı bir araç sağlamış oluyor.

APPENDIX C

TEZ FOTOKOPİSİ İZİN FORMU