Utilization of Healthcare Services by Young Children:

The Aftermath of the Turkish Health Transformation Program

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Abstract

The Turkish Health Transformation Program (HTP), initiated in 2003, has identified achieving universal access to healthcare as one of its main tenets. To date, substantial progress has been made towards universal health coverage (UHC). Service utilization statistics display an upward trend. In this study, we use official and nationally representative micro data collected by the Turkish Health Research Surveys to examine young children's (ages 0-5) utilization of health services. Children in this age group deserve special attention, because adverse health conditions in early childhood are known to have long-time consequences. Policy makers regularly monitor statistics such as infant mortality rate and under-5 mortality rate. We conduct logistic regression analyses to explain the probabilities of being taken to a health institution, to a dentist, and being included in the newborn screening program. We use a rich set of explanatory variables that represent the socio-economic status (SES) of the child's household. Contrary to our expectations and to the goals of UHC, SES indicators such as the insurance ownership of the parent matter for utilization. Decomposition analyses confirm these findings and reveal that the increase in utilization should have been higher than observed. Children from low SES households should be given special attention and that research efforts should focus on identifying the barriers that still hinder children's utilization of healthcare services.

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1. Introduction

The importance of investing in early childhood health is well known. The literature has shown that socioeconomic inequalities in health persist [1] and health status in the childhood has consequences in adulthood for health and labor market outcomes as well as socioeconomic status [2]. Given the long-lasting effects of childhood health, it is clear that pursuing policies that aim to improve child health (to increase average health status of children and reduce health inequities across socioeconomic groups [3]) is one of the best human capital investments that a country can make [4].

A well-functioning health system should take measures to ensure universal access of children to basic health services. Universal health coverage (UHC) is a sustainable development goal (Goal 3) that all United Nations Member States have agreed to try to reach by 2030 [5]. UHC is defined as securing access to adequate healthcare services for all at an affordable price. By this definition, it requires the provision of healthcare for all (the breadth of service) at an adequate level (the depth of service) at an affordable cost (financial protection). Therefore, an important means of progress towards UHC is expanding the set of services that are available to people without exposure to out-of-pocket payment, either by including new services in the benefit package or by reducing the cost of the existing package. User fees that affect access to services should also be considered in the implementation of UHC [6]–[10].

Achieving universal access to healthcare and reducing inequities in health financing have been main tenets of the Turkish Health Transformation Program (HTP) [11]–[18]. HTP has introduced both demand and supply-side reforms on which discussions and criticisms still continue [15], [19], [20]. In line with the supply-side HTP reforms, the Ministry of Health (MoH) has been positioned as a strategic institution in charge of planning and regulation. For the provision of services, the family medicine system (FMS) has been introduced for primary healthcare services and public hospitals have been given administrative and financial autonomy (with the establishment of public hospital unions and continuing establishment of huge city hospitals with the public private partnerships). Reforms to address the shortage of health human resources include the establishment of new medical schools and a performance-based payment system for health personnel [21]. As a demand-side HTP reform, the General Health Insurance (GHI) system has been adopted with the aim to extend health insurance coverage to the entire population (14).

On the access and utilization of health services by young children, GHI is crucial as a demand-side reform and FMS as a supply-side reform. In 2006, the Social Security Institution (SSI) law created a single pool that gathered the entire population under a single umbrella to standardize benefits and liabilities. Thus, the SSI became the sole purchaser of health services

from the public and private sectors which was fragmented earlier [7], [22]. In 2008, the Social Insurance and General Health Insurance law extended health insurance coverage to the whole population [23]. GHI law covers all the population and operates on a premium basis. People who are unemployed or informally employed (a non-negligible part of the population) can have access either by qualifying for a means-tested public health insurance scheme (called the Green Card) and receiving the same benefit package that others have been receiving since 2007 [24], [9], [10]; or, more recently, by joining the system compulsorily by paying 3% of gross minimum wage as premium. Some services are subject to contribution fees. There are some premium and contribution fee conditions for entitlement to services and these conditions have prevented GHI system in Turkey from providing UHC fully [7], [25], [26].

Our focus group in this study, the 0-5 year old children, are a special group in the sense that they (along with all individuals younger than 18) have been granted health insurance coverage by law [23, Sec. 69]. This means that children are covered by GHI regardless of the insurance status of their parents or their ability to pay. Moreover, services provided by FHS (examinations, laboratory tests, vaccines) are provided free of charge and without an appointment. Yet, other healthcare services (such as outpatient secondary or tertiary care, or outpatient medications) are subject to contribution fees.

Adopted in 2004, FMS is important, as the World Health Organisation (WHO) has identified primary healthcare as the key to providing universal access to acceptable and affordable healthcare for all [27]. It is also important for our study as young children usually obtain most of their health needs from the FMS. In Turkey, family physicians are contracted by the MoH and paid based on performance measures that focus on key priority areas such as immunization coverage, antenatal care visits, and follow-up visits for babies and children [28, p. 193], [29], [30]. The official statistics indicate that infant mortality rates, immunization and service coverage have improved considerably. Between 2003 and 2016, infant mortality rate fell from 28.5 to 7.3 per 1,000 live births and average national immunization coverage rates rose from 70% to 97% [28]. It has been found that FMS reduced mortality rate by 25.6% among infants and 22.9% among children ages 1-4, which translate into 2.6 and 13 fewer deaths among infants and children ages 1-4, respectively [31]. Moreover, FMS has contributed to an equalization of mortality across provinces. However, regional inequality in health human resources still remains. In 2016, population per actively working family medicine was 3.395 in Istanbul (where population density is very high), compared to 3.011 in the Northeast Anatolia (where population density is very low) [30, p. 128].

The HTP placed special emphasis on enhancing primary care and child health. Protecting and enhancing child health and improving the family medicine system have priority in public health goals, as clearly admitted in the Strategic Plan of the Public Health Institution of Turkey

for 2013-2017 [33]. For example, one of the targets under Goal 1 is to ensure that 0-12 year old children visit a dentist twice a year. Goal 2 is to take all preventive measures to protect and develop health of mothers, children, and youth and thereby to invest in the health of the next generations. Goal 3 is to reduce the mortality and morbidity of diseases, with a child-specific target of achieving full vaccination for 13-24 month old children at a rate of 90% by 2014 and maintaining that rate. Goal 4 is to ensure the quality, efficiency, and effectiveness of primary care services.

Since the implementation of the HTP, utilization of health services increased significantly. Number of visits to a physician in a healthcare facility rose from 3.1 per capita in 2002 to 8.6 in 2016, which was 6.9 for OECD countries [34], [35, p. 143]. However, the insufficient and unequal distribution of health services, health personnel, and infrastructure across the country still continue to some extent [11], [16], [20], [36].

Gains from the HTP are visible on both the demand side (increased insurance coverage, health service access, and use of key child health services) and the supply side (better infrastructure, health human resources, and health services) [20]. However, as our findings indicate, more work needs to be done to achieve UHC. In the 2008-2012 period, the socioeconomic status of a young child (the education level or the insurance status of the parent) is still associated with the likelihood of using healthcare services, which should not be the case in UHC.

In this paper, we aim to identify the factors that are related to the utilization of healthcare services by young children in Turkey. We use micro level data collected by the nationally representative Health Research Surveys in years 2008, 2010, and 2012. To the best of our knowledge, ours is the first study that examines health service utilization by young children using these data. Other studies consider either the entire population or a different time period. Two papers ask similar questions to ours. One of them investigates maternal and child health in Turkey in 2003-2008 with a focus on antenatal, delivery, and postpartum care of mothers [37]; the other one studies access to maternal and child health services in 1993-2013 and reports inequity in utilization of such services [38]. Both papers use a dataset that is different from ours.

We contribute to the literature in the following dimensions: We confirm that utilization is correlated with the socioeconomic status and insurance ownership of the parent, which we do not expect to see under UHC. We apply non-linear decomposition techniques to estimate the extent to which improvements in household economic conditions (in particular, better education, fewer children per household, greater insurance coverage) translate into higher utilization of healthcare services.

2. Data and Descriptive Statistics

Our data source is the Turkish Health Research Surveys administered by the Turkish Statistical Institute (TurkStat) in 2008, 2010, and 2012 on nationally representative samples during late spring or early summer. The 2008 survey is the earliest survey. 2010 was the year when the family medicine program was available in the entire country; therefore, we study the changes in a four-year period covering two years before 2010 and two years after. (Although the 2014 survey data are available to us, we cannot use them, because the change in the design of the questionnaire makes compatibility with earlier years problematic.)

The surveys employ a two-stage stratified cluster sampling method [39]. In the beginning of the study, we had to recode the entire data. The most challenging task was to ensure the consistency of the variable definitions across the years of the survey. Details of variable definitions are given in the Appendix. Where possible, the descriptive statistics were cross-checked with administrative sources (for example, insurance ownership rates were compared with the nationwide statistics in the yearbooks of the SSI). Our samples include 2,025 children in 2008, 1,955 in 2010, and 3,408 in 2012.

Descriptive statistics presented in Table 1 confirm that the sample composition remained stable over time in children's average age, sex, and the prevalence of chronic illnesses. However, in 2012, compared to 2008, an average parent is older, better educated, and less likely to smoke, has a higher BMI, a higher income, and is less likely to have financial access problems. In 2012, on average, households have fewer children. Both public and private insurance ownership increased, while Green Card ownership and having no insurance declined.

Table 2 presents descriptive statistics on the children's use of health services. The share of children who were Taken to a Health Institution (THI) significantly increased from 59.76 % to 71.68 % between 2008 and 2012. For age 0, we observe a significant decrease, which is both surprising and worrying. The surveys ask parents if during the calendar year the child was Taken to a Health Institution when Not Sick (THINS). Further questions were asked if the child was THINS (see the Appendix for details). We show in Table 2 that among 0-5 year old children, 17.86% were included in the newborn screening program in 2008, but the rate rose to 74.85% in 2012. The low rate of being taken to a dentist (around 9.25-9.7%) showed no sign of increase. Among children THINS, the share of those taken to a family health center (FHC) increased from 64.51% in 2010 and 73.77% in 2012 (p-value less than 1%). Clearly, FHCs were the most popular choice of parents for check-ups of their young children.

Table 1: Descriptive statistics on children's and their parents' characteristics (ages 0-5)

	2008	2010	2012	Change (p-value)*	Direction
1. Average age in the 0-5 year old sample	2.70	2.76	2.76	0.1833	
2. % Children with a Chronic Illness	5.05	4.64	6.01	0.2083	
3. % Female Children	48.42	52.01	49.31	0.043	Up
4. % Children by the Parent's Education level					
Primary School or Less	72.05	67.15	58.13	0	Down
Middle School Graduate	7.32	8.46	13.14	0	Up
High School Graduate	14.12	14.86	17.41	0	Up
University+	6.50	9.52	11.32	0	Up
5. Number of Children (<14) in the Household	2.36	2.43	2.20	0	Down
6. Parent's Age (mean)	33.99	35.12	35.59	0.0001	Up
7. Parent's BMI Levels (Mean)	25.06	25.6	25.72	0	Up
8. % Children whose Parents Smoke	NA	18.74	15.5	0.0344	Down
9. Type of Insurance that the Parent Has					
Public insurance	66.5	63.71	78.15	0	Up
Private insurance	0.43	0.99	0.99	0.0003	Up
Green Card	21.74	24.02	16.05	0	Down
No insurance	11.43	11.28	4.98	0	Down
10. % of Children whose Parent Has Problems with:					
Financial access	14.91	15.08	5.26	0	Down
Physical access	1.68	1.36	1.49	0.3067	
11. % Children by Employment Status of Parent					
Employed	16.39	18.85	19.19	0.0003	Up
Unemployed	1.26	0.7	0.63	0.1498	
Seasonal Worker	0.54	0.26	0.15	0.0068	Down
Inactive	81.81	80.19	80.02	0.0036	Down
12. % Children in Income Brackets					
Income not revealed	61	52.47	61.1	0.2686	
Income bracket 1 (lowest)	9.46	8.77	3.08	0	Down
Income bracket 2	7.22	8.38	3.16	0	Down
Income bracket 3	4.71	4.88	2.04	0	Down
Income bracket 4	4.89	5.15	3.95	0.3186	
Income bracket 5	3.14	4.52	5.46	0	Up
Income bracket 6	3.21	3.97	4.58	0.0013	Up
Income bracket 7	1.56	3.93	4.39	0	Up
Income bracket 8	2.35	2.63	4.97	0	Up
Income bracket 9	1.27	2.10	3.01	0.0001	Up
Income bracket 10 (highest)	1.18	3.19	4.25	0	Up
13. % Children by Type of Income Received in the Household					
Income Type: Labor	90.18	91.56	94.17	0	Up
Income Type: Asset	1.7	0.67	1.9	0.5327	
Income Type: Retirement	9.88	10.1	10.62	0.2410	
Income Type: Transfers	5.80	9.02	6.43	0.9391	

Notes: Weighted statistics are shown in the table. In several questions of the survey (such as insurance ownership or type of income received) the parent can choose all that applies.

* Null hypothesis is no change between 2008 and 2012. If the variable is not available in 2008, the null hypothesis is no change between 2010 and 2012. The direction of change is shown if p-value<5%.

Source: Authors' calculations using data from the Turkish Health Research Surveys.

Table 2: Descriptive statistics on the children's use of health services

	2008	2010	2012	Change (p-value)Ω	Direction
1. % Children Taken to a Health Institution (THI) (for any reason)					
All children in ages 0-5	59.76	70.75	71.68	0	Up
Age 0	79.9	65.84	62.53	0.0068	Down
Age 1	74	73.19	75.22	0.2791	
Age 2	61.03	73.32	77.69	0	Up
Age 3	54.72	70	70	0	Up
Age 4	46.87	67.02	69.5	0	Up
Age 5	52.35	72.04	70.57	0	Up
Parental Insurance Type: Public Insurance	64.16	73.66	74.94	0	Up
Parental Insurance Type: Private Insurance	73.87	92.30	86.89	0.6418	
Parental Insurance Type: Green Card	50.36	61.87	58.15	0.0343	Up
Parental Insurance Type: No Insurance	51.87	71.34	62.11	0.0027	Up
2. % Newborn Screening Program	17.86	53.84	74.85	0	Up
3. % Children taken to a Dentist	NA	9.25	9.7	0.3854	
3. Among Children THINS					
Taken to a FHC	NA	64.51	73.77	0	Up
Taken to a hospital	NA	38.58	36.09	0.0681	
Taken to a private physician's office	NA	23.64	22.52	0.9221	

Notes: Weighted statistics are shown in the table. Ω Null hypothesis is no change between 2008 and 2012. If the variable is not available in 2008, the null hypothesis is no change between 2010 and 2012. The direction of change is shown if p-value<5%.
Source: Authors' calculations using data from the Turkish Health Research Surveys.

4. Method

Theoretical Basis

Our study relies on the theoretical framework that links together the concepts of need, access, and utilization [40]. Equity in health care usually refers to the principal of 'equal access for equal need'. It is hard to find an unambiguous definition of 'need' [41]. In empirical work, where authors are constrained by the set of variables in their dataset, it is common to take one's overall subjective or objective health status as a measure of need. Both measures have deficiencies, because the researcher has to assume that there is no systematic variation across groups (either in the way the subjective health question is answered or in the way the objective health status in measured). In this study, we use the age of the child and the presence of a chronic illness to measure 'need'. Here, the idea is that health services should be tailored to the need of the child, which is determined by the age and the chronic health condition of the child.

'Access' to health services can simply be thought of as having health insurance or, in a broader sense, the ability to use a desired range of services at the desired quality [40]. Since the measurement of access is difficult, most of the empirical studies investigate the observed choice

(i.e., 'utilization' or 'receiving treatment') rather than the unobserved concept of 'availability of treatment'. We follow the same strategy in this paper.

Hence, the model of utilization decision relies on the economic choice, made by a person with a known level of need, between the expected benefit of utilization versus perceived costs.

Empirical Strategy

We estimate the coefficients of the following equation using binary multivariate logistic regression:

$$U_i = \beta_0 + B_1\, Need_i + B_2\, Nonneed_i + \epsilon_i, \qquad (1)$$

where U_i indicates child i's use of health care services (1 if the child uses services, 0 otherwise). B_1 and B_2 are the coefficient vectors to be estimated. $Need_i$ and $Nonneed_i$ are the need related and non-need related characteristics of the child and the household. Need related variables are the age of the child and the chronic illness dummy variable (1 if yes, 0 if no). All children in ages 0-5 require preventive care, including well-child visits, scheduled vaccinations, and guidance on proper nutrition. Especially in the first year of life, routine visits to a health facility are crucial to ensure a healthy start to life. Children with special needs (e.g. chronic conditions) must be treated in accordance to their specific needs.

If utilization were determined solely by need, all of the non-need variables would have a zero coefficient in equation (1). However, there is evidence in the literature that utilization is related to non-need variables. For example, there is evidence for gender-based discrimination in pediatric healthcare, even in immunizations [42]. To account for gender-based differences, we control for the sex of the child. There is also evidence in the literature that factors such as the socio-economic status of the household, household resources and insurance ownership may be determinants of health service utilization [43]. To account for such factors, we include the education level of the parent, the number of children (ages 0-14) in the household, household income, the employment status of the parent, and the income sources of the household as control variables in the regressions.

One important non-need variable is the type of insurance held by the parent (base category: no insurance). The insurance status of the parent should not affect utilization, since all children are covered by the state (as explained in section 2 above). Other non-need variables are whether the parent has difficulties in financial access (difficulty in affording out-of-pocket expenditures) or physical access (being far from a health facility). The western regions of the country have a higher population density than the eastern regions, which means that the density of health facilities may vary across regions. For this reason, we control for the geographical region where the household lives (12 NUTS-1 regions). In the regressions, we also control for the parent's health related behaviors (smoking status) and a health indicator of the parent (Body

Mass Index (BMI)). Here, we aim to control for the possibility that unobserved attitudes and preferences of the parents affect their own health related behaviors and health indicators as well as their decisions on their children's utilization of health care services.

In Table 1, we showed that the mean values of some of the explanatory variables (such as insurance ownership, access problems, income and education of the parent) changed substantially over time. If nothing else changed, these changes alone could have generated a change in the utilization rates. With X representing the control variables and $\hat{\beta}$ the coefficient estimates, the logit equation can be written as

$$U = F(X\hat{\beta}). \quad (2)$$

The change in the average value of U between years t_1 and t_0 can be decomposed as follows:

$$\overline{U}_{t1} - \overline{U}_{t0} = \left[\sum_{i=1}^{N_{t1}} \frac{F(X_{i,t1}\widehat{\beta}_{t0})}{N_{t1}} - \sum_{i=1}^{N_{t0}} \frac{F(X_{i,t0}\widehat{\beta}_{t0})}{N_{t0}}\right] + \left[\sum_{i=1}^{N_{t1}} \frac{F(X_{i,t1}\widehat{\beta}_{t1})}{N_{t1}} - \sum_{i=1}^{N_{t1}} \frac{F(X_{i,t1}\widehat{\beta}_{t0})}{N_{t1}}\right], \quad (3)$$

where N is the number of observations. In equation (2), the first square brackets is related to changes in the distributions of control variables and the second square brackets is related to changes in the process that determines U (also captures the part of change in U due to time differences in unmeasurable or unobserved factors, such as changes in health attitudes or preferences over time). We are mainly interested in the first term, rendering the second term to a residual. This is known as the 'Fairlie decomposition' technique, which is an extension of the classical Oaxaca-Blinder decomposition technique [44]. Basically, the technique estimates the contributions of the control variables (or groups of control variables) in explaining the change in utilization.

The decomposition in equation (2) relies on using the t_0 coefficients as weights in the first term and the t_1 distributions of the control variables as weights in the second term. Alternatively, t_1 coefficients and t_0 distributions could have been used. As a third alternative, the pooled coefficients $\hat{\beta}^*$ can be used (which are obtained from the logit regressions that pool observations in years t_0 and t_1). Since there is no theoretical guidance on which coefficients to use in the first term, we follow the third alternative and therefore estimate the first term as:

$$\left[\sum_{i=1}^{N_{t1}} \frac{F(X_{i,t1}\widehat{\beta}^*)}{N_{t1}} - \sum_{i=1}^{N_{t0}} \frac{F(X_{i,t0}\widehat{\beta}^*)}{N_{t0}}\right]. \quad (4)$$

5. Results

Logit Estimation Results

Table 3 presents the results obtained from logit regression estimation of equation (1) using 2012 data. Starting with the need variables, we observe that children in ages 0-4 are more likely to be THINS (compared to the 5-year old base category) (odds ratio>1, column (3)). They are

also more likely to participate in the newborn screening program (column (7)), which is not surprising given the rise in the participation rate from about 17.86% in 2008 to almost 75% in 2012 (See Table 2). (But here, recall bias may also be at work. Information about children's health is collected from their parents. Compared to the parents of older children, it may be easier for parents of younger children to remember the newborn screening program.)

We observe that children are less likely to be taken to a dentist before age 5 (column (5)). For many children, the first dental check-up is probably performed during dental screening at elementary school. Considering being THI, we find evidence that visits in the first year of life are missed (or not reported) and weak evidence that younger children are more likely to be THI than 5 year olds (column (1)). Children with a chronic illness are much more likely (about 40%-60% more likely) to have used health care services (see columns (1), (5), and (7)). Therefore, both age and having a chronic illness are important variables that should be controlled for in these regressions.

The non-need variables that we control for are the child's gender as well as parental and household characteristics. We find that the estimated odds ratios for girls are statistically not different from 1. The largest measured effect is about 16% lower likelihood for girls of being taken to a dentist (column (5)). We conclude that in Turkey there is no statistically significant evidence for gender-based discrimination in health service utilization of 0-5 year old children in 2012.

We use several variables to control for the socio-economic status (SES) of the household and the amount of resources that the child has access to. The excluded dummy variables for income and education are 'highest income bracket' and 'university or more'. The odds ratios for income bracket dummies are mostly less than one and some of them are statistically significant, which means that relative to the children of households in the highest income bracket, those in lower brackets have lower odds of using healthcare services.

Children of parents with at most primary school education are significantly less likely (about 40-45% less likely) to receive healthcare services compared to children whose parents have a university degree or more. Also, we observe a difference between the children of parents with primary school versus high school degree (except for the 'newborn screening' regression). (The p-values of the test for equality of the effects of having a primary school graduate parent and a high school graduate parent are 0.026 in the THI regression, 0.0002 in the THINS regression, and 0.0135 in the 'taken to dentist' regression. However, the p-value is 0.4105 in the 'newborn screening' regression. The difference between the coefficients of having a parent with a primary and middle school degree is statistically zero.) No significant difference is observed between having a primary school versus a middle school degree (except for the THI regression).

Moreover, a child is about 40% less likely to be included in the newborn screening program if the parent does not have a university degree (column (7)).

In addition, if the parent is female, the child is about 42% less likely to participate in the newborn screening program. These are alarming findings that should be investigated further to determine the extent to which they are a result of the recall bias of parents. The number of children (0-14 years old) in the household is another significant factor that influences the odds of receiving health services. Our results clearly show that children from crowded families have a lower odds of using health services. An additional child in the household reduces the odds by about 10-25%. The odds of being THINS is reduced by about 25%. Hence, crowded families may be targeted by selective subsidies or better incentives for health care.

Our results indicate that if the parent experiences difficulty in physical access (problems making appointments or transportation) or financial access (difficulty in making out-of-pocket payments), this, in general, does not preclude a child from using health services. The only exception is that physical access problems significantly reduce the odds of being in the newborn screening program (by about 49%). Hence, households that are located far from health institutions or in places with scarce health resources have the problem of intergenerational transmission of disadvantages: The difficulties that a parent faces may adversely affect the health of the child.

Under the current legal framework that regulates access of children to basic health care and preventive care services, the insurance status of the parent should not matter for service use, once we control for need. However, our results indicate otherwise. Compared to those with no insurance, children whose parents have public or private insurance have greater probability of being THI and THINS, controlling for income and access problems. Such a finding is surprising, given the enlarged network of family health centers and assistance programs that offer cash transfers conditional on the use of health services [45]. Further investigation is needed to recover the reasons behind the finding (such as a lack of information on the availability of services, social exclusion, a superstition that keeps children away from health institutions, or some other reason).

Table 3: Logit Regression Results (2012 data): Odds ratios and 95% confidence intervals

	Taken to Health Institution (THI)		Taken to Health Institution when not sick (THINS)		Taken to a dentist		Newborn Screening Program	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Odds R.	95% CI	Odds R.	95% CI	Odds R.	95% CI	Odds R.	95% CI
Need Variables:								
Child's Age:0	0.662**	0.465 - 0.941	4.045***	2.853 - 5.733	0.0113***	0.00156 - 0.0813	1.347	0.931 - 1.948
Child's Age:1	1.208	0.909 - 1.606	4.434***	3.354 - 5.862	0.0529***	0.0277 - 0.101	2.879***	2.128 - 3.896
Child's Age:2	1.417**	1.054 - 1.906	1.966***	1.487 - 2.599	0.177***	0.113 - 0.277	1.819***	1.361 - 2.431
Child's Age:3	0.928	0.709 - 1.214	1.283*	0.979 - 1.681	0.349***	0.243 - 0.502	1.493***	1.141 - 1.954
Child's Age:4	0.892	0.680 - 1.171	0.834	0.627 - 1.110	0.580***	0.424 - 0.793	1.345**	1.031 - 1.754
Chronic illness	1.591**	1.075 - 2.354	1.006	0.690 - 1.468	2.005***	1.266 - 3.176	1.755***	1.169 - 2.636
Non-Need Variables:								
Female	0.895	0.754 - 1.063	0.969	0.822 - 1.143	0.840	0.653 - 1.081	0.986	0.827 - 1.175
Income not revealed	0.785	0.489 - 1.262	0.727*	0.498 - 1.061	1.069	0.608 - 1.879	0.660	0.389 - 1.120
Income bracket 1 (lowest)	0.635	0.317 - 1.271	0.668	0.332 - 1.345	0.255**	0.0657 - 0.991	0.485*	0.227 - 1.039
Income bracket 2	0.454**	0.231 - 0.891	0.325**	0.137 - 0.770	0.288*	0.0701 - 1.183	0.265***	0.132 - 0.533
Income bracket 3	0.690	0.310 - 1.539	0.730	0.314 - 1.696	0.0600***	0.00761 - 0.472	0.585	0.262 - 1.305
Income bracket 4	0.752	0.390 - 1.450	0.725	0.409 - 1.285	0.659	0.259 - 1.681	0.455**	0.230 - 0.898
Income bracket 5	0.387***	0.215 - 0.699	0.353***	0.200 - 0.623	0.501	0.190 - 1.318	0.466**	0.247 - 0.879
Income bracket 6	0.601*	0.331 - 1.094	0.744	0.438 - 1.262	1.606	0.758 - 3.402	0.710	0.369 - 1.367
Income bracket 7	0.695	0.377 - 1.280	0.641*	0.379 - 1.084	0.878	0.388 - 1.988	0.361***	0.190 - 0.686
Income bracket 8	0.889	0.477 - 1.658	0.640*	0.382 - 1.072	0.817	0.354 - 1.884	0.785	0.405 - 1.520
Income bracket 9	0.540*	0.280 - 1.042	0.819	0.445 - 1.508	1.081	0.440 - 2.657	0.894	0.407 - 1.964
Parent: Primary School or Less	0.651**	0.449 - 0.944	0.590***	0.434 - 0.802	0.551**	0.344 - 0.883	0.536***	0.363 - 0.791
Parent: Middle School Graduate	0.840	0.554 - 1.272	0.666**	0.466 - 0.951	0.564**	0.334 - 0.952	0.591**	0.383 - 0.912
Parent: High School Graduate	0.877	0.600 - 1.284	0.920	0.674 - 1.255	0.885	0.571 - 1.372	0.598**	0.402 - 0.888
No.of Children in the hh	0.832***	0.771 - 0.898	0.742***	0.676 - 0.814	0.819***	0.705 - 0.953	0.901**	0.828 - 0.980
Parent's Age	1.007	0.995 - 1.020	0.999	0.986 - 1.012	1.008	0.990 - 1.026	1.006	0.994 - 1.018
Parent Female	0.925	0.578 - 1.482	1.339	0.846 - 2.121	1.044	0.511 - 2.134	0.577**	0.354 - 0.941
Difficulty in Physical Access	1.547	0.838 - 2.857	1.135	0.556 - 2.317	1.924	0.795 - 4.660	0.507**	0.264 - 0.976
Difficulty in Financial Access	1.339	0.913 - 1.962	1.080	0.711 - 1.640	0.784	0.404 - 1.521	0.873	0.588 - 1.296
Insurance: Public	1.609**	1.096 - 2.361	2.065***	1.339 - 3.185	1.427	0.719 - 2.831	1.135	0.765 - 1.684
Insurance: Private	3.099**	1.049 - 9.161	3.882***	1.669 - 9.032	1.197	0.325 - 4.405	1.168	0.452 - 3.014
Insurance: Green Card	1.272	0.823 - 1.965	1.536*	0.944 - 2.500	1.288	0.554 - 2.995	1.115	0.715 - 1.739
Observations	3,363		3,363		3,363		3,363	

Notes: The odds ratios estimated for the region dummies (12 NUTS-1 regions) are not shown in the table. They vary in the range 0.358-1.668 if the dependent variable is "Taken to Health Institution", 1.133-2.926 if the dependent variable is "Taken to a health institution when not sick", 0.290-1.269 if the dependent variable is "Taken to a dentist", and 0.639-4.782 if the dependent variable is newborn screening program; many of them are statistically significant. We also control for the 'parent employed' dummy variable, three dummy variables for income type received by the household (labor, asset, retirement), and a dummy for 'Parent not mother or father'. Base categories are as follows: For income, the top bracket; for child's age, "Child age: 5"; for parent's education level, "University or higher degree"; for insurance types, "No insurance"; for employment status of the parent, "Not employed"; and for household's income type: "Income Type: Subsidy". All regressions include a constant term. *** 1%, ** 5%, * 10% level of significance.
Source: Authors' calculations based on data from Turkish Health Research Surveys.

Table 4 presents the odds ratios for logit regressions on the type of health institution visited: FHC, hospital, or a private office. Here, the samples include children THINS and not all 0-5 year old children. We observe that among those who are THINS, the younger children are more likely to use a FHC. For children with chronic problems, the odds of being taken to a hospital is substantially higher (almost three times higher) than being taken to the other two alternatives.

We find no difference in the choice of health institution between boys and girls or across household income brackets (except that the middle brackets have lower odds of being taken to a private office). However, the findings on parental education and the number of children in the household reveal a picture in which SES of the households is a crucial factor in health care choices. Among children THINS, children whose mothers have less education are more likely to use FHC and not a private physician's office; children from crowded families are less likely to use hospitals or physicians' offices.

As part of robustness checks (available upon request), we control for the parent's health related behaviors and health indicators (BMI and smoking status) as non-need variables and see that our results do not change qualitatively. We find that children with smoker parents have greater odds to be THI and THINS. Those children are also more likely to have a dental visit. Regarding the parent's BMI levels, we observe that children whose parents have greater BMI levels are more likely to be THI, but they have lower tendency to participate in the newborn screening program.

Table 4: Logit regressions on the type of institution visited (Odds ratios are shown) (2012)

VARIABLES	(1) Family Health Center	(2) Hospital	(3) Physician's Office
Need Variables:			
Child's Age:0	2.690***	1.603*	0.830
Child's Age:1	2.888***	0.876	0.943
Child's Age:2	1.999***	1.121	1.013
Child's Age:3	1.704**	0.873	0.912
Child's Age:4	1.747**	0.757	0.744
Chronic illness	0.813	2.826***	0.558
Non-Need Variables:			
Female	1.031	0.968	0.853
Income not revealed	0.963	1.046	0.755
Income bracket 1 (lowest)	1.808	1.706	4.731
Income bracket 2	0.986	1.054	
Income bracket 3	0.312*	1.789	0.674
Income bracket 4	1.086	1.564	0.242*
Income bracket 5	0.858	1.252	0.201**
Income bracket 6	0.949	1.422	1.080
Income bracket 7	0.720	1.025	1.372
Income bracket 8	1.177	1.285	0.982
Income bracket 9	0.880	1.407	1.073
Parent: Primary School or Less	3.004***	0.912	0.405***
Parent: Middle School Graduate	2.119***	0.785	0.459***
Parent: High School Graduate	1.515*	0.807	0.771
Number of Children in the hh	1.130	0.830**	0.644***
Parent's Age	0.994	1.010	1.029**
Parent Female	0.840	0.424**	1.276
Difficulty in Physical Access	2.292	0.512	0.569
Difficulty in Financial Access	0.928	1.184	0.965
Insurance: Public	0.628	1.539	1.916
Insurance: Private	0.176**	2.046	3.764
Insurance: Green Card	0.319*	3.320**	0.352
Observations	1,253	1,253	1,241

Notes: Samples include children taken to a health institution when not sick during the year. "Family health center" is equal to one if the child was taken to a family health center and equal to zero if not. The other dependent variables are defined similarly, without excluding joint use of health institutions. We also control for the 'parent employed' dummy variable, three dummy variables for income type received by the household (labor, asset, retirement), and a dummy for 'Parent not mother or father', and region dummies. All regressions include a constant term. Base categories are as follows: For child's age; "Child age: 5"; For parent's education levels; "University or higher degree", for insurance types; "No insurance", for employment status of the parent; "Unemployed or inactive or seasonal worker", and for household's income type: "Income Type: Subsidy". All regressions include a constant term. *** 1%, ** 5%, * 10% level of significance.

Source: Authors' calculations based on data from Turkish Health Research Surveys.

Fairlie Decomposition Analyses

Descriptive statistics in Table 2 reveal that there is a huge increase in the rate of participation to the newborn screening program, from 17.86 % in 2008 to 74.85 % in 2012. There is also

considerable increase in the rate of being THI, from 59.76 % in 2008 to 71.68 % in 2012. Moreover, among the children who were THINS, we observe a significant increase in the utilization of family health centers, from 64.51% in 2010 to 73.77 % in 2012. In sum, we observe a substantial increase in these three dependent variables.

In this part of the paper, we use the Fairlie decomposition technique to estimate the extent to which the changes in the explanatory variables have led to the changes in the three dependent variables: being THI, newborn screening, and visiting FHC. As the fourth dependent variable, we consider being THINS. Even though there is no significant increase in this variable during the analysis period, we are still interested in it, since it is an important indicator of utilization of preventive healthcare services by children.

The decomposition results in Table 5 initially show us the predicted probabilities (i.e. $E(U_i)$ in equation (1)) in the beginning and at the end of the analysis period. Next, the results show us the percentage of the difference in $E(U_i)$ explained by the change in the distribution of the control variables. The contribution of the change in the control variables is estimated as in equation (4), relying on the pooled coefficients. For example, column (1) of the table shows the results for the dependent variable "being THI". We can see that only 26.28% of the increase in this variable between 2008 and 2012 can be explained by the changes in the distribution of need and non-need variables. In columns (3) and (4), again, we see that only a small share of the predicted change is explained by the changes in the need and non-need variables. Looking at the contributions of need versus non-need variables, we notice that the contribution of the changes in the distribution of need variables is negligible.

In column (2), the increase over time in the rate of being THINS is already small so that there is not much change to be explained. The interesting finding here is that, keeping all else the same, the changes in the explanatory variables alone would have led to a greater increase in the dependent variable, which did not realize.

In columns (1) and (2), we observe three non-need variables that significantly contribute to explaining the change in $E(U_i)$: the number of children in the household, the education level of the parent, and insurance ownership. Logit estimation results suggest that a higher number of children in the household reduces the chances of a child to use healthcare services. We also know that the number of children per household declined over time (Table 1). Here, we find that the decline over time in the number of children per household has led to an increase in the likelihood of a child's utilization of health services. Similarly, with advances in parent's education on average (Table 1) has led to an increase in being THI and THINS. The third finding is that the rising share of insurance ownership contributed significantly to explaining the increase in the rates of being THI and THINS. This means that efforts of the government to

increase insurance coverage of the population have generated the beneficial result of increasing utilization.

In column (3), as in columns (1) and (2), the changes in the number of children per household and insurance ownership contributed positively to $E(U_i)$. In column (4), we find that none of the control variables contributed significantly to explain the change in $E(U_i)$. (Not shown on the table: Asset ownership reduced $E(U_i)$ at 10% significance level.)

Therefore, the factors that have contributed significantly to the increase in the utilization rate of healthcare services are the reduction in the number of children per household in addition to improvements in average education level of the parents and their insurance ownership. We would expect the share of children THINS to have increased faster, given the substantial changes in non-need variables, but this expectation did not realize. In the overall, control variables can explain only a small part of the change in the dependent variables in columns (1), (3), and (4). Therefore, the change in $E(U_i)$ must be, to a great extent, the result of changes in the process that determines U (changes in β in response to demand and supply-side incentives to increase utilization), or changes in unmeasurable or unobserved factors, such as changes in health attitudes or preferences over time.

Table 5: Fairlie Decomposition Results

	(1) Taken to a Health Institution (THI)	(2) Taken to Health Institution when not sick (THINS)	(3) Newborn Screening Program	(4) Visit to a Family Health Center (FHC)
Predicted U_i (earlier year)	0.6484	0.4384	0.2352	0.6887
Predicted U_i (later year)	0.7268	0.4455	0.7803	0.7946
Difference	0.0784	0.0071	0.5451	0.1059
Explained difference	0.0206	0.0407	0.0277	-0.0143
Percent explained	**26.28%**	**573.24%**	**5.08%**	**-13.50%**
Contributions from across-year differences in:				
Need variables	-0.000811	0.00792***	0.00127	-0.00149
	(-1.03 %)	**(111.54%)**	**(0.23 %)**	**(1.41 %)**
Child's Age	-0.00085	0.075***	0.001502	0.000545
Chronic illness	0.00000594	-0.0000446	-0.0000836	-0.00127
Non-need variables	0.0215***	0.0325***	0.0263***	-0.0125
	(27.42 %)	**(457.75 %)**	**(4.83 %)**	**(-11.8 %)**
Female	-0.000592	0.0000703	0.000576	0.00126
Household Income	0.011621	0.009507	0.00609	-0.0063
Parent: Primary School or Less	0.00257	0.00898	0.00405	-0.00863
Parent: Middle School Graduate	-0.000670	-0.00473*	-0.00237	0.00203
Parent: High School Graduate	0.000363	-0.00100	-0.00107	0.000542
Number of children in the hh	0.00262***	0.00209**	0.00503***	-0.00173
Parent's Age	-0.00194	0.000171	0.00369	0.000155
Parent Female	-0.000213	-0.000343	0.0000948	0.000823
Difficulty in Physical Access	0.0000181	-0.000140	0.00004	
Difficulty in Financial Access	-0.00129	0.00205	0.00395	0.00671
Insurance: Public	0.0120***	0.0162***	0.00936**	-0.00333
Insurance: Private	0.000619	0.00163**	0.000583	0.00222
Insurance: Green Card	-0.00246	-0.00162	-0.00159	0.00554
Observations	3,375	3,375	3,375	749

Notes: Decompositions in columns (1), (2) and (3) are implemented by using the pooled 2008 and 2012 THS data sets and using observations for children who are under 4 years old in order to circumvent overlapping. Decomposition in column (4) is implemented by using 2010 and 2012 pooled THS data set (because the 2008 survey does not ask the type of the institution that the child was taken). In column (4), we use the observations for children who are under 2 years old.

We aggregate the estimates of income brackets and reveal only the total effect of income in the table. We aggregate the effects of child's age dummies and reveal only the total effect in the table. The results of the separate effects are available upon request.

We also control for the 'parent employed' dummy variable, three dummy variables for income type received by the household (labor, asset, retirement), and a dummy for 'Parent not mother or father'.

All regressions include a constant term. *** 1%, ** 5%, * 10% level of significance.

Source: Authors' calculations using Turkish Health Research survey data and Fairlie decomposition technique.

6. Conclusions

This paper investigates the utilization of healthcare services by children in ages 0-5 in Turkey, where a major health transformation program was initiated in 2003. As expected, utilization increased. In particular, the shares of children THI and to newborn screening increased. Also, visits to family health centers increased. However, contrary to our expectations, the share of

children THINS did not increase significantly over time. We observe that the socio-economic status and insurance ownership of the parent have a crucial impact on utilization. This is surprising, since all children are unconditionally covered by the General Health Insurance law, regardless of their parents' SES or insurance ownership. Hence, we may conclude that, the data do not confirm that we have achieved universal access of young children to healthcare services in Turkey.

This paper contributes to the literature as being the first study to use nationally representative Turkish Health Research Survey data from Turkey to examine the utilization of healthcare services by young children and to estimate the extent to which observable characteristics explain the change in utilization over time.

In our multivariate logistic regression analyses, we find that children from crowded families or families with low income and education are less likely to receive healthcare services. Children whose parents are (publicly or privately) insured are more likely to be THI and THINS. Possible reasons behind this finding can be overcrowding in health facilities, the lack of information on the availability of services, social exclusion, or a superstition that keeps children away from health institutions.

Moreover, socioeconomic variables are crucial for explaining the choice of the healthcare provider. For instance, children whose mothers have less education are more likely to use a FHC and less likely to use a private physician's office. Children from crowded families are less likely to use hospitals and physicians' offices. Insurance ownership of the parent also matters: Private insurance owners are less likely to use a FHC, and Green Card holders are more likely to use hospitals.

Finally, the results of the Fairlie decomposition analyses suggest that in the overall, control variables can explain only a small part of the change in utilization. Hence, we conclude that the observed changes must be, to a great extent, the result of changes in the process that determines the usage of these services, or changes in unmeasurable or unobserved factors, such as changes in health attitudes or preferences over time. The factors that have contributed significantly to explaining the increase in utilization are the reduction in the number of children per household, improvements in average education level of the parents and their insurance ownership.

As the conclusion, we admit that we find some results of the study unexpected and surprising, and emphasize the need for further analysis of young children's utilization of health services in Turkey. It is difficult to explain some of the findings (such as the low (and declining) utilization rate of the youngest children and the existence of a link between the parent's insurance status and child's utilization), given the huge efforts of the government in achieving UHC and the resources devoted to this aim. Further research is needed to uncover whether methodological differences between administrative and survey data in measuring utilization is

the answer. In 2008, Turkey initiated the General Health Insurance system, which aimed to cover the entire population regardless of insurance status or income level. Although this is a big and important step towards achieving the Sustainable Development Goal of UHC, more needs to be done.

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Appendix

The surveys contain a module with questions about the household, followed by age-specific modules (0-6, 7-14, and 15+). In this study, information on the health of young children comes from the 0-6 age children:

- Was the child included in the newborn screening program (heel stick collection, hearing test, hip dysplasia detection)?
- Does the child have any chronic health problems? (loss of hearing or vision, mental retardation, muscular or skeletal anomaly, difficulty in learning, delay in speech, behavioral problems, cerebral palsy, autism)
- Has the child ever been seen by a dentist?
- Within the last 12 months, was the child Taken to a Health Institution when Not Sick (THINS)? If "yes", to which health institution was the child taken? A family health center, a hospital, or a physician's private office? (Mark all that apply.)

The questions on household composition and characteristics of each person are as follows:

- Age and gender,
- Relationship to the reference person,
- Completed education: We defined four dummy variables (Less than middle school (8 years or less); Middle school completion; High school completion; University or more)
- Employment status: Employed; Not Employed (unemployed, seasonal worker, or inactive).
- Insurance coverage (Public insurance (SSI); Private insurance; Green card; No insurance): We defined these variables such that public insurance and Green Card

holders do not have any other type of insurance; private insurance holders may also have public insurance.

- Household income: For some households, income is not known; for the rest, net monthly income is given in brackets (less than 350, 351-500, 501-620, 621-750, 751-900, 910-1100, 1101-1300, 1301-1700, 1701-2300, more than 2301, all in TL).
- Sources of income received in the household (labor income (wage/salary or entrepreneurial income); asset or real estate income; retirement income; and subsidy income (state assistance, child benefits, scholarships, etc.)).
- Region of residence: 12 NUTS-1 regions of the country. The Statistical Institute reveals information on region codes, but not the names of the regions.

In the data we can see all members of the household and their relationship to the head), but not the parent of a child. We define the parent as follows: If the child is the son/daughter of the reference person (which is mostly the case), the parent is the mother, or, if mother is not present, the parent is the father. Otherwise, the parent is the reference person or spouse of the reference person (the grandmother in most cases). For about 95-97% of children, the parent is female. For about 83-84% of the children, the mother or the father is the reference person in the household.

The following questions are asked in the age 15+ module:

- Unmet need for healthcare: Within the past 12 months, whether the parent failed to satisfy healthcare needs because of problems with financial access (affordability) or physical access (difficulty of making an appointment or lack of transportation)
- Health indicators of the parent (body mass index (BMI); current smoker or not)