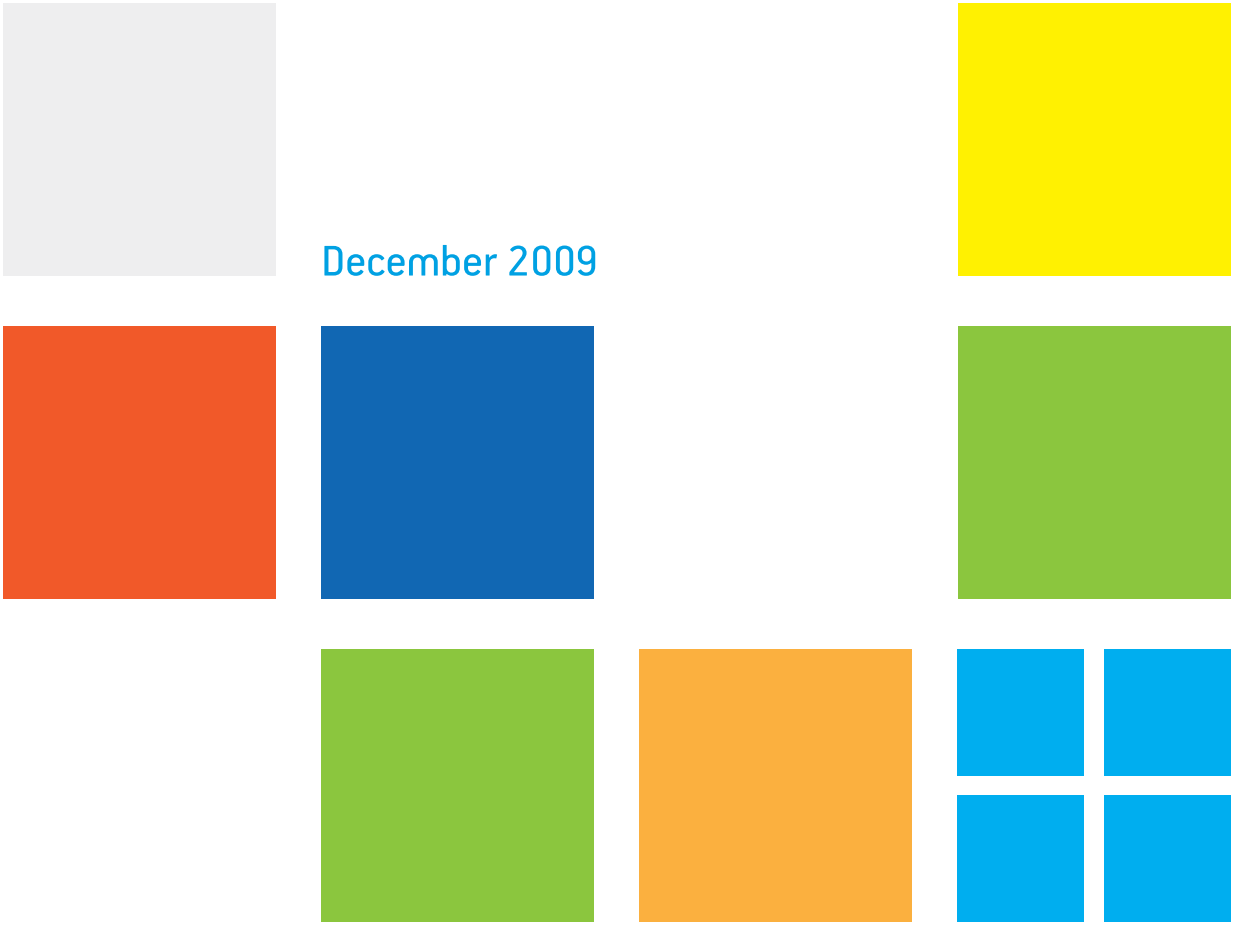
Decline in the Under-5 Mortality Rate (U5MR) in Turkey:

A Case Study

December 2009



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DECLINE IN THE UNDER-5 MORTALITY RATE (U5MR) in TURKEY:
A CASE STUDY

March 2010

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(1) Executive Summary

Several notable points from this assessment include:

- Turkey has observed a rapid decline in the Under-5 Mortality Rate (U5MR) since 1990, largely due to the rapid decline in both components (neonatal and post-neonatal) of the infant mortality rate. Since both components of the infant mortality rate declined significantly, these declines were likely systemically-induced, the result of broad comprehensive improvements in the public health and health services systems in Turkey.
- This decline occurred in the context of a similarly rapid population shift from rural to urban areas, a corresponding large increase in GDP/capita, decreased family size, and increased education achievement for women.
- Sustained focus on health strategy and planning, and implementation of widespread, effective public health campaigns namely focused around family planning, vaccination, child survival, and neonatal resuscitation have contributed significantly to the decline in the IMR and subsequently in the U5MR.
- The resulting strengthening of components of maternal and child health systems in Turkey – namely, a rapid increase in antenatal care attendance, large increases in the proportion of women delivering in health institutions and in the proportion of women whose deliveries were attended by health providers, and the rapid development of neonatal intensive care, all directly contributed to increased survival of newborns and children.
- Despite these achievements, some populations remain at elevated risk for infant and under-5 mortality, namely: residents of the Eastern region, in rural areas, with no/ incomplete primary education, in the lowest quintile of wealth, and for infants born to women who already have several other children (higher birth order). There has been an impressive expansion of public health programs and strengthened health systems in Turkey; though a gap remains in health disparities between high- and low-risk groups, this gap is narrowing.
- While exhibiting a precipitous decline, the infant mortality rate in Turkey could decrease further with attention to the major causes of infant death, which are largely preventable with scale-up of and access to existing technology and intervention: low birthweight/ prematurity, congenital anomalies, and sepsis, among others.

As a result of Turkey's investments in public health programs and health systems, in the context of a generally stronger socioeconomic status of its population, the U5MR decline since 1990 is one of the highest in the world, likely a decline of more than 70 percent from 1990 to 2007. The Turkey Demographic and Health Survey (TDHS) is an invaluable resource in assessing risk, progress, and opportunities; a population-based perinatal data system would enhance the utility of TDHS and provide more real-time monitoring, evaluation, and research opportunities for targeting further declines in U5MR.

(2) Introduction

The Republic of Turkey is a country that has undergone rapid social, economic, and health change in the past two decades. Since the 1980s and before, the economy of Turkey has grown rapidly, with occasional setbacks and recoveries, and large portions of the rural population have migrated to several rapidly growing cities, creating challenges facing the Turkish health care system. In the historical context of these geographic, sociodemographic, and health status challenges, Turkey's achievements in reducing mortality among infants and children since 1990 are quite remarkable. In fact, Turkey's Infant Mortality Rate (IMR) and Under-5 Mortality Rate (U5MR)* are among the most rapidly declining rates worldwide.

As many countries are undergoing similar rapid social and economic changes, Turkey provides an interesting case study in U5MR mortality decline. This report provides a framework for the examination of U5MR in Turkey, a framework that may help other countries similarly examine their declines in U5MR over time in the context of other country changes.

The purpose of this report is to present a description and analysis of U5MR mortality decline in Turkey, with a particular focus on policy, programmatic, and epidemiological changes observed since 1990 that may help explain Turkey's rapid progress toward reducing U5MR, and indeed underscoring Turkey's experience in achieving the Millennium Development Goal 4 (to reduce by two-thirds between 1990 and 2015 the under-five mortality rate). Further, this report provides interpretation of trends in Turkey and summarizes the Turkish experience in improving maternal and child health status. The analysis adopts a logic model approach, examining context, system inputs, system outputs and outcomes, impacts.

* U5MR: Under-5 Mortality Rate is defined as "the probability (expressed as a rate per 1,000 live births) of a child born in a specified year dying before reaching the age of five if subject to current age-specific mortality rates" (http://www.childinfo.org/mortality_methodology.html).

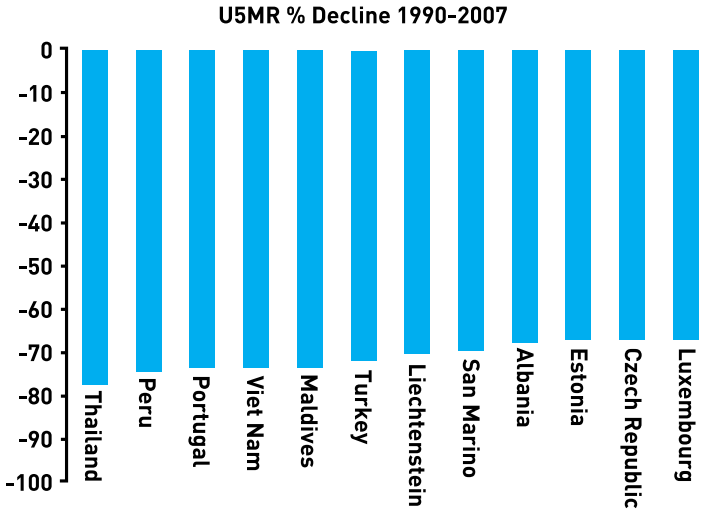
(3) Turkish U5MR in Global Context

The Fourth Millennium Development Goal (MDG4) is by 2015 to reduce the under-five mortality rate (U5MR) by two-thirds from the 1990 level. To date, all regions of the world and the world in aggregate fall well-below this goal, and well-below where one might expect them to have achieved if the goal is to be met by 2015. Turkey, however, is one country among only a few that have likely already surpassed the MDG4 goal and have reduced their U5MR by more than two-thirds: in fact, according to UNICEF's State of the World's Children Report (2009), Turkey's U5MR in 2007 has reduced by 72% over 1990 levels. This substantial decline is only slightly less than the decline observed by Portugal during the same period, the only other European or OECD country to have achieved a greater decline than Turkey.

Figure 3.1: Comparison of Turkey Under-5 Mortality (U5MR)

World Region/ Classification	Percent Change in U5MR (90-07)
Industrialized Countries	- 40.0%
Developing Countries	- 28.2%
Least Developed Countries	- 27.4%
Middle East and North Africa	- 41.8%
Central/ Eastern Europe, Commonwealth of Independent States	- 52.8%
WORLD	- 26.9%
Republic of Turkey	**- 72.0%**

(Source: UNICEF State of the World's Children 2009)

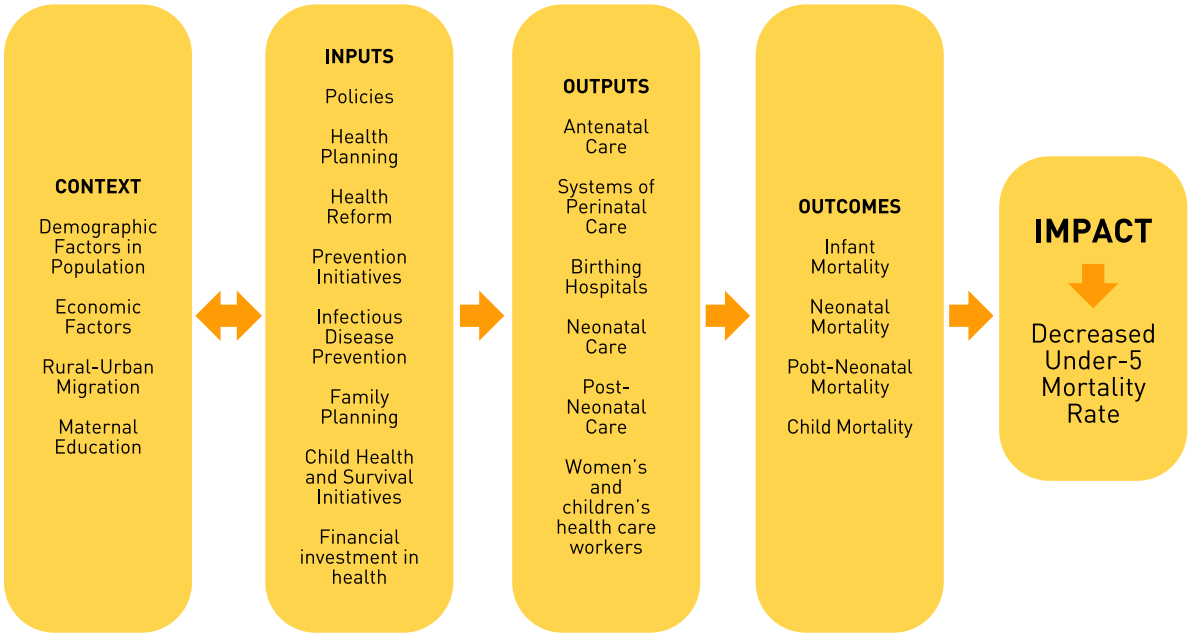


The U5MR in Turkey declined an average of 7.5% per year during this timeframe as well (1990-2007), with only five countries worldwide with a higher annual decline. U5MR declined much faster than expected in Turkey during this period when compared with similar countries throughout the world.

(4) U5MR Analytic Framework and Data Sources

The analytic framework adopted to examine U5MR is the logic model approach, which delineates systems inputs and outputs, outcomes, and impacts as shown in the model below.

Figure 4.1: Logic Model Framework for U5MR Reduction o Turkey



Underlying this framework is the assumption that direct attribution of a single cause (or, input) that creates the impact desired (in this instance, decreased U5MR) is not possible, nor is appropriate. In fact, U5MR is a multifactoral construct that results from the combined effects of health policies and reforms, and well-functioning maternal and child health (MCH) systems and interventions, in the context of particular social, demographic, and economic contexts. In this model, we examine the contexts of population and economic change, and educational change and gender, as these often relate directly and indirectly to under-5 mortality. Systems inputs, particularly health policies, health reforms, and implementation of effective intervention programs surrounding family planning, childhood immunization, breastfeeding and child nutrition, and oral rehydration/ child survival, all combine to create well-functioning MCH systems of care. These MCH systems of care (the "outputs") include direct maternal and neonatal care contexts (including antenatal, delivery, neonatal, and post-neonatal clinical and preventive care), which subsequently directly and indirectly impact infant mortality, comprised of both neonatal and post-neonatal death, and child death. These components combined form the U5MR, which is expected to decline as the logic

model functions, i.e., as the inputs create the outputs desired, which subsequently impact the outcomes and impacts anticipated. Data sources are varied and come from a variety of sources, to include:

Turkey Demographic and Health Surveys (TDHS): The TDHS surveys from 1993, 1998, 2003, and 2008 reflect extensive data collection efforts on a representative sample of the Turkish population and is directed and managed by Hacettepe University, Institute of Population Studies. TDHS gathers information directly relevant to maternal and child health analyses and, by design, reports aggregate data for five year periods ending with the year of the assessment (for example, the five year period 2003-2008 is included in the TDHS-2008). For some subanalyses on infant death, only a 10-year period ending in 2008 is possible to achieve even a minimal sample size that allows for some generation of point estimates.

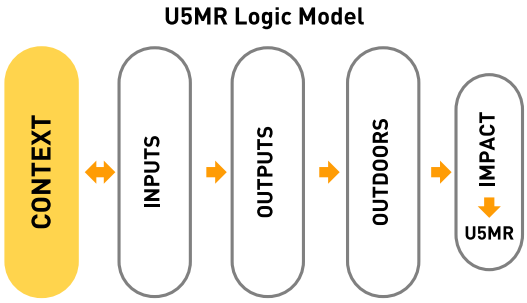
UNICEF State of the Children 2009 and Millennium Development Goals Monitoring: These external data sources collate information from sources from within Turkey that allow for comparable assessment with other countries' data, particularly core UNICEF monitoring data and MDG goals.

Special Government Assessments: This analysis uses a wide variety of special government reports on health status, health workforce, economic development, and health reform. These sources aggregate data as needed from within a variety of, largely, government sources and data systems.

OECD Reports: OECD produces regular statistics on Turkey's economic and health status, and OECD also produced a special review of Turkey's health system and health reform efforts in 2008. These reports are used as needed for background and contextual information.

Ministry of Health/ MCH information. Information particularly on cause of death and other selected child/ infant health indicators are tabulated within MCH at the Ministry of Health. These indicators are typically based on reported data housed within MOH.

(5) The Context: Social, Economic, and Demographic Change in Turkey



Turkey's population grew rapidly in the past decades, with a growth rate of about 25 percent (cumulative) in the 1980s, decreasing to about 18 percent in the 1990s. Since 2000, Turkey's population growth has slowed, though remained at 1.2 percent in 2006.

Table 5.1 Population Growth Rate (%), Turkey 2000-2007

Year	Annual Population Growth rate (%)
2000	1.6
2004	1.3
2005	1.3
2006	1.3
2007	1.2

Source: OECD, Turkey Country Statistical Profile, 2009.

The Annual Population Growth Rate from 1970 to 1990 in Turkey was 2.3%, declining to 1.6% overall for 1990-2007.[1] From 2000 to 2007, the Annual Population Growth Rate has declined by 25 percent from 1.6% in 2000 to 1.2% in 2007. During the time frame 2000-2006, Turkey's urban population increased almost 14 percent to 49.5 million people, while the rural population declined slightly by 1.4 percent to 23.4 million people.[2] In fact, Turkey has transformed in recent decades into a country with a predominantly urban population, with 68 percent of Turkey's population living in urban areas in 2007.[3] The average annual rate of growth in the urbanization of Turkey slowed from the 1970-1990 rate of 4.5% increase in the urban population per year, to an increase of 2.6% per year. Some cities, for instance Istanbul, have grown very rapidly, with a 17% increase in population just between the span of six years (2000 and 2006).[2] In the past decades as well as the urban population expanded, the average family size, overall, in Turkey decreased from 5.3 to 3.9 from 1980 to 2008.[2] Turkey's

1 UNICEF, State of the World's Children, 2009.
2 Ministry of Health of Turkey. Health at a Glance: 2007. MOH Publication No. 723, 2007.
3 UNICEF, State of the World's Children, 2009.

economy grew rapidly throughout the period 1970-1990, at an annual rate of growth in the GDP/capita at 1.9% per year1 increasing to an average annual growth in GDP/capita of 2.2% per year from 1990 to 2007.[1] The economic growth since 2000 is also evident, shown in Table 5.2, as GDP per capita grew almost 50 percent from 2000 to 2007.

Table 5.2 GDP Per Capita ($), Turkey 2000-2007

Year	GDP/Capita ($)
2000	8724
2004	9595
2005	10841
2006	12074
2007	12993

Source: OECD, Turkey Country Statistical Profile, 2009.

While the economic status of Turkey overall continues to grow, however, the proportion of the population that lives in extreme poverty (<$1 per person, per day) increased from 2.1 percent of the population in 1994, to 2.7 percent of the population in 2005.[4]

Overall, as shown in Table 5.3, the proportion of women who had no or incomplete primary school in Turkey in 2008 was 33 percent, down 15 percent from the 2003 rate of 39 percent. The decline was particularly evident in urban areas, where the proportion of women without education, or with incomplete primary education, decreased from 34 percent in 2003 to 28 percent in 2008. No substantial change was observed in the proportion of the rural female population without a primary education from 2003 to 2008.

Table 5.3 No/ Incomplete Primary School among Women, Turkey DHS, 2003/ 2008

Location	DHS 2008 %	DHS 2003 %
Urban residence	28	34
Rural residence	48	49
West region	25	32
South region	36	41
Central region	27	32
North region	38	38
East region	57	60
Total	33	39

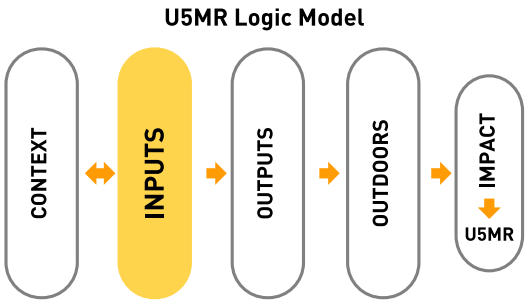
Source: Turkey DHS, 2003, 2008.

4 Millennium Development Goal Indicators, http://mdgs.un.org.

According to the TDHS-Report 2008, women in poverty were particularly impacted by poor education status: 60 percent of women in the lowest wealth quintile had incomplete or no primary education, twice as high as the proportion of women in the middle income category, and almost five times higher than the rate of poor/ no primary education among the wealthiest women.

Similarly, the disparity in education attendance is particularly pronounced in high school. Overall, for the TDHS-2008, the ratio of females to males attending primary school was virtually equal across all social divisions (e.g., urban/rural, wealth, place of residence).[5] By high school, however, significant disparities between female and male secondary school attendance emerge: females in rural areas, in the Central and Eastern regions, and in the lower wealth quintiles were considerably less likely to attend school that were their male counterparts. That this disparity emerges as girls approach reproductive age could have important consequences for other maternal and child health risks that coincide with maternal education.

(6) The Inputs: Trends in Programs, Policies, and Resources



Turkey has a long, established history of strategic planning around health, and more recently, specifically around maternal and child health issues. From 1963[6] when health was included for the first time in the national five-year plan, Turkey has focused upon expanding access and equity to preventive public health services. The National Health Policy from the Ministry of Health in 1990 set targets for health that included several maternal and child health targets for infant, child, and maternal mortality, with target dates set for the year 2000.

Since 2000, also set forth in the National Health Policy strategies were components of new health reform activities, which would create a context for the most recent health transformations and reforms in Turkey. The focus of these strategies, developed in 1990s and for which significant efforts were made to implement in the 2000s, are as follows:[7]

- Establishment of Universal Health Insurance
- Development of primary health services and family medicine
- Transformation of hospitals

5 Hacettepe University, Institute of Population Studies. Turkey Demographic and Health Survey 2008. Ankara, Turkey, October 2009, Publication No: IPS-HU.09.01.

6 See Historical Overview of the Turkish Health System and Key Policy Developments, in OECD, Reviews of Health Systems: Turkey, 2008: Appendix 1.A1.

7 Health Transformation Program in Turkey: Progress Report, January 2009. Ministry of Health, MOH Publication NO. 749.

- Strategic development and structure for MOH to prioritize health services and preventive health.

  Turkey has demonstrated its commitment to planning and improving services that impact children through its adoption and participation in a range of formal global initiatives, including:[8]

- UN Children's Rights Convention (1990)
- European Convention for Implementation of Council of Europe United Nations Children's Rights Convention (1999)
- Optional Protocol to the Children's Rights Convention on the Involvement of Children in Armed Conflicts (2000)
- Convention on Protection of Children and Cooperation in respect of Intercountry Adoption (2001)
- Among numerous others

  A system-wide, comprehensive health reform in Turkey called the Health Transformation Programme (HTP) targeting the period of 2003-2013 has as its goals to move Turkey further toward reducing health disparities, increasing equity and access, reducing fragmentation, and improving quality of care.[9] While the main activities of the HTP are on-going, the OECD assessment from 2008[9] suggested the following conclusions to date:

- Health status in Turkey has improved rapidly in recent decades, though often remains, relatively, lower than other OECD countries.
- A significant portion of improvements in health status are likely attributable to higher and more effective spending on health care.
- Continuous investment in prevention is increasingly important as Turkey's population faces new and increasing risks such as smoking and obesity.
- Financial protection and equity in access to health care has improved.
- While disparities remain in distribution of health personnel, significant increases have occurred in the Eastern region where the need is highest.

  In addition, the Sexual and Reproductive Health National Strategic Action Plan for the Health Sector, 2005-2015 notes, similarly, that significant changes in health status have occurred in Turkey over recent decades and now require more targeted, prioritized approaches to continue to make significant progress in the coming years.[10]

  Numerous large-scale initiatives have been implemented in the past several decades by the Ministry of Health and its partners in Turkey with the aim of preventing morbidity and mortality in children. Many of these and other programs that are particularly likely to impact U5MR have been successfully implemented in Turkey in the past decades and include programs that reduce infectious disease, promote effective family planning, and improve child survival. MOH[11] summarizes these comprehensive maternal and child health programs to include the following, shown in Figure 6.1:

8 National Strategies and Action Plan for Child and Adolescent Health: 2008-2015. Ministry of Health, 2009.
9 OECD, Reviews of Health Systems: Turkey, 2008
10 Sexual and Reproductive Health National Strategic Action Plan for the Health Sector, 2005-2015
11 National Strategies and Action Plan for Child and Adolescent Health: 2008-2015. Ministry of Health, 2009.

Figure 6.1: MOH-Identified Maternal and Child Health Programs Implemented in Turkey

- Premarital and Pre-pregnancy Counseling and Consulting Program
- Hemoglobinopathy Control Program
- Marital Medical Examinations
- Family Planning Program
- Antenatal Care Program
- Emergency Obstetric Care Program
- Program on Delivery and Cesarean Section
- Postnatal Care Program
- Maternal Mortality Monitoring Program
- Newborn Intensive Care Program
- Program on Provision of Primary Newborn Care
- Neonatal Resuscitation Program
- Primary Newborn Care Program
- Newborn Screening Program
- Metabolic Screening (Phenylketonuria, Congenital Hypothyroidism, Biotinidase Deficiency)
- Newborn Hearing Screening
- Maternal and Infant Nutrition
- Program on Encouragement of Breastfeeding and Baby-friendly Hospitals
- Program on Iron Supplementation
- Program on Prevention of Vitamin D Deficiency and Improvement of Bone Health
- Program on Control of Iodine Deficiency Diseases and Iodization of Salt
- Program on Iron Supplementation to Pregnant Women
- Infant Mortality Monitoring Program
- Program on Prevention of Childhood Infections
- Program on Control of Acute Respiratory Tract Infections
- Program on Control of Diseases with Diarrhea
- Integrated Management of Childhood Infenctions
- Program on Monitoring and Support of Infant and Child Development
- Immunization Studies
- Program on Adolescent Health and Development
- Program on Provision of Male Participation in MCH/FP Services

Table 6.1 Full Vaccination Coverage, Turkey Demographic and Health Surveys, 1993-2008	
Survey Year	5-yr Period Fully Vaccinated (%)
TDHS-1993 (1)	65
TDHS-1998 (1)	46
TDHS-2003 (1)	54
TDHS-2008 (2)	81

(1) Among 12-23 month olds, (2) among 15-26 month olds

Full vaccination = BCG, measles, and three doses of DPT and polio

Source: Turkey Demographic and Health Survey, 2008

Turkey has focused a major initiative on childhood vaccination through its Expanded Programme on Immunization (EPI) efforts, aimed at expanding vaccination coverage throughout the country. The proportion of children in the TDHS-2008 that are fully vaccinated (81 percent) is considerably higher than was observed in prior years. Very few children (<2%) are reported to have no vaccinations, with children born to women in the lowest wealth quintile, to women without primary school education, or infants born in higher birth orders being most likely not to have received any vaccination at all.

A large increase in investment by the Ministry of Health in vaccination occurred between 2002 and 2008, with a greater than ten-fold increase in the vaccination allocation.[12] The number of measles cases in Turkey decreased dramatically from the early 2000s, when 30,509 cases of measles were reported in 2001 to 2008, when only four cases were reported as externally-acquired.[12] Turkey was declared polio-free by WHO in 2002. The TDHS-2008 report indicates that 89 percent of children age 15-26 months were vaccinated against measles, and 89 percent of children received all three doses of polio vaccine. Apart from these activities, in February 2009, following the validation efforts made in consultation with WHO, Turkey has taken place among the countries eliminating Maternal and Neonatal Tetanus (MNT).[13]

As reported by UNICEF, the Total Fertility Rate (TFR) in Turkey has declined more than 50 percent since 1970, and by almost one-third since 1990.

Table 6.2 Total Fertility Rate, Turkey, 1970-2007	
Year	Total Fertility Rate (births/woman)
1970	5.5
1990	3.0
2007	2.1

Source: UNICEF, State of the Worlds Children, 2008

12 Health Transformation Program in Turkey: Progress Report, January 2009. Ministry of Health, MOH Publication NO. 749.

13 WHO, Weekly Epidemiological Record, No:17,2009,84,141-148.

By the TDHS-2008, knowledge of contraceptive methods, including modern contraceptive methods, is essentially universal in Turkey, and approximately 90 percent of all women now or ever-married have used a contraceptive method.

Table 6.3 Current contraception (any, or modern), married women, age 15-49, Turkey, TDHS

TDHS Year	Any Contraception %	Modern method %
1988	63	31
1993	63	35
1998	64	38
2003	71	43
2008	73	46

Source: Turkey DHS 1988-2008

Further, as shown in Table 6.3, current use of any contraceptive method has increased approximately 15 percent between 1988 and 2008, while use of modern contraceptive methods has increased nearly 50 percent during this same time period.

Numerous programs have been initiated in Turkey to promote child survival, including nutritional programs, breast feeding promotion, Integrated Management of Childhood Illness, and neonatal resuscitation. For example, Turkey initiated the "Baby Friendly Hospitals" initiative in 1991 with four hospitals participating.[14] The number of hospitals participating in Baby Friendly increased to 141 by 2002, and to 665 by January 2009. In 2002, 21 percent of deliveries occurred in Baby-Friendly hospitals while this proportion increased to 92 percent in 2009. Correspondingly, the rate of exclusive breastfeeding within the first six months in Turkey nearly doubled from 2003 (20.8%) to 2008 (41.6%).[13]

An additional example of a special maternal and child health initiative is the Newborn Resuscitation Training program, aimed specifically at preventing neonatal mortality. The program started in 1998 with 100 health providers trained, increasing to 4,000 trained in 2002 and 22,606 trained by 2009.13 The program has had a significant impact on health provider knowledge and practice around newborn resuscitation, and has resulted in increased attempts at resuscitation of newborns with asphyxia, a decrease in hospital stay, and an increase in early (one-minute) Apgar scores. This increase in training corresponded with a large increase in neonatal intensive care units in Turkey (discussed later in Section 7).

Turkey has also successfully implemented numerous other child health initiatives, such as IMCI (Integrated Management of Childhood Illness), that have since become institutionalized in standard practice. The IMCI program consists of a variety of strategies used in homes and in health facilities to reduce the preventable burden of newborn and childhood malnutrition and infectious disease. Key child

[14] Health Transformation Program in Turkey: Progress Report, January 2009. Ministry of Health, MOH Publication NO. 749.

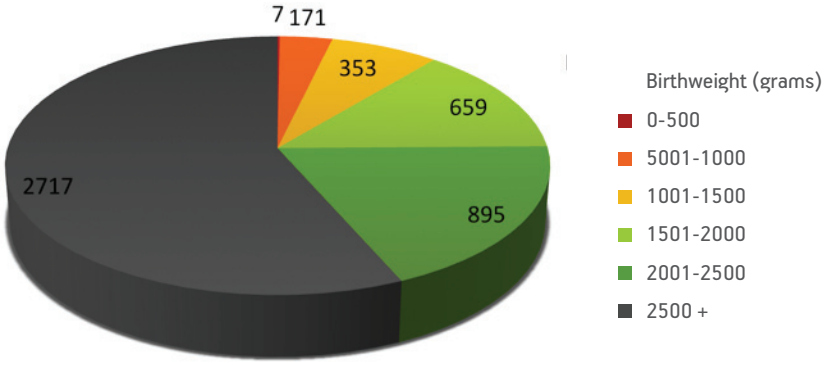
health indicators reflecting these initiatives have shown considerable progress. For example, the proportion of children who were less than two standard deviations below normal weight-for-height decreased by two-thirds from 1993 (3.0%) to 2008 (1.0%). In addition, the proportion of children taken to a health provider for treatment of diarrhea nearly doubled, from 25% in 1993 to 47% in 2008.[15]

Finally, an additional example of an effective, widespread public health initiative in Turkey was the Iodine Deficiency Disease (IDD) effort, promoting country-wide iodonized salt consumption to combat the disease, which was commonly found in Turkey. The proportion of salt samples that were not iodonized decreased by 50% from 2003 from 30% of samples not iodinized in 2003 to 15% of the samples not iodonized in 2008.[16] Other similar micronutrient-related public health campaigns have been instituted in Turkey in the past decades, addressing other nutritional illnesses such as iron deficiency anemia, which has distributed iron tablets to over 5 million children free of charge.[17] Further, women who received iron tablets as a component of antenatal care increased by 25%, from 64% in 2003 to 80% in 2008.[16]

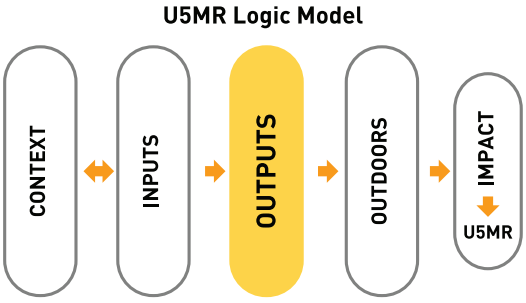
Zekai Tahir Burak Maternity Hospital in Ankara, Turkey is one of the largest birthing hospitals in the world, hosting approximately 25,000 births per year. With a daily census of approximately 150 infants/day in it's system of neonatal intensive care, and with an annual volume of approximately 5,000 infants passing through its neonatal care system per year, Zekai Tahir Burak hospital is also one of the worlds largest children's hospitals. The hospital also trains hundreds of neonatal and obstetrical residents and fellows each year. Zekai Tahir Burak Hospital serves as a national and regional referral center, providing high-risk care to pregnant women and specialized care to high-risk babies.

15 Hacettepe University, Institute of Population Studies. Turkey Demographic and Health Surveys.
16 See Duran R, Aladağ N, Vatansever U, Süt N, Acunaş B. The impact of Neonatal Resuscitation Program courses on mortality and morbidity of newborn infants with perinatal asphyxia. Brain Dev. 2008;30:43-6.
17 Health Transformation Program in Turkey: Progress Report, January 2009. Ministry of Health, MOH Publication NO. 749.

Neonatal Care Admissions by Birthweigt,
Zekai Tahir Burak Hospital, Ankara, Turkey 2008



(7) The Outputs: Strengthened maternal and child health systems



Several overlapping, complex care systems support improved maternal and child health outcomes during pregnancy, delivery, and post-partum.

The proportion of women attending antenatal care in Turkey increased dramatically since the early 1990s, as shown in Table 7.1 Overall, the rate of attendance at antenatal care visits increased in Turkey by 50 percent from the 1993 Turkey Demographic and Health Survey (TDHS) period to the TDHS-2008 period. In particular, the proportion of women who saw a doctor for antenatal care increased from 47 percent in the TDHS-1993 period to 89 percent in the TDHS-2008 period, representing an increase of approximately 90 percent.

Table 7.1 Turkey Demographic and Health Survey, Antenatal Care Attendance Rates (% had at least one ANC visit) during Five Years Preceding Survey

Survey Year	5-yr Period ANC Rate (%)
TDHS-1993	62
TDHS-1998	68
TDHS-2003	81
TDHS-2008	92

Source: Turkey Demographic and Health Survey, 2008

According to the TDHS-2008 report, significant disparities remain regarding antenatal care attendance in Turkey, including:

- In rural areas, women are three times more likely than women in urban areas to not have attended at least one ANC visit.
- Women in the Eastern region of Turkey are 4-5 times more likely not to have had at least one ANC visit when compared with women living in the rest of Turkey.
- Women without at least a primary school education are 3-4 times more likely not to have had at least one ANC visit when compared with women who had at least a primary school education.
- Women in the middle to higher wealth quintiles are nearly 20 times more likely to have ANC than are women in the lowest wealth quintile.

In addition, women residing in rural areas who do access antenatal care are considerably more likely than urban women to have later first ANC visits and to have fewer ANC visits throughout pregnancy.

An important goal of an improving maternal and child health system is that women deliver their infants in health facilities. In Turkey, substantial progress has been made toward this goal, with a 50 percent increase in the proportion of newborns born in health facilities from the TDHS-1993 period to the TDHS-2008 period.

Table 7.2 Turkey Demographic and Health Survey, Rate (%) of Women delivering in a health facility, during Five Years Preceding Survey

Survey Year	5-yr Period Delivering in Health Facility (%)
TDHS-1993	60
TDHS-1998	73
TDHS-2003	78
TDHS-2008	90

Source: Turkey Demographic and Health Survey, 2008

Similar trends in delivering in a health facility were noted in the TDHS-2008 report as were noted for women who received antenatal care, in particular:

- Rural women were four times more likely than urban women to deliver at home.
- Women living in the Eastern Region of Turkey were at least 3-4 times more likely to deliver at home when compared with women throughout the rest of Turkey.
- Women with the lowest income quintile were nearly 5-8 times more likely to not deliver in hospitals when compared with the remainder of the women in other wealth quintiles.
- Women without ANC were nearly 10 times more likely to deliver at home when compared with women who had received at least four ANC visits.

Likewise, as with usage of ANC, women without a primary school education were 4-times more likely to deliver at home when compared with women who had at least some primary school completion.

The development of Neonatal Intensive Care Units (NICUs) has had a remarkable impact on infant mortality, particularly neonatal mortality, worldwide.[18] In Turkey, the number of neonatal intensive care beds rose from 665 NICU beds in December 2002, to 2,918 NICU beds in 2008, an increase of more than 300 percent. In addition, the number of transport incubators, which facilitate the transfer of sick/ small babies to institutions and units with appropriate services, increased from 158 in 2002 to over 400 in 2008, while the number of ventilators (essential for treatment of premature infants and infants with respiratory distress) rose from 252 in 2002 to almost 500 in 2008.

Table 7.3 Newborn Intensive Care Systems and Resources, Turkey, 2002-08

	SB 2002	SB 2008	Diğer 2008	Türkiye-Total 2008	Türkiye/ (Goal)
Newborn centers	39	106	50	156	200 (2010)
Newborn intensive care beds	665	2918	807	3725	4500 (2010)
Transportable incubators	158	440	344	784	515
Ventilators	252	491	889	1380	937
Newborn specialists	5	26	77	103	525 (2010)
Nurses in newborn services	654	1671	1402	3073	6000 (2010)

Source: Ministry of Health, 2009

The workforce attending to pregnancy and child health has grown in Turkey since the TDHS assessment of the 1993 period. In total, the rate of deliveries attended by a health provider increased 20 percent from 1993 to the 2008 period. In particular, physician-attended deliveries rapidly increased from 34 percent in the 1993 period to 64 percent in the 2008 period, an increase of over 80 percent.

Table 7.4 Turkey Demographic and Health Survey, Rate (%) of Health Provider Attendant at Delivery, during Five Years Preceding Survey

Survey Year	5-yr Period Health Provider Delivery Rate (%)	5-yr Period Physician Delivery Rate (%)
TNSA-1993	76	34
TNSA-1998	81	40
TNSA-2003	83	47
TNSA-2008	91	64

Source: Turkey Demographic and Health Surveys

18 Health Transformation Program in Turkey: Progress Report, January 2009. Ministry of Health, MOH Publication NO. 749.

According to the TDHS-2008 Report, while much of Turkey has high rates of delivery attendance by a health provider, some regions (namely Northeast, Southeast, and Central Anatolia) remain less likely to have women deliver with a health attendant present. Virtually all deliveries occurring in health facilities were attended by a health provider, while less than one in five deliveries occurring outside a health facility was attended by a health provider. Similarly, women who lived in rural areas, did not have at least a primary school education, and who were in the poorest income quintile, were all less likely than their counterparts to have a health provider attend their delivery.

While the proportion of births attended by physicians has increased dramatically in the past decades, trained midwives form an important component of the maternal and child healthcare workforce in Turkey. In 2002, 41, 513 midwives were employed in Turkey, rising by four percent to 43,050 in 2007.[19] According to the TDHS-2008, 27.2 percent of deliveries in Turkey were attended by nurses or midwives in the 2008 period.

Table 7.5 Turkey Demographic and Health Survey, Rate (%) of Nurse/Midwife-Attended Delivery, 5-yr period ending in 2008, by Region

Region	%nurse/midwife-attended delivery
West	16
South	34
Central	23
North	32
East	42
Total	27

Source: Turkey Demographic and Health Survey, 2008

Trained nurses and midwives are an important source of care throughout the country, but particular in areas such as the South and East where nurses and midwives attend at least one-third or more of all deliveries. Midwives are much more likely to be employed by the Ministry of Health than are physicians in general, or specialist physicians in particular (94 percent, 60 percent, and 49 percent, respectively).

[19] Source: MOH Personnel General Directorate, April 2007, Human Resources Workshop in Health Politics, MOH Publication, no.718, 2007.

Table 7.6 Midwifery students/ graduates in university, Turkey, 2001-2007

Year	Students (#)	Graduates (#)
2001	3781	296
2002	4409	575
2003	5085	537
2004	5431	838
2005	5653	979
2006	5719	1101
2007	5906	1169

Source: SSPC Higher Education Statistics 2001-2007, Quoted in Human Resources in Health and Policy Dialogue Workshop

Importantly, as shown in Table 7.6, the number of midwives graduating from Turkish universities nearly tripled from 2001 to 2007.

As shown in Table 7.7, the TDHS-2008 reported that physicians attended the majority of deliveries in Turkey, and do so in all regions except the East region where they attend one-third of all deliveries. Nearly 100,000 physicians were employed in Turkey in 2007, nearly half of whom were specialist physicians.16 It is unclear what proportion of these physicians attend to pregnant women, though in 2007 the number of residents completing their residency programs in gynecology and obstetrics is was the third largest of all specialties, after pediatrics and internal medicine.16 Physicians are particularly an important component of the maternal and child health workforce in urban areas, where in the TDHS-2008 period they attended more than 70 percent of all deliveries, and in highly urbanized areas such as Istanbul where physicians attended 90 percent of all deliveries.

Table 7.7 % Physician-attended deliveries, Turkey, Demographic and Health Survey, 2008	
Location/ Region	**% Physician-attended**
Istanbul	90
West Marmara	80
Aegean	80
East Marmara	68
West Anatolia	82
Mediterranean	60
Central Anatolia	66
West Black Sea	67
East Black Sea	65
Northeast Anatolia	42
Central East Anatolia	36
Southeast Anatolia	29
West Region	83
South Region	60
Central Region	76
North Region	64
East Region	33
Total (all regions)	64
Source: Turkey Demographic and Health Survey, 2008	

An important component of detecting anomalies and risks in neonates that may help prevent mortality is a thorough newborn exam. The TDHS-2008 reports that overall, 88 percent of newborns had a postnatal exam, 74 percent within the first day of life.

Table 7.8 % Postnatal Checkup for Newborns by a health provider, Turkey, Demographic and Health Survey, 2008

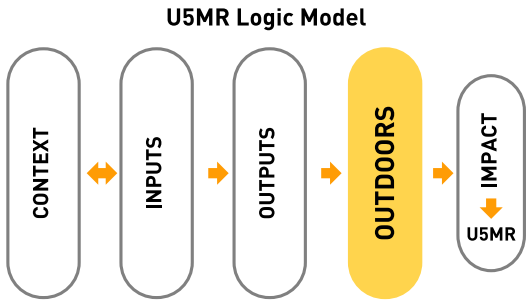
Location/ Region	% newborns with checkup
Istanbul	96
West Marmara	93
Aegean	96
East Marmara	94
West Anatolia	91
Mediterranean	88
Central Anatolia	95
West Black Sea	95
East Black Sea	92
Northeast Anatolia	66
Central East Anatolia	69
Southeast Anatolia	70
West	95
South	88
Central	93
North	95
East	69
Total (all regions)	88

Source: Turkey Demographic and Health Survey, 2008

Of particular note, newborns born in Northeast, Central East, and Southeast Anatolia were less likely to have a newborn exam and only half or fewer of infants born in those areas had the exam in the first day of life. In contrast, in the West region, and particularly in Istanbul, greater than 95 percent of newborns had a medical checkup and nearly 90 percent within the first day. Other correlates of having had a postnatal checkup were noted in the TDHS-08 report, including:

- Newborns with high birth orders were less likely to have a postnatal checkup than were firstborn children, or children with lower birth orders.
- Newborns born to women without at least a primary school education were less likely to have a postnatal checkup.
- Newborns born to women in the lowest wealth quintile were least likely to have a postnatal checkup.

(8) Sonuçlar: Neonatal, Post-neonatal, Bebek ve Çocuk Ölümleri*



As shown in Table 8.1, the infant mortality rate (IMR; number of deaths to live born infants under 1 year of age, per 1000 live births) has declined rapidly in Turkey. The Ministry of Health of Turkey[20] reports a decline in the IMR from 134 infant deaths per 1,000 live births in 1971 to 21.7 deaths per 1,000 live births in 2007, which represents a reported period decline from 1971 to 2007 of more than 80 percent, and a decline from the late 1980s to 2007 of more than 70 percent.

Table 8.1 Ministry of Health Reported Infant Mortality Rates, Turkey, 1971-2007

Year	IMR	Year	IMR
1971	134	1993	52.6
1973	123	1998	42.7
1975	112	2003	29
1977	102	2004	24.6
1979	96	2005	23.6
1983	95.3	2006	22.6
1988	77.7	2007	21.7

Source: Ministry of Health - Turkey, Health at a Glance 2007

Consistent with trends observed by the Turkey MOH, for the time period covered to date by the Millennium Development Goals (MDGs), UNICEF[21] reports that Turkey's IMR in 1990 was 67 deaths per thousand, decreasing almost 70 percent down to 21 per thousand births in 2007.

Finally, similar trends as reported by MOH and UNICEF are noted by the Turkey Demographic and Health Survey (TDHS), which reports a decline in the five-year period IMR from 53 infant deaths per 1000 live births to 17 infant deaths per 1000 live births, a decline of almost 70 percent.

* See, Koç, Yüksel ve Eryurt: Hacettepe University Institute of Population Studies (2009) Turkey Demographic and Health Survey, 2008. Hacettepe University Institute of Population Studies, Ministry of Health General Directorate of Mother and Child Health and Family Planning, T.R. Prime Ministry Undersecretary of State Planning Organization and TÜBİTAK, Ankara, Turkey, pp. 129-139.

20 Republic of Turkey MOH. Bir Bakışta Sağlık: 2007. MOH Publication no. 723, 2007.

21 State of the World's Children, 2009, Health of Mother and Neonatal

Table 8.2 Turkey Demographic and Health Survey, 2008, Estimated Period Infant Mortality Rates for Five Years Preceding Survey	
Survey Year	5-yr Period IMR
TDHS-1993	53
TDHS-1998	43
TDHS-2003	29
TDHS-2008	17
Source: Turkey Demographic and Health Survey, 2008	

The Neonatal Mortality Rate (NNMR) refers to the rate of infant deaths that occur within the first month of life. The NNMR is typically related to maternal and antenatal factors, and to the availability of skilled care at delivery and for newborns that require specialized care.

As reported in Table 8.3 by the TDHS, the neonatal mortality rate declined by 55 percent from the 1993 period to the 2008 period, which represents a substantial decline in early infant deaths from 29 early deaths per 1000 live births to 13 early deaths per 1000 live births.

Table 8.3 Turkey Demographic and Health Survey, 2008, Estimated Period Neonatal Mortality Rates for Five Years Preceding Survey	
Survey Year	5-yr Period NNMR
TDHS-1993	29
TDHS-1998	26
TDHS-2003	17
TDHS-2008	13
Source: Turkey Demographic and Health Survey, 2008	

An analysis of the correlates of the NNMR for a 10-year period (1998-2008) was reported in the 2008 Turkey Demographic and Health Survey (TDHS) and showed the following observations regarding demographic correlates of neonatal death in Turkey:

- No difference was noted in neonatal death rates between genders
- Neonatal death was higher among the youngest (under age 20) and oldest (over age 40) women
- Neonatal death is higher as birth order increases
- Neonatal death is highest in newborns with the shortest times since their mother's last pregnancy (birth interval)
- Neonatal death is highest among small/ very small newborns

These correlates between demographic characteristics and neonatal death have been noted in other populations outside of Turkey, and are generally well-documented risk factors for neonatal death.

Further, TDHS-2008 noted19 the following additional socioeconomic correlates of neonatal death for the 10-year period:[22]

- Neonatal mortality is higher in rural areas of residence, particularly in the Eastern region of the country when compared with the Western region;
- Wide variation can exist in neonatal mortality, for example the 10-year period shows a neonatal mortality rate in Istanbul of 2 neonatal deaths per 1000 live births, while in Southeast Anatolia, the NNMR is 10 times higher, at 20 neonatal deaths per 1000 live births.
- Neonatal mortality is highest among newborns born to women with no education or with incomplete primary school education.
- Neonatal mortality decreases as wealth increases: the newborns born to women in the lowest wealth quintile are nearly three times more likely to die in the first month than are newborns born to women in the highest wealth quintile.

The post-neonatal mortality rate (PNMR) refers to deaths of newborns between the first month of life until one year. PNMR rates often reflect conditions surrounding the child's environment and exposure to environmental risks (infectious disease, second-hand smoke) more than maternal and delivery factors (as is the case with NNMR).

Table 8.4 Turkey Demographic and Health Survey, 2008, Estimated Period Post-Neonatal Mortality Rates for Five Years Preceding Survey

Survey Year	5-yr Period PNMR
TDHS-1993	23
TDHS-1998	17
TDHS-2003	12
TDHS-2008	4

Source: Turkey Demographic and Health Survey, 2008

As shown in Table 8.4, the TDHS-2008 reports a large decline in the PNMR from the TDHS-1993 period to the TDHS-2008 period. During this time, the PNMR declined more than 80 percent from 23 post-neonatal deaths per 1,000 live births, to 4 post-neonatal deaths per 1,000 live births. This decline is significant, and is related to a variety of demographic correlates documented in the TDHS-2008 report, including:

- Male infants have higher PNMRs than do female infants.
- PNMR declines as maternal age increases.
- PNMR increases as birth order increases.
- PNMR for newborns with a short birth interval (less than 2 year) is over three times higher than the PNMR for infants born with an interval of 4 or more years.

22 TDHS-observations should be interpreted with caution; these observations suggest correlations though in some cases analyses do not reach sufficient statistical power to be conclusive

- PNMR is more than three times higher for infants born small/ very small.

In addition, the TDHS-2008 reports the following socioeconomic correlates of PNMR in Turkey, including:

- Less variation in the PNMR is observed by region than was observed in the NNMR, though newborns born in the Eastern region had the highest rate of post-neonatal death.
- Post-neonatal death in Istanbul was 6 deaths per 1000 live births, compared with 13 deaths per 1000 live births in Southeast Anatolia, indicating some considerable regional variation, though not as dramatic as NNMR variation.
- PNMR is almost five times higher in newborns born to women in the lowest educational categories compared with those born to women in the highest.
- PNMR declines as wealth increases: the PNMR in the highest wealth category is more than four times less than the PNMR in the lowest wealth category.

In Turkey, as elsewhere throughout the world, neonatal mortality and its associated causes of death comprise the majority of infant deaths. In the TDHS-2008 period, for instance, more than 70 percent of all infant deaths were neonatal deaths, occurring in the first month of life. During this period of life, as mentioned previously, maternal conditions and neonatal conditions at birth are the leading causes of death. Broad cause of death information for all reported infant deaths in Turkey is presented in Table 8.5 below, provided by the Ministry of Health.

Table 8.5 Reported Causes of Infant Death, 2007-2008, Turkey, Ministry of Health

Cause	2007	2008	Total	% of total
Prematurity	4964	3988	8952	31%
Congenital anomaly	2752	2164	4916	17%
Sepsis	1282	1568	2850	10%
Heart disease	1461	917	2378	8%
Perinatal Asphyxia	929	903	1832	6%
Acute Respiratory Infection	651	316	967	3%
Birth trauma	251	97	348	1%
Diarrhea	126	83	209	1%
Accident	80	94	174	1%
Intravascular Hemorrhage	30	78	108	<1%
Meningitis	50	48	98	<1%
Malignancy	72	18	90	<1%
Neonatal tetanus	0	7	7	<1%
Special Conditions	1102	672	1774	6%
Other	1425	2753	4178	15%
	15175	13706	28881	100.0%

Source: Ministry of Health, Infant Mortality Forms – 2009

The leading reported cause of infant death in Turkey according to the Ministry of Health is prematurity, followed by congenital anomaly, which together comprise almost half of all infant deaths. This same pattern is commonly found elsewhere throughout the world, and there is interaction amongst birthweight-related causes such as prematurity, congenital anomaly, respiratory distress, intravascular hemorrhage, etc. Despite Turkey's considerable decline in infant death and its components neonatal and postneonatal death in the past decade, substantial portions of these causes of death (notably prematurity, congenital anomaly, sepsis, etc) are considered preventable with existing technologies and evidence-based practices. Further declines in infant death could likely be realized with scale-up and increased use of these effective interventions and strategies that target common causes of death.

As the leading correlate of infant mortality, low birthweight (<2.5 kg) is an important indicator to understand regarding potential to reduce infant mortality in a country. In Turkey, low birthweight varies by several important variables, including region of residence, as shown in Table 8.6 below:

Table 8.6 Low Birthweight (<2.5 kg) Rate, Turkey, Demographic and Health Survey, 10-year period 1998-2008

Location/ Region	LBW Rate (%)
Istanbul	11
West Marmara	8
Aegean	7
East Marmara	8
West Anatolia	11
Mediterranean	12
Central Anatolia	12
West Black Sea	8
East Black Sea	14
Northeast Anatolia	18
Central East Anatolia	17
Southeast Anatolia	16
West	9
South	13
Central	10
North	10.3
East	16.7
Total (all regions)	11

Source: Turkey Demographic and Health Survey, 2008

In general the Eastern region of Turkey has the highest low birthweight rate, which is about 1.5 times higher than the low birthweight rate found elsewhere throughout the country. In addition, The areas of Turkey with the highest low birthweight rates (Central East Anatolia, Southeast Anatolia, Northeast Anatolia) are generally twice or more than the low birthweight rates found in the Aegean, West Black Sea, and West Marmara regions.

While the precise reasons for these geographic disparities in low birthweight are unclear, the TDHS reported several important correlations of sociodemographic factors with low birthweight in analyzing the 10-year period from 1998-2008 in TDHS that include:

- Birth order: LBW rates among infants with higher birth order (4+) are 1.5 times higher than infant with lower birth order.
- Maternal education: Infants born to women without a primary school education were twice as likely to be born low birthweight than were infants born to women with at least some secondary school education.
- Wealth: Infants born to women in the lowest wealth quintile were over 1.5 times more likely to be born with low birthweight than were infants born to women at higher wealth quintiles.

These correlates of low birthweight – place of residence, birth order, maternal education, and wealth – serve, therefore, as important direct and indirect correlates of infant mortality, notably of neonatal mortality.

Of the components of the Under 5 Mortality Rate (U5MR) – which are neonatal mortality (first month), post-neonatal mortality (1 month to 1 year), and child mortality (from age 1 to 5), the latter is traditionally the least common in Turkey, though in the TDHS-2008, the child mortality rate of 6 child deaths per 1000 live births was slightly higher than the post-neonatal mortality rate of 4. Child mortality in Turkey has declined by one-third since the TDHS-1993 period rate of 9 deaths per 1000, to the TDHS-2008 period rate of 6 deaths per thousand.

Table 8.7 Turkey Demographic and Health Survey, 2008, Estimated Period Child Mortality Rates (age 1 to under 5) for Five Years Preceding Survey

Survey Year	5-yr Period CMR
TDHS-1993	9
TDHS-1998	10
TDHS-2003	9
TDHS-2008	6

Source: Turkey Demographic and Health Survey, 2008

The child death rate overall, correlates with fewer sociodemographic variables than do the other components of the U5MR, as summarized from the TDHS-2008 report. For instance, while the Central, North, and South regions overall had lower child death rates than did the East and West regions, the relationship of the child death rate with wealth and maternal education was unclear from analysis of the TDHS-2008 period data.

The Health Transformation Programme in Turkey and Decline in Under-5 Mortality

Turkey has actively engaged in a wide range of systemic health reforms and investments, particularly since 2003. These reforms are largely cross-cutting health systems investments that promote access, equity, availability, distribution, and quality of care. It is widely considered that these investments have, overall, contributed to improved health in Turkey:

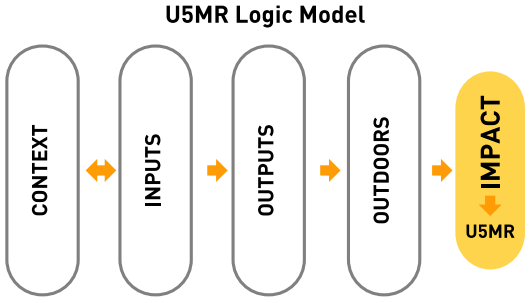
"The health status of the Turkish population has improved significantly over the past few decades, accompanying improvements in the scale and functioning of the health-care system..." *

In tangible terms, while the rapid decline observed in under-5 mortality in Turkey is not clearly attributable to any single dimension of health reform, it likely reflects the culmination of several different dimensions of health reform impacting mortality both directly and indirectly. For example, evidence that the health care system strengthened concomitantly with this rapid decline in U5MR is seen in such reform effects as greater availability of specialized neonatal providers and centers, expansion of trained birthing providers, and improved distribution of primary health care providers throughout the country. Further, evidence that health reform has concomitantly improved prevention of mortality is observed in increased rates of family planning, greater access to and utilization of prenatal care, and improved vaccination.

Since the context of child health and survival is complex and multi-sectoral, rapid declines are most likely attributable to the synergistic and compounded impact of multiple systemic investments that manifest as improved care and prevention systems, with greater availability, that are better distributed. The synergistic impact of multiple health reforms and the resulting system improvements clearly are associated with the very rapid decline in U5MR in Turkey.

* OECD and The World Bank. OECD Reviews of Health Systems: Turkey, 2008.

(9) Etki: Türkiye'de 5YKÖH'de azalma



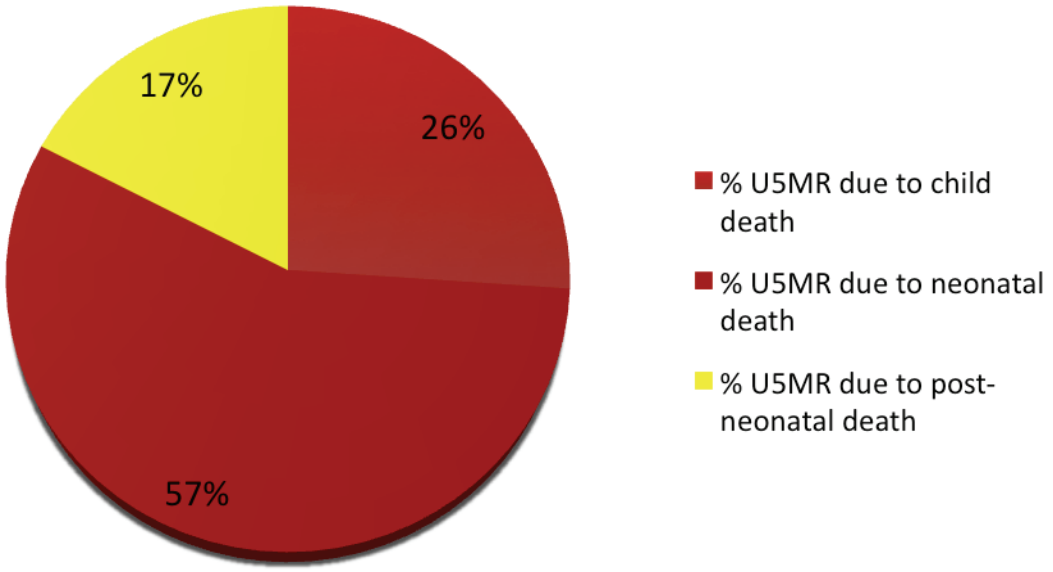
The principal measure of interest for this assessment is the Under-5 Mortality Rate, which is created through the combination of the various component mortality rates (neonatal, post-neonatal, and child).Taken together, the U5MR has decreased dramatically in Turkey over the past decades as shown in Table 9.1. Though multiple data sources are used, ranging from the five-year period estimates of TDHS, to the single-year estimates used by TURKSTAT and UNICEF, clearly a rapid decline in U5MR emerges through the period of interest. U5MR has declined by approximately 70 percent since the 1990 estimates and by 75 percent since the 1988 estimates.

Table 9.1 Turkey Under Five Mortality Rate (U5MR), 1988-2008, From Various Sources

Survey Year	U5MR
TDHS-1988	97
UNICEF/ TURKSTAT Estimate 1990	82
TDHS-1993	61
TDHS-1998	52
TDHS-2003	37
TURKSTAT Estimate 2004	27
TURKSTAT Estimate 2005	26
TURKSTAT Estimate 2006	25
UNICEF/TURKSTAT Estimate 2007	23
TDHS-2008	24

Sources: TDHS: Turkey Demographic and Health Survey, 2008; TURKSTAT Estimates: Health at a Glance 2007; UNICEF State of the World's Children 2009

Figure 9.1 U5MR Components



As discussed previously and as shown in Figure 9.1, the largest portion of Turkey's U5MR remains the neonatal mortality rate (NNMR), which accounts for almost 60% of deaths under age 5 in the TDHS-2008 period. The rapid declines in both the neonatal mortality rate and in the post-neonatal mortality rates in Turkey since 1990 are the main determinants of the decline in the U5MR decline, as the child death rate (which accounts for about one-quarter of the U5MR) has changed little throughout this same period.

As shown previously in section 3, Turkey ranks high among the world's countries with the largest achievements toward MDG4 (U5MR).

In addition, the period 1990-2007 saw rapid acceleration in reduction of Turkey's U5MR: from 1970 to 1990, Turkey's U5MR declined an average of 4.5% per year, from 1990 to 2007, however, the reduction in U5MR declined much more rapidly at 7.5% per year (a decline that was two-thirds faster than the earlier period). Despite these impressive declines, Turkey in 2007 ranked as having the 104th highest U5MR (out of 189 ranks), though at a U5MR of 23 deaths per 1,000 live births, Turkey could continue to make substantial gains as maternal and child health systems, indeed as the entire health system, continues to transform and generate further improvements in health status.

(10) Implications of Observations: Achievements and Opportunities for Maternal and Child Health System Strengthening in Turkey

The logic model framework illustrates several key findings underscoring the factors contributing to Turkey's U5MR experience (presented in Figure 10.1):

- Turkey's experience in the global context
- Turkey has achieved a remarkable decrease in U5MR since 1990 when compared with countries around the world and the reduction in U5MR is gradually increasing.
- Rapid declines were seen in both neonatal mortality and in post-neonatal mortality. Since these components are sensitive to different inputs and factors, it is likely that systemic changes and strengthening health systems led to overall MCH systems improvement.
- Turkey is a country of rapid sociodemographic change
- Contextual factors are important in Turkey. The migration of Turkish residents to urban areas was rapid throughout the past decades and continues, though at a somewhat slower pace. Knowledge of family planning is nearly universal, and contraceptive practice is common and increasing. Resulting family sizes are decreasing in Turkey.
- GDP per capita has grown rapidly and continues to grow, though those in extreme poverty (<$1/day) remain and have even increased proportionally in recent years. Wealth is often strongly associated with birth outcomes; namely women in the lowest wealth quintile frequently have far worse outcomes than women in most of the other quintiles.
- Educational status of women has improved though remains challenging, particularly in regions where infant and U5MR is highest. Women's educational status (no/ incomplete primary school) is frequently a strong correlate of poor maternal and child health outcomes (mortality, low birthweight) demonstrated in this assessment.
- Region of residence is strongly associated with most MCH outcomes. In particular, women residing in the Eastern region, including Northeast, Central East, and Southeast Anatolia.

Figure 10.1 Logic Model Summary: U5MR in Turkey

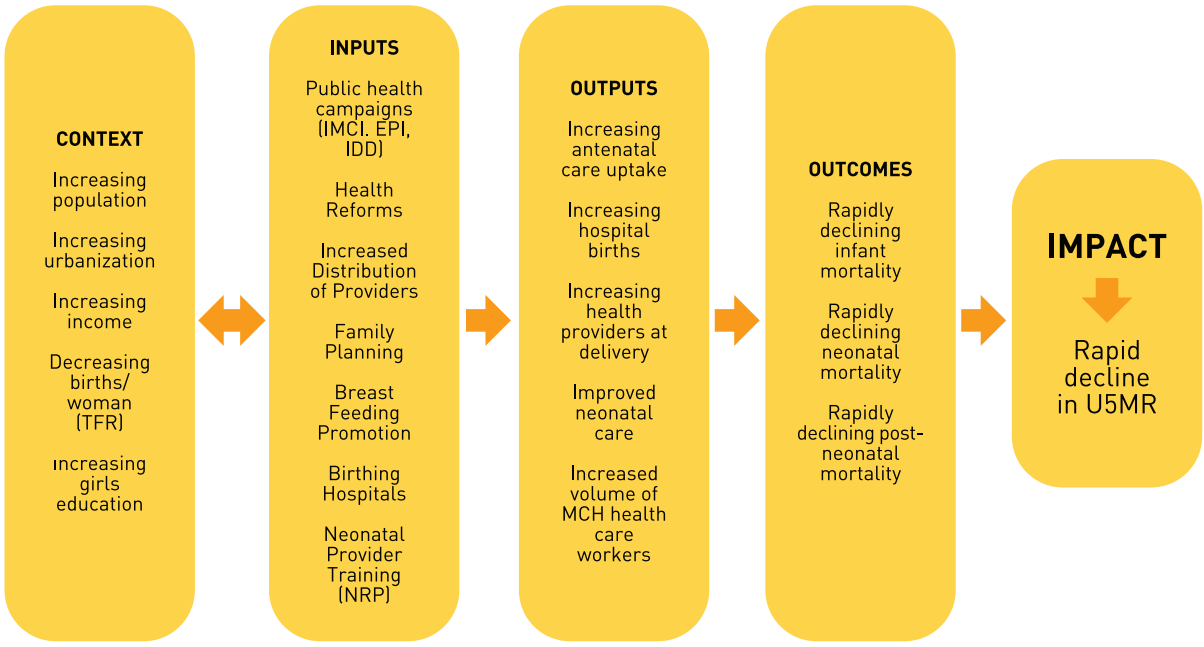
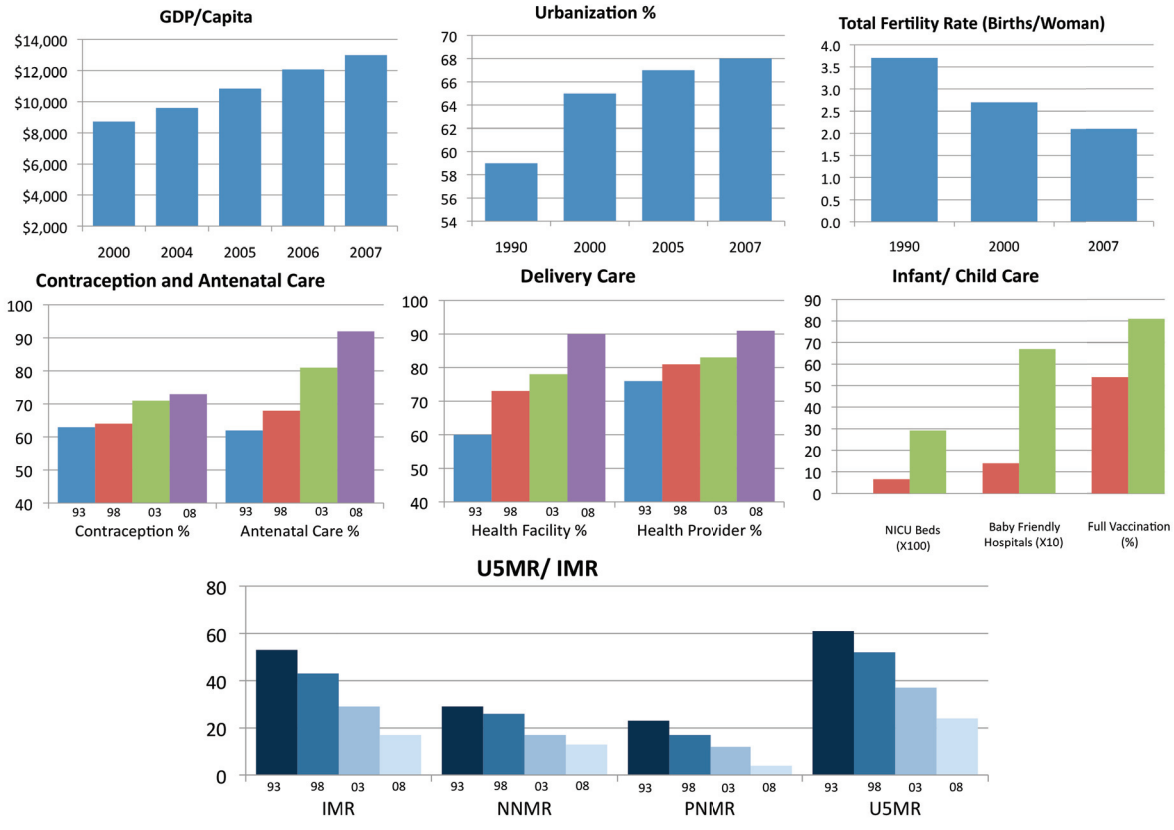


Figure 10.2 U5MR Analysis: Turkey



- Further declines in U5MR are feasible
- Rapid under-five mortality change is due largely to rapid decreases in the infant mortality component of the U5MR, with both neonatal mortality and post-neonatal mortality declining rapidly during this period.
- Most of the leading causes of death in infancy (prematurity, congenital anomalies, and sepsis, among others) have strong preventable components, and have treatment components associated with neonatal intensive care. Further decreases could likely be observed in the infant mortality rate only through primary and secondary prevention of these causes of death.
- Turkey has followed a path of health systems strengthening and reform
- Turkey has implemented strong programs around vaccination, child survival, neonatal intensive care development, family planning, and prenatal care that have reached much of the population and undoubtedly contributed much to the rapid declines observed in the U5MR
- Turkey has rapidly mobilized health providers and increased the proportion of women delivering in hospitals; both of these factors support improved detection and treatment of maternal and child difficulties
- Better monitoring and evaluation will be enabled as data systems improve
- The Turkey Demographic and Health Survey is a rich resource of information as it provides general knowledge on maternal and child health, though is limited by timing (every five years) and scope (sample) which prohibit real-time monitoring of maternal and child health status.
- For this reason, the Ministry of Health has developed data systems to monitor the data on maternal and child health synchronously, and continues to develop new systems to support ongoing monitoring and evaluation.
- The perinatal data system is one of these systems that bridges large birthing hospitals and national birth registration, which will rapidly increase the national capacity to report accurate statistics on maternal and child health.

APPENDIX A

Turkey Demographic and Health Survey 2008:

Infant and Child Mortality Reference Tables[23]

Table 9.1 Infant and child mortality
Neonatal, post neonatal, infant, child and under-five mortality rates by five-year periods preceding the TDHS-2008, TDHS-2003 and TDHS-1998

Years preceding survey	Approximate reference date	Neonatal Mortality (NN)	Post neonatal Mortality (PNN)	**Infant Mortality ($_1q_0$)**	Child Mortality ($_4q_1$)	**Under-five Mortality ($_5q_0$)**
TDHS-2008						
0-4	2003-2008	13	4	17	6	24
5-9	1998-2003	17	16	33	9	41
10-14	1993-1998	21	23	50	10	59
TDHS-2003						
0-4	1998-2003	17	12	29	9	37
5-9	1993-1998	24	22	47	10	56
TDHS-1998						
0-4	1993-1998	26	17	43	10	52

23 From: Koç I, Yüksel I, Eryurt MA. Infant and Child Mortality. In: Hacettepe University Institute of Population Studies (2009) Turkey Demographic and Health Survey, 2008. Hacettepe University Institute of Population Studies, Ministry of Health General Directorate of Mother and Child Health and Family Planning, T.R. Prime Ministry Undersecretary of State Planning Organization and TÜBİTAK, Ankara, Turkey, pp. 129-139.

Table 9.2 Early childhood mortality rates by socioeconomic characteristics
Neonatal, post-neonatal, infant, child, and under-five mortality for the ten-year period preceding the survey by socioeconomic characteristics, Turkey 2008

Socioeconomic characteristic	Neonatal mortality (NN)	Post neonatal mortality (PNN)[1]	**Infant mortality ($_1q_0$)**	Child mortality ($_4q_1$)	**Under-five mortality ($_5q_0$)**
Residence					
Urban	13	9	22	7	29
Rural	20	14	33	10	43
Region					
West	9	7	16	10	26
South	17	13	30	6	35
Central	12	9	22	1	23
North	16	8	24	3	27
East	24	15	39	11	50
Selected regions of residence (NUTS 1)					
Istanbul	2	6	9	14	23
Southeast Anatolia	20	13	33	12	45
Education					
No education/Prim. incomplete	23	18	41	12	53
First level primary	14	10	24	5	29
Second level primary and higher	9	4	13	8	21
Wealth quintile					
Lowest	22	19	41	11	52
Second	19	11	30	9	38
Middle	10	6	16	4	21
Fourth	11	7	18	4	23
Highest	7	4	12	9	20
Total	15	11	26	8	33

[1] Computed as the difference between infant and neonatal mortality rates

Table 9.3 Early childhood mortality rates by biodemographic characteristics

Neonatal, post-neonatal, infant, child, and under-five mortality for the ten-year period preceding the survey by biodemographic characteristics, Turkey 2008

Biodemographic characteristic	Neonatal mortality (NN)	Post neonatal mortality (PNN)[1]	**Infant mortality ($_1q_0$)**	Child mortality ($_4q_1$)	**Under-five mortality ($_5q_0$)**
Sex of child					
Male	15	13	28	8	36
Female	15	8	23	7	30
Mother's age at birth					
< 20	22	12	33	12	45
20-29	12	11	23	6	29
30-39	19	8	27	11	37
40-49	28	6	34	0	34
Birth order					
1	13	7	21	5	26
2-3	12	10	22	7	28
4-6	23	17	40	12	52
7+	30	17	47	17	63
Previous birth interval[2]					
< 2 years	27	24	51	12	62
2 years	15	12	27	7	33
3 year	11	6	17	2	19
4 years or more	11	7	18	9	27
Size at birth[3]					
Small or very small	18	6	24	NA	NA
Average or larger	9	2	11	NA	NA

NA= not applicable
[1] Computed as the difference between the infant and child mortality rates
[2] Excludes first-order births
[3] Refers for the five-year period before the survey

Table 9.4 Perinatal mortality

Number of stillbirths and early neonatal deaths, and the perinatal mortality rate for the five-year period preceding the survey, by background characteristics, Turkey, 2008

Background characteristic	Number of stillbirths[1]	Number of early neonatal deaths[2]	Perinatal mortality rate[3]	Number of pregnancies of 7+ months duration
Mother's age at birth				
<20	3	8	34	347
20-29	12	17	13	2,177
30-39	9	15	26	897
40-49	4	0	(51)	70
Previous pregnancy interval in months				
First pregnancy	6	11	16	1,090
<15	0	9	28	315
15-26	3	6	15	561
27-38	3	2	14	403
39+	15	12	24	1,121
Residence				
Urban	20	30	20	2,496
Rural	7	10	17	995
Region				
West	18	12	25	1,191
South	3	5	18	444
Central	1	10	14	742
North	0	0	(2)	197
East	6	13	21	917
Selected NUTS 1 Regions				
Istanbul	9	3	21	557
Southeast Anatolia	3	7	18	536
Education				
No education/Prim. incomplete	7	8	20	788
First level primary	16	26	25	1,707
Second level primary and higher	4	6	9	995
Wealth quintile				
Lowest	6	10	19	858
Second	7	13	24	824
Middle	5	6	16	714
Fourth	2	7	14	581
Highest	7	4	22	513
Total	27	40	19	3,490

Table 9.5 High-risk fertility behaviour

Percent distribution of children born in the five years preceding the survey by category of elevated risk of mortality and the risk ratio, and percent distribution of currently married women by category of risk if they were to conceive a child at the time of the survey, Turkey 2008

	Births in the 5 years preceding the survey		
Risk category	Percentage of births	Risk ratio	Percentage of currently married women[a]
Not in any high risk category	33.2	1.0	31.1[b]
Unavoidable risk category			
First order births between ages 18 and 34 years	31.8	1.4	7.4
Single high-risk category			
Mothers's age <18	2.7	1.5	0.2
Mothers's age >34	3.8	0.2	20.9
Birth interval <24 months	8.2	3.1	7.3
Birth order >3	11.2	1.5	6.1
Subtotal	26.0	1.8	34.5
Multiple high-risk category			
Age <18 & birth interval <24 months[c]	0.1	0.0	0.1
Age >34 & birth interval <24 months	0.3	0.0	0.4
Age >34 & birth order >3	4.1	3.3	22.8
Age >34 & birth interval <24 months & birth order >3	0.7	8.3	0.9
Birth interval <24 months & birth order >3	3.9	3.5	2.7
Subtotal	9.0	3.6	27.0
In any avoidable high-risk category	35.0	2.3	61.4
Total	100.0	NA	100.0
Number of births/women	3,463	NA	6,999

[a] Women were assigned to risk categories according to the status they would have at the birth of a child, if the child were conceived at the time of the survey: age less than 17 years and 3 months, age older than 34 years and 2 months, latest birth less than 15 months ago, and latest birth of order 3 or higher.
[b] Includes sterilised women.
[c] Includes the combined categories *Age <18 and birth order >3*.
NA=Not Applicable.

Daha fazla bilgi için irtibat:
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