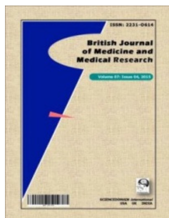

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Mother and Child Health Care and Human Development in Turkey: A Review

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Author's contribution

The sole author designed, analyzed and interpreted and prepared the manuscript.

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ABSTRACT

Human development and investing in human are major issues of today's world. In spite of rapid improvements in the near past, Turkey is still behind of the most middle- income and of the countries at a similar level of economic status in terms of human development. As an economic power Turkey is 17th in the global scale but is 71st in the Human Development Index prepared according to social indicators involving health and education.

The demographic profile of Turkey is relatively young and mother and child health care issues concern about 57.0% of the total population. On the other hand Turkey has the poorest indices in terms of mother and child health among European countries. The indicators regarding mother and child health care issues have shown improvements in the last four decades as a result of socio-economic development and priority given to these health services. But still there are discrepancies between rural-urban and eastern-western regions of the country. Some of these discrepancies exist because of the economic disadvantages. But most of them are still alive due to cultural norms. The most effective cultural norm is the diminished value of women and girls. Almost all studies showed a strong correlation between these discrepancies and educational and/or socioeconomic level of women. Turkey's health expectations are not far to reach but depend on prioritizing and strengthening of women both in educational and economic manner.

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1. GENERAL PERSPECTIVES

The demographic profile of Turkey is relatively young compared to other European countries. According to 2015 census data 24.9% of the total population is under age of fifteen and 26.6% of the total population is women in childbearing ages [1]. These numbers reveal that mother and child health care issues concern about 51.5% of the total population.

On the other hand Turkey has the poorest indices in terms of mother and child health among other European countries. Compared to the neighbourhood countries infant mortality is higher than most of them [2]. Table 1 Shows the UNDP Human Development Index, infant mortality rates and estimated maternal mortality ratios of these countries.

Turkey has the highest fertility rates among the European countries. Fertility showed a significant decline since 1978 [3-7]. Data for the year 2013 showed that a woman would have 2.3 children on average when she reaches the end of her fertile period. This number is higher in rural areas and among illiterate (Fig. 1).

Education levels of women have an important effect on women's fertility and this fact have been reported in every Demographic and Health Surveys which have been conducted since 1978 (Fig. 2).

Table 1. Some measures of human development: Turkey and neighbourhood countries

Country (HDI Rank)	GNI per capita PPP$	HDI	GDI	% of parliament seats held by women	Adolescent birth rate (births per 1000 women ages 15-19)	Infant mortality rate (per 1,000 live births)	Maternal mortality ratio (per 100,000 live births)
Albania (75)	10,397	0.764	0.959	21.7	20.7	12.5	29
Armenia (84)	7,899	0.743	0.993	23.0	10.7	12.6	25
Azerbaijan (78)	16,695	0.759	0.940	59.8	16.9	27.9	25
Bosnia & Herzegovina (81)	10,024	0.750	0.923	8.6	19.3	5.1	11
Bulgaria (56)	16,956	0.794	0.984	37.7	20.4	9.3	11
Croatia (45)	20,430	0.827	0.997	9.5	15.2	3.6	8
Czech Rep (28)	29,805	0.878	0.983	9.9	19.6	2.8	4
Georgia (70)	9,109	0.769	0.970	39.7	11.3	10.6	36
Greece (29)	24,617	0.866	0.957	7.5	19.7	3.6	3
Hungary (43)	24,474	0.836	0.988	18	10.1	5.9	17
Iran (69)	16,507	0.774	0.862	26.7	3.1	13.4	25
Iraq (121)	14,018	0.649	0.804	84.0	26.5	26.5	50
FYR Macedonia (82)	12,725	0.748	0.947	17.6	33.3	4.8	8
Moldova (107)	4,742	0.699	1.010	22.6	21.8	13.6	23
Montenegro (48)	15,410	0.807	0.955	12.2	17.3	4.7	7
Romania (50)	19,926	0.802	0.990	34.6	12.0	9.7	31
Serbia (66)	12,202	0.776	0.969	19.0	34.0	5.9	17
Slovakia (40)	27,394	0.845	0.991	20.2	18.7	5.8	6
Slovenia (25)	28,942	0.890	1.003	3.8	27.7	2.1	9
Syrian Arab Republic (149)	-	0.536	0.851	39.4	12.4	11.1	68
Turkey (71)	18,959	0.767	0.908	27.6	14.9	11.6	16

HDI = Human Development Index; GDI =Gender Related Development Index; GNI= Gross National Income; PPP = Power Purchase Parity
Source: UNDP Human Development Report 2016, NY New York. Available at: http://hdr.undp.org

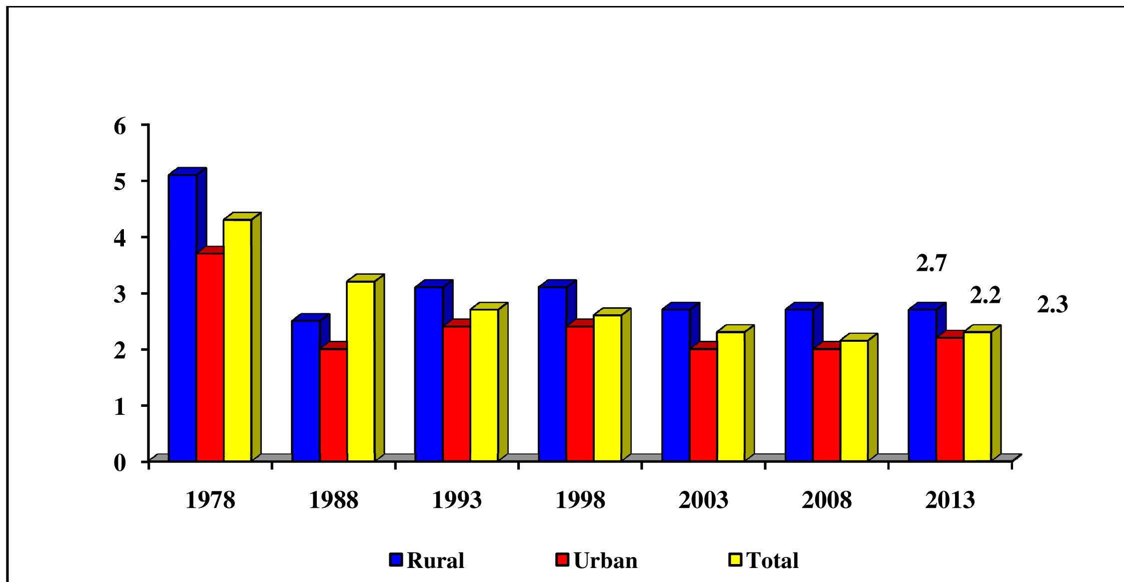

Fig. 1. Total fertility rates in Turkey
Source: Turkey Demographic and Health Survey, 1993, 1998, 2003, 2008 & 2013

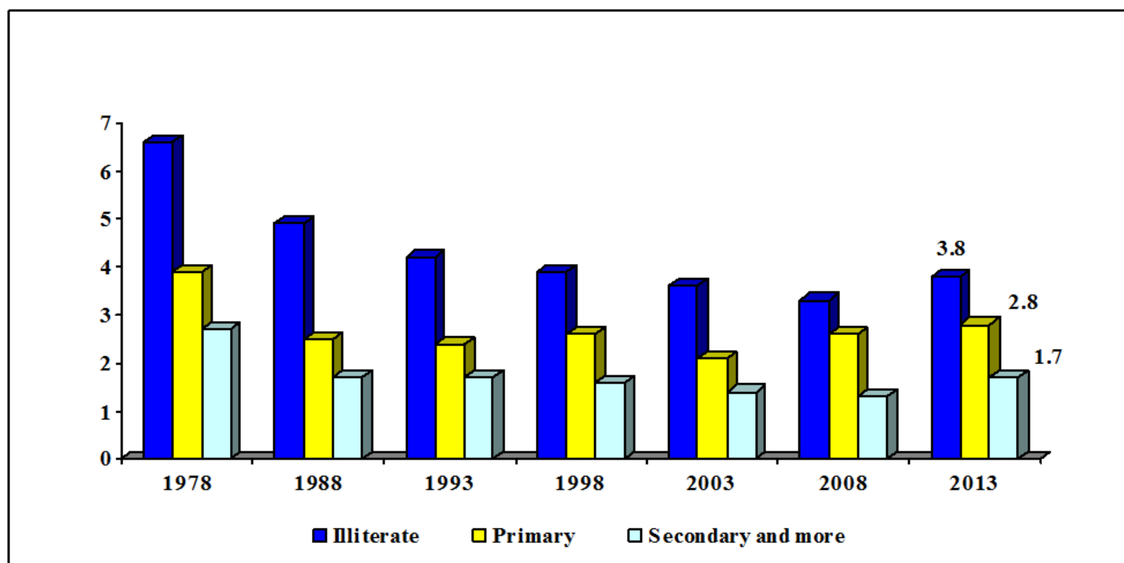

Fig. 2. Total fertility rates and educational attainment of women
Source: Turkey Demographic and Health Survey, 1993, 1998, 2003, 2008 & 2013

2. FAMILY PLANNING

Family planning is an essential tool for reducing the high fertility rates and protecting the health of mothers and children. Traditional attitudes of the government toward population growth began to change in late 1950s, mainly due to medical problems especially related with realization of the existence of high maternal mortality caused by unwanted pregnancies and illegal abortions. High urbanization and unemployment were also factors contributing new anti-natalist policy. The State Planning Organization and the Ministry of Health pioneered the policy change; previous policies liberalized by allowing to provide contraceptives and also information, education and communication activities of family planning. The first anti-natalist population planning law was enacted in 1965 and in 1983 the law was revised and a more liberal and comprehensive one was

accepted. In addition trained nurses and midwives were authorized to provide effective family planning methods. Also trained general practitioners were authorized to provide to terminate pregnancies by menstrual regulation [8].

After the International Conference on Population and Development in 1994 and Beijing Conference in 1995 the special programs focused more on reproductive health rather than mother and child health and family planning only [9]. The main objective of these programs was strengthen the reproductive health services including mother and child health and family planning services to reach the WHO's "Health for All" targets. Two documents have been prepared for this reason [10]:

1) National Program of Action for Children has been prepared in 1993 and updated in 1995. This program aimed to realize the overall goals of the World Summit for Children.
2) Women's Health and Family Planning Strategic Plan, was prepared in 1995. The Safe Motherhood Program has been implemented in 8 provinces.

As a result of these programs progress has been made in the reproductive health. However, considerable work still needs to be done in some areas such as improving the status of women, the quality of health care and promoting the decentralization of health care services. Nowadays nearly 100% of all women in childbearing ages have the knowledge about family planning but the usage of family planning is not at desired level. Traditional ineffective methods are still used widely and there are gaps between urban-rural; east and west regions in terms of using modern family planning methods [5-7]. Fig. 3 shows distribution of family planning methods.

3. MATERNAL MORTALITY

According to the estimates of WHO, estimated maternal mortality ratio in Turkey is about 17 per 100.000 live births [11]. Unfortunately the real numbers of maternal deaths do not exist. The National Maternal Mortality Study (NMMS) was performed in June 2005- May 2006 period and the overall ratio of pregnancy related deaths was found to be 38.3 (± 2.8 in the 95% confidence interval) per 100,000 live births [9]. It was 28.2 per 100.000 live births in urban areas and 53.7 in rural areas. For the same period, the country wide estimate for the maternal mortality ratio was 28.5 (± 2.5 in the 95% confidence interval) per 100,000 live births, 20.7 in urban and 40.3 in rural areas. NMMS results show that 58.4% of all pregnant women died from direct maternal causes, 15.8% from indirect causes and 23.2% from co-incidental causes and the remaining 2.4% were deaths for which the kind of pregnancy relation could not be specified [9]. About 61.6% of all maternal deaths found to be preventable within the current health system [9]. The causes of maternal deaths are shown in Fig. 4.

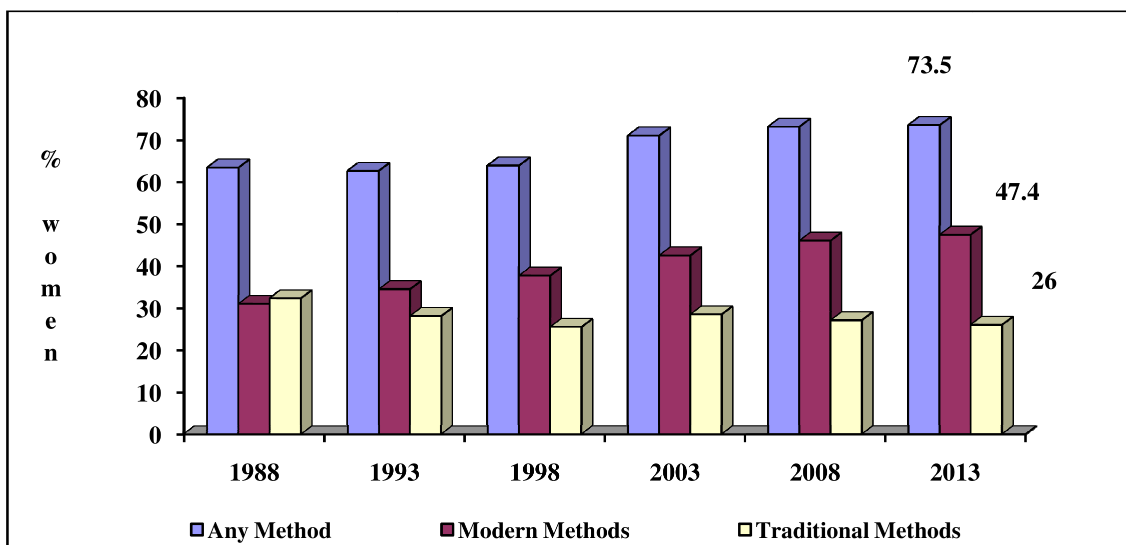

Fig. 3. Family planning in Turkey
Source: Turkey Demographic and Health Survey, 1993, 1998, 2003, 2008 & 2013

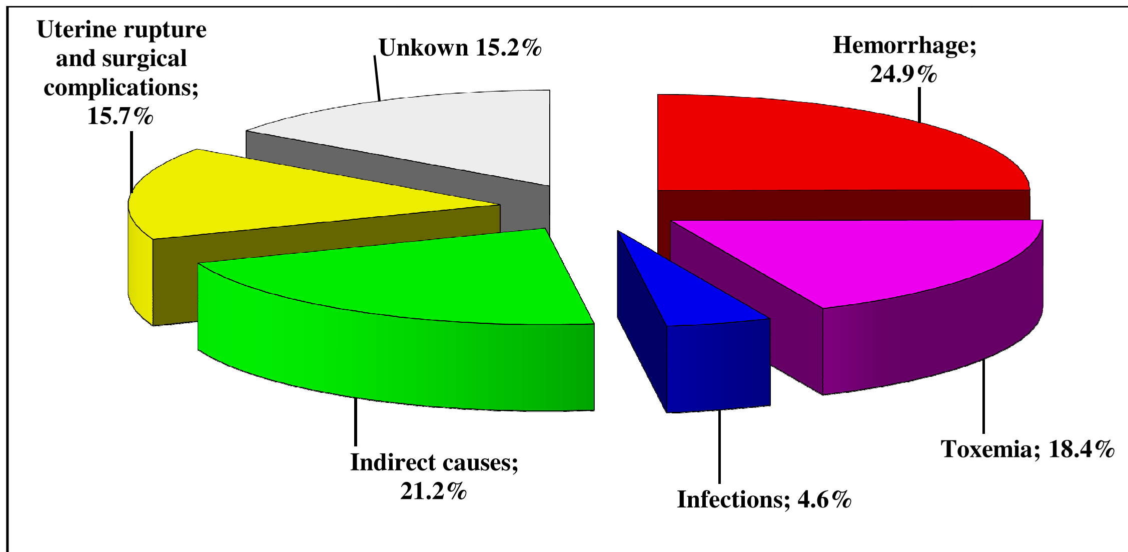

Fig. 4. Causes of maternal deaths in Turkey

Source: Hacettepe University Institute for Population Studies, ICON-Institut Public Sector GmbH & BNB Consulting (2006). National Maternal Mortality Study 2005

4. CHILD MORTALITY

The infant mortality rate is showing a declining trend from 200 per thousand live births in 1960s to 13 in 2013 [3-7]. The decline in post-neonatal infant mortality rate was more significant than the decline in neonatal infant mortality rate and first time in 1993, neonatal infant mortality rate was higher than the post-neonatal infant mortality rate [3]. The difference is assumed to be showing the impact of some special programs aiming to improve child health like the "Expanded Program on Immunization", "Control of Diarrhoeal Diseases" and "Acute Respiratory Infections Control Program". The under five year mortality is going down rapidly as it was 114 per thousand in 1983 and 15 per thousand in 2013 [3-7]. However, infant mortality rates showed a decline by the years, there are still big regional and urban-rural differences. In rural areas and in the eastern part of the country, under five year mortality rates are higher than the rate of the whole country [7]. Fig. 5 shows the declining trends in infant mortality and Fig. 6 child mortality throughout the years in Turkey.

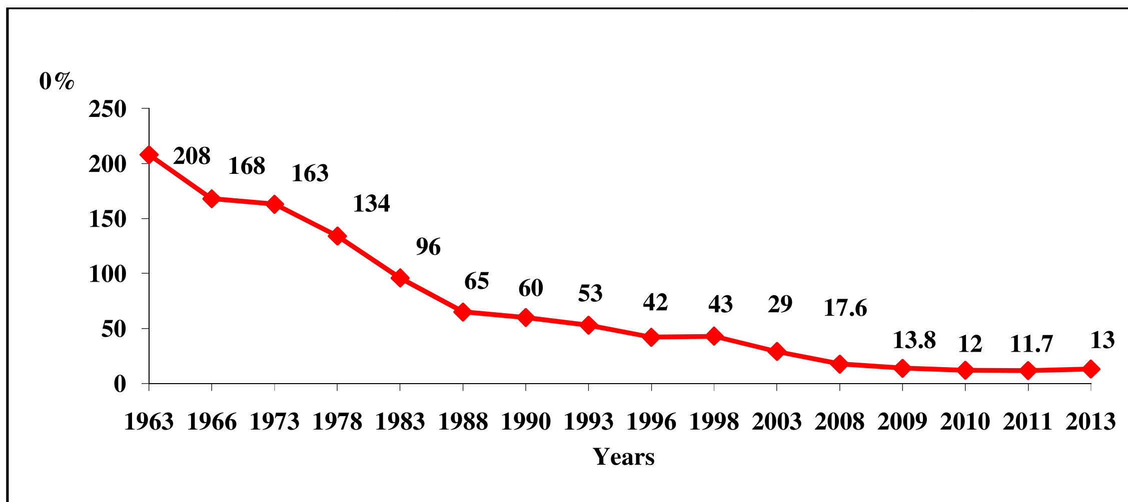

Fig. 5. Infant mortality rates in Turkey

Source: Turkey Demographic and Health Survey, 1993, 1998, 2003, 2008 & 2013

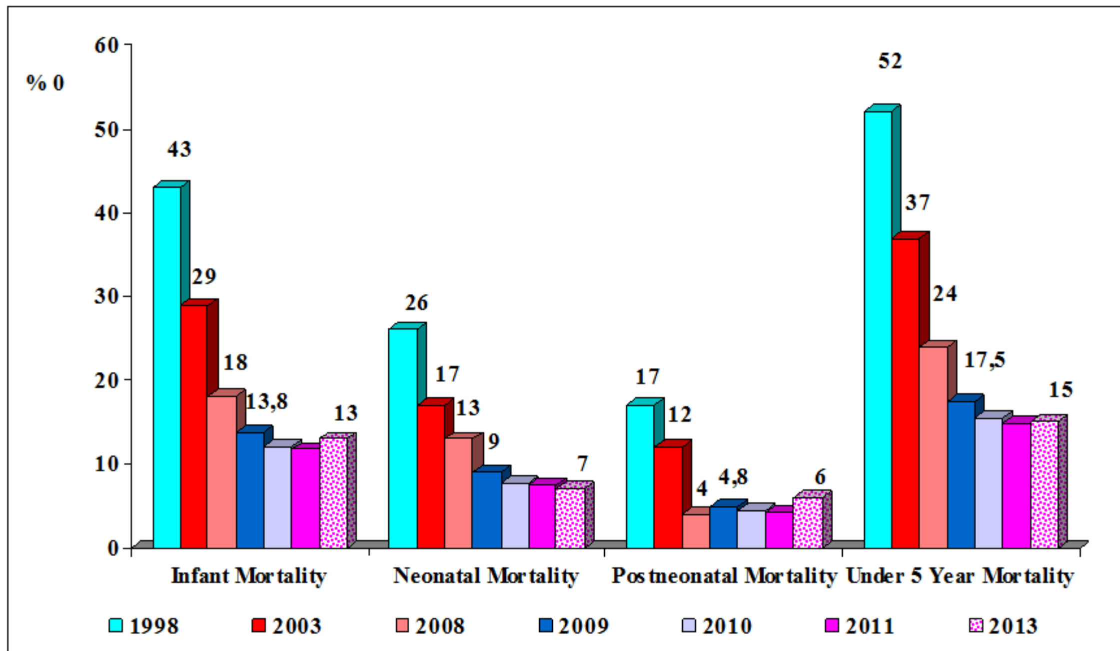

Fig. 6. Child mortality in Turkey

Source: Turkey Demographic and Health Survey, 1998, 2003, 2008 & 2013

Pregnancy and birth related peri-natal reasons are still leading causes of infant mortality [12]. Therefore receiving ante-natal care and professional assistance at birth are core issues. Table 2 shows the percentages of women receiving ante-natal care and professional assistance at birth.

Since 1993 a declining trend for women without ante-natal care and without any professional assistance at birth are remarkable but still with urban-rural or regional inequalities [3-7].

Since the integration of "Expanded Immunization Program" within routine primary care services in 1985, vaccine coverage rates gradually increased and morbidity of vaccine preventable diseases has declined significantly [13]. However, coverage rates still need to be improved to provide effective disease control activities.

Table 2. Antenatal care and assistance at birth among Turkish women

	% of women without antenatal care			% of women assisted at birth		
Years	**2003**	**2008**	**2013**	**2003**	**2008**	**2013**
Settlement						
Urban	11.6	5.0	1.7	90.3	94.0	98.7
Rural	34.2	15.7	7.0	68.9	79.0	91.7
Region						
West	8.5	3.1	1.0	95.3	96.0	99.8
South	14.6	5.1	1.6	88.8	92.2	97.9
Middle	16.6	5.2	2.7	91.0	98.3	99.1
North	14.8	4.2	3.8	86.5	95.6	98.8
East	38.8	20.5	5.9	59.7	72.2	91.7
Education						
Illiterate	45.7	21.5	7.7	54.9	71.2	90.3
Primary	15.1	6.5	2.3	91.1	92.9	97.9
Secondary +	3.4	1.7	1.5	97.5	99.6	99.5
Total	18.6	7.8	2.7	83.0	89.7	97.2

Source: Turkey Demographic and Health Survey, 2003, 2008 & 2013

5. SOCIO-ECONOMIC ISSUES

The basic population policy of Turkey is to improve quality of life with respect to education, health and human resources, and alleviate regional disparities to reach a balanced and sustainable development.

Population with sustainable access to an improved water source was 100% and with access to improved sanitation was 95% for the year 2012 [14].

Problem of absolute poverty by the standards of a developing country is not seen in Turkey. However, indicators of living standards and economic opportunity describe a country which despite substantial progress, still faces a steep challenge in bringing the great majority of its poor and economically vulnerable population into the economic mainstream. Progress in reducing poverty, while significant, has been uneven. The data also reveal disparities within the country between urban and rural areas, between prospering regions and impoverished ones. Poverty affects mostly specific groups of the population whose ability to participate in economic progress is handicapped. Education, employment and earnings opportunities are key determinants of poverty risks. While the number of persons that can be classified under “absolute poverty line” is low, but the income distribution is extremely skewed, and thus “relative poverty” exists as a significant problem. The percentage of the population below the poverty threshold was 15% in the year 2014 [15]. The groups with lowest and highest poverty rates were higher education graduates (1.3%) and illiterates (27.7%) [15]. In the year 2014 the mean annual equivalised household disposable income reached from 13,250 to 14, 553 Turkish Liras with a 9.8% increase as compared with the previous year and about 29.4% of the population suffered material deprivation [15].

Studies of income distribution were carried out since the 1960s and they showed little improvement over the time. The share of the lowest household income quintile has ranged from 3 to 5%, and the share of middle income quintile from 10 to 14%, while the share of highest income quintile has been over 50% for three decades and the GINI coefficient is about 39.1%, which indicates an income distribution far from being equal [16]. Fig. 7 shows income distribution in Turkey.

Gross National Income per capita reached about 18,959 PPP $ in the year 2015 but disparities between urban–rural areas and among regions are existing [15]. The labour force participation is 50.7% (male 70.8%; 31.0% female) and employment rate (45%) is among the lowest levels in the world [17]. Non-agricultural unemployment rate is 13% and the ratio of persons who worked without any social security related to the main job realized as 31.8% in the year 2016 [17].

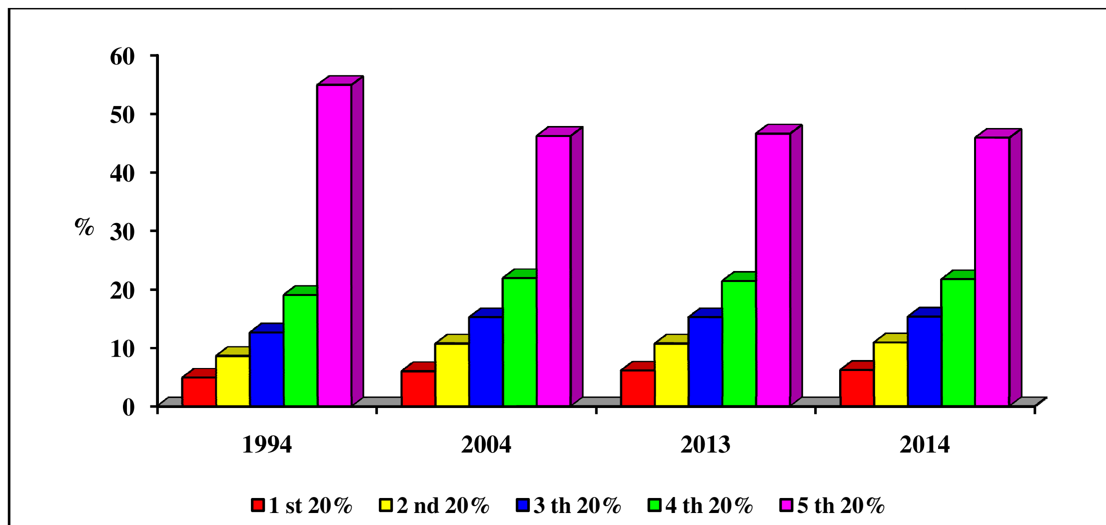

Fig. 7. Income distribution by quintiles ordered by income

Sources: Turkish Statistical Institute. Common indicators on household disposable income by quintiles ordered by income group, Turkey 2003-2005.
Turkish Statistical Institute. Income and Living Conditions Survey, 2014

Table 3. Summary of some health measures of Turkey

Measure	Value	Ranking	Source
Life expectancy at birth (years)			
Male	72.3	56th out of 99	
Female	78.7	67th out of 196	http://www.nationmaster.com
Under five year mortality	14%	112th among 208 countries	
Measles Immunization (1 year old children)	97%	-	UNICEF: The State of World's Children 2016
DTP3 Immunization (1 year old children)	96%	-	http://www.unicef.org
BCG Immunization (1 year old children)	95%	-	
Hospital Beds (per 1,000 people)	2.5	32nd among 34 OECD countries OECD average is 5	
Physicians (per 1,000 people)	1.6	33rd among 34 OECD countries OECD average is 3.2	
Nurses (per 1,000 people)	1.5	33rd among 34 OECD countries OECD average is 8.4	OECD Health Data 2011 http://www.oecd.org
Total Health Spending as % of GDP	6.1	34th among 34 OECD countries OECD average is 9.5	
Health Spending per capita	902 PPP$	34th among 34 OECD countries OECD average is 3234 $	

Available data shows that in spite of rapid improvements in the near past, Turkey is still behind of the most middle- income and of the countries at a similar level of economic development. As an economic power Turkey is 17th in the global scale but is 71st in the Human Development Index prepared according to social indicators involving health and education [2]. A summary of the health status of Turkey is shown in above Table 3. Among the OECD countries Turkey is in the last or last second place in terms of important health indices [18].

6. GENDER GAP

Women in Turkey are still exposed to violence, being abused, trafficked, their access to education and political participation is refused and face with many other human rights violations. Turkey with a score of 0.623 is the 130th country out of 144 countries according to the Gender Gap Index (2016) of World Economic Forum [19]. The gender gap is deeper in terms of education and labour force participation. In Turkey 3.7% of population cannot read and write and 82.9% of them are women [19]. Roughly one million girls of primary school age are not going to school in Turkey. The gender gap in primary education enrolment is 7.0%- about 600,000 more girls than boys. More than 50.0% of girls between 6–14 years of ages are out of school in some provinces [1].

Statistics showed that 37.5% of women have faced with physical and sexual domestic violence, at least one time in their life [20]. According to the research of an independent communication network on the number of female killings reflected in the media, 216 women were killed in the year 2016 [21]. Most of these women were killed by their husbands and partners (66.0%) whereas about 9.0% of the victims were killed despite they were under protection and one of every four women was killed because of the desire of getting divorced [21]. Honour killings in Turkey emerge as one of the most important problems in terms of gender policy. The honour killings are an on-going social problem and their elimination does not seem possible only with legal changes, social transformation is needed to address this issue.

Turkey has one of the highest rates of child marriage in Europe with an estimated 15% of girls married before the age of 18 [13]. Turkey has a poor birth registration system which means that families can marry their daughters without fear of repercussion. Therefore available data may not be representative of the scale of the issue since most child marriages are unregistered and take place as unofficial religious marriages. Patriarchal values remain strong in Turkish society and girls are often valued for their ability to be good wives and mothers and little importance is placed on their education. Economic considerations along with concerns about girls' safety and family honour are also drivers of child marriage.

7. CONCLUSION

The indicators regarding mother and child health care issues have shown improvements in the last four decades as a result of socio-economic developments and priority given to these health services. But still there are discrepancies between rural-urban and eastern-western regions of the country. Some of these discrepancies exist because of the economic disadvantages. But most of them are still alive due to cultural norms. The most effective cultural norm is the diminished value of women and girls. This norm affects the social acceptance, education and economic situation of women. Especially in the eastern parts and rural areas of the country the only good that a woman can produce is children, and in order to take a place in the community, to gain respect and dignity, women are going to produce more children and are motivated to do so by the community which they are living in. More pregnancies, more births and more children are bringing more health risks to mothers and also to their children. Almost all studies showed a strong correlation between these discrepancies and educational and/or socioeconomic level of women. Therefore the next step for Turkey should be prioritizing and strengthening of women both in educational and economic manner.

First steps for this action has been already done and some projects for the formal school education of girls has begun. The girls' education campaign in Turkey "Girls, let's go to school" which was launched in 2003, addressed the complex range of economic and social factors that contribute to the non-attendance of girls at school [22]. Another campaign named "Daddy, send me to school" was launched in 2005 and sponsored by a Turkish newspaper and two NGO's and after the 10 years of operation the campaign reached more than 10,000 girls [23].

The acceptance of those campaigns and high funding contributions by individuals could be a sign of the public awareness concerning these matters. Hopefully this awareness will solve the health deficiencies in mother and child health issues and bring Turkey to the desired and deserved position among the other countries of the world.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Author has declared that no competing interests exist.

REFERENCES

1. Turkish Statistical Institute. Turkey in Statistics 2015. Publication No: 4431. Ankara: TURKSTAT; 2016. Available:http://www.turkstat.gov.tr (Accessed 17 January 2017)
2. UNDP. Human Development Report 2016: Human Development for Everyone NY, New York: UNDP; 2016. Available:http://hdr.undp.org (Accessed 6 April 2017)
3. Hacettepe University Institute of Population Studies, Ministry of Health [Turkey], and Macro International Inc. Turkish Demographic and Health Survey 1993. Ankara, Turkey: HIPS. 1994;37-39,83-85, 93. Available:http://dhsprogram.com/pubs/pdf/FR57/FR57.pdf (Accessed 13 February 2017)
4. Hacettepe University, Institute of Population Studies/Turkey and Macro International. Turkey Demographic and Health Survey 1998. Ankara, Turkey: HIPS. 1999;47,98,105. Available:http://dhsprogram.com/pubs/pdf/FR108/FR108.pdf (Accessed 13 February 2017)

5. Hacettepe University Institute of Population Studies/Turkey. Turkey Demographic and Health Survey, 2003. Ankara, Turkey: HIPS. 2004;63-64,109-118,120-126.

   Available:http://dhsprogram.com/pubs/pdf/FR160/FR160.pdf

   (Accessed 13 February 2017)

6. Hacettepe University Institute of Population Studies/Turkey. Turkey Demographic and Health Survey, 2008. Ankara, Turkey: HIPS. 2009;60:141-148.

   Available:http://www.hips.hacettepe.edu.tr/eng/dokumanlar/TDHS-2008_Main_Report.pdf

   (Accessed 10 January 2017)

7. Hacettepe University Institute of Population Studies. Turkey Demographic and Health Survey, 2013. Ankara, Turkey: HIPS; 2014.

   Available:http://www.hips.hacettepe.edu.tr/eng/tdhs13/report/TDHS_2013_main.report.pdf

   (Accessed 10 January 2017)

8. Savas BS, Karahan O, Saka O. In Thomson S, Mossialos E., eds. Health care system in transition: Turkey. European Observatory on Health Care Systems. 2002;4(4):77-85.

   Available:http://www.euro.who.int/__data/assets/pdf_file/0007/96415/e79838.pdf
   Accessed 12 March 2017.

9. Hacettepe University Institute of Population Studies, ICON-INSTITUT Public Sector GmbH and BNB Consulting. National Maternal Mortality Study, 2005. Turkey, Ankara: HIPS. 2006;49-69.

   Available:http://www.hips.hacettepe.edu.tr/UAOC2005-AnaRapor.pdf

   (Accessed 13 February 2017)

10. Ministry of Health of Turkey & School of Public Health. Turkey Health Report. SB-HM-2004/01. Ankara. 2004;81-95.

    Available:http://sbu.saglik.gov.tr/Ekutuphane/Yayin/158

    (Accessed 16 November 2016)

11. WHO, UNICEF, UNFPA, World Bank Group, and United Nations Population Division Maternal Mortality Estimation Inter-Agency Group. Maternal mortality in 1990-2015. Geneva, WHO; 2015.

    Available:http://www.who.int/gho/maternal_health/countries/tur.pdf

    (Accessed 13 February 2017)

12. Korkmaz A, Aydın Ş, Çamurdan AD, Okumuş N,Onat FN, Özbaş S, et al. *Türkiye'de bebek ölüm nedenlerinin ve ulusal kayıt sisteminin değerlendirilmesi.* Çocuk Sağlığı ve Hastalıkları Dergisi. 2013;56(3):105-121. Turkish (with English abstract).

    Available:http://www.cshd.org.tr/uploads/pdf_CSH_500.pdf

    (Accessed 12 March 2014)

13. UNICEF. The state of the world's children: A fair chance for every child; 2016.

    Available: http://www.unicef.org

    (Accessed 25 March 2017)

14. WHO & UNICEF. Progress on sanitation and drinking-water - 2014 update. Geneva: WHO. 2014;70-71.

    Available:http://www.wssinfo.org

    (Accessed 12 April 2017)

15. Turkish Statistical Institute. Income and Living Conditions Survey, 2014. Ankara: Turkstat; 2015.

    Available:http://www.turkstat.gov.tr/PreHaberBultenleri.do?id=18633 and http://www.turkstat.gov.tr/PreHaberBultenleri.do?id=21823

    (Accessed 6 April 2016)

16. Turkish Statistical Institute. Common indicators on household disposable income by quintiles ordered by income group, Turkey 2003-2005. Ankara: Turkstat; 2005.

    Available:http://www.turkstat.gov.tr/PreHaberBultenleri.do?id=408&tb_id=1

    (Accessed 27 June 2008)

17. Turkish Statistical Institute. Labour Force Statistics. Ankara: Turkstat; 2016.

    Available:http://www.turkstat.gov.tr/PreHaberBultenleri.do?id=21570

    (Accessed 6 April 2017)

18. OECD. Health at a Glance 2011: OECD Indicators. OECD Publishing; 2011.

    Available:http://dx.doi.org/10.1787/health_glance-2011-en

    (Accessed 12 March 2014)

19. World Economic Forum. The Global Gender Gap Report, Country Profiles. WEF. 2016;346-347.

    Available:http://www3.weforum.org/docs/GGGR16/WEF_Global_Gender_Gap_Report_2016.pdf

    (Accessed 25 March 2017)

20. The Republic of Turkey Ministry of Family and Social Policies & Hacettepe University Institute of Population Studies. Domestic Violence against Women in Turkey Summary Report. Ankara: HIPS; 2014. Available:http://www.hips.hacettepe.edu.tr/ingilizceozetraporweb.pdf (Accessed 16 November 2016)
21. Bianet; 2016. Available:http://bianet.org/5/102/183255-men-kill-at-least-261-women-girls-in-2016. (Accessed 15 April 2017)
22. UNICEF (2001-2005). The Girls' Education Campaign 2001–2005. Available:https://www.unicef.org/turkey/pr/ge6.html (Accessed 10 January 2017)
23. Daddy Send Me to School Campaign; 2017. Available:http://aydindoganvakfi.org.tr/en/educational-activities/girls-going-to-school-means-a-bright-future/the-daddy-send-me-to-school-campaign (Accessed 12 April 2017)

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