

A detailed assessment of high infant death rates in Gaziantep in 2013

Neriman Aydin,¹ Birgul Ozcirpici,² Senay Leyla Kuzu,³ Metin Karakok⁴

Abstract

Objective: To determine the causes of a relatively high infant mortality rate in a Turkish city compared to the nationwide rate.

Methods: The cross-sectional study was conducted at Gaziantep from January to March 2014, and comprised a representative sample of infant deaths that occurred between January and December 2013 in the city of Gaziantep, Turkey. Mothers of the deceased infants were interviewed using a structured questionnaire. Data was analysed using SPSS 22.

Results Of the 556 deaths, 114(20.5%) cases comprised the sample and their mothers formed the study universe. Of them, 3(2.6%) were aged below 18 years; 22(19.3%) were over 35 years; 20(17.5%) had 4 or more children, and 40(35.0%) had an interval of less than 2 years between two pregnancies. Consanguineous marriage was the case with 49(43.0%) mothers. Overall, 111(97.4%) mothers had received prenatal care. Of the births, 66(57.9%) had occurred in private hospitals and 41(36%) in state hospitals. A total of 77(67.5%) infants had been delivered by caesarean section. The most frequent causes of mortality were congenital abnormalities 33(28.9%), prematurity 29(25.4%), respiratory distress syndrome 24(21.1%) and congenital heart diseases 14(12.3%).

Conclusion: A high rate of consanguineous marriages seemed to be one of the most important causes of the high infant death rate in Gaziantep compared to the rest of Turkey.

Keywords: Infant mortality, Primary healthcare, Social inequalities, Turkey. (JPMA 69: 846; 2019)

Introduction

The infant mortality rate (IMR) is an important indicator that demonstrates children's health. The IMR is defined as a per thousand expression of the ratio of the number of infants who died within the first 365 days of life compared to the total number of live births.¹ It has been reported that 4.6 million infants died worldwide in 2013. Although there have been a decrease in the worldwide IMR in recent years, considerable inequalities are still observed in both national and international data.^{2,3}

Worldwide, approximately 40% of deaths under 5 years of age occur in the neonatal period, and three-fourths of newborn deaths occur in the first week of life. Common causes of death during this period are preterm birth, birth asphyxia, birth trauma and infections.⁴ The most important causes of death from the end of the neonatal period of 5 years of age are pneumonia, diarrhoea, malaria, measles and human immunodeficiency virus / acquired immunodeficiency syndrome (HIV/AIDS). Malnutrition is the major factor in approximately 45% of deaths.⁵

As mentioned in the guidelines published by the Turkish Ministry of Health, it is known that some of the infant deaths can be prevented by offering quality prenatal care services with at least 4 follow-ups during pregnancy, and obtaining a detailed pregnancy history, physical examination, following weight, blood pressure, oedema and health education during the follow-ups.⁶

In addition to monitoring IMR, it is also necessary to accurately determine the causes and risk factors of death and take preventive measures against them. The Infant Mortality Registry and Notification System was put into effect in 2005 by the Turkish Ministry of Health with the purpose of creating a resource for child healthcare studies and to assist in monitoring ongoing routine services and special programmes. The system was updated in 2006 by expanding its scope, and in 2007, it was upgraded to include an electronic registry system. The infant mortality monitoring system included monthly notification of deaths from the place/institution where the deaths occurred to document all deaths and to prevent duplicate notifications.⁷

Despite these developments concerning the registry, there is still a discrepancy in IMR. The Turkish Statistical Institute (TSI) declared IMR as 11.6 per thousand in 2012 and 10.8 in 2013.⁸ The Public Health Agency of Turkey reported 7.8 IMR in 2012.⁹ According to the Turkish Demographic and Health Survey (TDHS), which is

.....
^{1,2}Medical Faculty, Department of Public Health, Gaziantep University, ³Faculty of Arts and Science, Sociology Department, Gaziantep University, ⁴Medical Faculty, Department of Pathology, Gaziantep University, Turkey.

Correspondence: Neriman Aydin. Email: naydin@gantep.edu.tr

conducted every 5 years, the IMR was 17.1 in 2008 and 13.6 in 2013.¹⁰ According to World Health Organisation (WHO), the risk of a child dying before completing the first year of age was the highest in the WHO African Region (52 per 1000 live births), over six times higher than that in the WHO European Region (8 per 1000 live births). The highest infant mortality rate is in Sierra Leone (83.3 per 1000 live births), the lowest is in Iceland (1.6 per 1000 live births).¹¹

According to TSI data, the IMR in Turkey was 10.8 in 2013⁸, but it was 17.2 in Gaziantep, which is an urban region located in the southeast of Turkey.¹² The populations in the east, middle and southeast regions compared with other regions of the country show substantially lower education levels, lower income patterns, and higher unemployment levels.^{13,14} After 1980, when immigration from the Southeastern Anatolia and Eastern Anatolia regions continued to other areas, cities such as Diyarbakir, Sanliurfa, and Gaziantep emerged as both emigrant and intensively immigrant cities.¹⁵ The current study was planned to assess infant deaths in detail, evaluate the risk factors associated with infant deaths, compare the percentage of risk factors with nationwide data.

Subjects and Methods

The cross-sectional study was conducted at Gaziantep from January to March 2014, and comprised a representative sample of infant deaths that occurred between January and December 2013 in the city of Gaziantep, Turkey. According to the registry data of Public Health Directory of Gaziantep, 556 infant deaths occurred in 2013 in Gaziantep. The sample size was calculated using the formula¹⁶ ($n=Nt^2pq/d^2(N-1)+t^2pq$) ($p=0.013$, $q=0.987$, $\alpha=0.05$ and $d=0.02$). TDHS 2013¹⁰ reported an IMR of 13.6. As such p value was taken as $p=0.013$ and $q=0.987$. Dwelling units (including towns and villages) were divided into 5 groups according to their socioeconomic status, and the number of samples from every stratum was determined according to weight, using the stratified sampling method for 556 deaths.

The socio-economic situation of districts was obtained by taking into consideration the percentage of families applying for social assistance to the municipality.

A three-member health staff team administered a structured questionnaire to the selected mothers of the deceased infants. The questionnaire included sociodemographic data, pregnancy and obstetric history, nutrition status, prenatal care, questions about the death of the infant, information about the place of residence, and environmental health. Information on the causes of infant death and consanguineous marriages were

obtained from the records and through face-to-face interviews.

Approval for the study was obtained from the Gaziantep University ethics committee, and verbal informed consent was taken from all the subjects. The study was performed in conjunction with the Gaziantep Local Health Authority and the Gaziantep University Department of Public Health.

Data was evaluated using SPSS 22. Frequency and percentage were calculated and chi square test was applied. Level for statistical significance was set at $p<0.05$.

Results

Of the 556 deaths, 114(20.5%) cases comprised the sample and their mothers formed the study universe. Of the families, 91(79.8%) were living in the city centre, and 31 (27.2%) were immigrants. All the immigrant families said they had migrated because of economic reasons from eastern Turkey. A total of 82 (71.9%) mothers were, at minimum, had primary education, and 12 (10.5%) were illiterate. Fathers in 75 (65.8%) cases had primary education, and 3(2.6%) were illiterate. Of the families, 81(71.1%) had social security, and 49(43.0%) were in a consanguineous marriage. The percentage of consanguineous marriages was significantly higher among the immigrants compared to the local residents ($p=0.022$).

In terms of risks factors, 3(2.6%) mothers were below 18 years of age; 22(19.3%) were older than 35 years. Moreover, 20(17.5%) had 4 or more children, and 40(35.0%) had an interval of less than 2 years between

Table-1: Distribution of the mothers according to risk factors during their pregnancy of the deceased infants.

		n	%
Maternal age (years)	Younger than 18	3	2.6
	19-34	89	78.1
	Older than 35	22	19.3
Marriage age (years)	Younger than 18	52	45.6
	Older than 19	62	54.4
Number of children	0-3	94	82.5
	4 and above	20	17.5
Interval between 2 pregnancies	less than 2 years	40	35.0
	2 years and more	53	57.0
Weight gained during pregnancy (kg)	0-8	19	22.4
	9-13	42	49.4
	14 and more	24	28.2
Birth week of the infant	Before the 37th week	63	55.3
	38 and later	51	44.7
Birth weight of the infant (gr)	Less than 2500	56	49.1
	2500 and above	58	50.9

Table-2: Nutritional status (food insecurity) of the families of the deceased infants.

		n	%
Nutritional status at home in the last year	We ate whatever we wanted in enough quantities	60	52.6
	We ate in enough quantities but not whatever we wanted	33	29.0
	Sometimes we could not eat in enough quantities	13	11.4
	Mostly we could not eat in enough quantities	8	7.0
Unbalanced nutritional status of the children due to a lack of money	Mostly	19	19.6
	Sometimes	34	35.1
	Never	44	45.3
Have your children ever gone hungry due to a lack of money?	Yes	13	13.1
	No	86	86.9

Table-3: Distribution of the causes of infant death.

Cause of death	n	%
Congenital abnormalities/syndromes	33	28.9
Prematurity	29	25.4
Respiratory Distress Syndrome	24	21.1
Congenital heart diseases	14	12.3
Sepsis	5	4.4
Metabolic disease	5	4.4
Sudden infant death syndrome	2	1.8
Aspiration	1	0.9
Breech birth/hypoxia	1	0.9
Total	114	100.0

two pregnancies. And 31(27.2%) women were pregnant again during the study shortly after the infant's death.

Obstetric history suggested that 10(8.8%) women had at least 1 stillbirth, 32 (28.1%) had spontaneous abortions, 11(9.6%) had induced abortions, and 18(15.8%) had experienced a previous infant death. Besides, there were 17(14.9%) multiple pregnancies.

Among the infants, 63(55.3%) were born before the 37th gestational week, and 56(49.1%) had a birth weight of less than 2500g, and 48(42.1%) were born both before the 37th gestational week and had a birth weight of less than 2500g (Table-1).

Of the births resulting in infant deaths, 66(57.9%) had occurred in private hospitals, 41(36.0%) in state hospitals, 3(2.6%) in university hospitals, and 2(1.8%) at home. Overall, 77(67.5%) of the deceased infants were delivered by caesarean section, and 72(93.5%) of the caesarean section births were due to medical causes, according to the mothers.

Of the mothers, 111(97.4%) had received prenatal care during the pregnancy that resulted in the infant's death. Median number of prenatal visits was 8 (range: 1-30). The percentage of women receiving prenatal care (at least 1

health control) was 3(100%) among those under age 18 year, 86(96.6%) among mothers aged 19-34 years, 21(95.5%) among mothers 35 years and older, 93 (98.9%) among mothers with fewer than 4 children, and 17(85.0%) for mothers with 4 or more children. Only 3(2.6%) mothers had never had prenatal care, and 108(94.7%) had no prenatal care at home. Besides, 36(31.6%) mothers were not vaccinated against tetanus during their pregnancies, and 9(25%) of the women who were not vaccinated were regarded as immune to neonatal tetanus due to having been vaccinated in their previous pregnancies. Also, 10(8.8%) mothers smoked during their pregnancies.

Regarding nutritional status (food insecurity) of the families, 21(18.4%) mothers stated that they were sometimes or usually malnourished in the preceding year, and 19(19.6%) stated that their children were poorly nourished due to a lack of money; in addition, 13(13.1%) mothers remarked that there were times when their children went hungry due to a lack of money (Table-2).

Of the families, 32(28.0%) had incomes below US\$300 a month; 42(36.8%) lived in a rented house; and 98(86.0%) were using stoves to heat their homes. A total of 105(92.1%) families used municipal water.

Of the infant deaths, 56(49.1%) occurred during the early neonatal period, 22(19.3%) during the late neonatal period, and 36 (31.6%) during postneonatal period. Overall, 104(91.2%) deaths occurred in a hospital.

The causes of death, as ascertained with the help of the Infant Mortality Monitoring System, which is completed by experts, the most frequent were congenital abnormalities and syndromes 33(28.9%), prematurity 29(25.4%), respiratory distress syndrome (RDS) 24(21.1%), and congenital heart diseases 14(12.3%) (Table-3).

Among the consanguineous marriage, 24(49.0%) causes of infant deaths were congenital abnormalities and

syndromes and congenital heart diseases. In other marriages, such caused accounted for 23(35.4%) deaths ($p=0.144$).

Discussion

In the current study, the most frequent cause of death was congenital abnormalities and syndromes. A 2008 study in Turkey reported that the most frequent causes of infant mortality were prematurity (45%), congenital abnormality (10.2%), and congenital heart disease (9.2%).⁷ In most infant mortality studies in Turkey, prematurity and congenital abnormalities rank high.^{7,17-20} The differences in proportions may be due to social differences and differences in regional primary and secondary health service usage. Compared to these studies, the percentage of congenital abnormalities and syndromes was high, and prematurity was low in our study, likely because of the high number of consanguineous marriages. Infection did not rank among the causes of mortality in our study. This result may be related to high use of antibiotics, high vaccination coverage, and relatively good sanitation.

According to the study results, most of the infant deaths (79.8%) occurred in the city centre. According to the 2013 TDHS results, 80.7% of the population in Turkey lived in urban areas.¹⁰ Because deaths are usually proportional to the population, this rate could be accepted as being compatible with the literature. In the Economic and Social Integration in Immigrant-Receiving Cities Project (EKOSEP), performed in 2008-09, immigration due to economic causes had a rate of approximately 70%.¹⁵ All the immigrant families declared that migration was because of economic reasons from eastern Turkey. More than one-fourth (27.2%) of infant deaths occurred among the immigrants, which may be related to socioeconomic problems.

The mother's education level is an important factor affecting a child's health and usage of health services. The results of the TDHS-2008 demonstrated that the children of mothers who have at least a primary, second-phase education have a 78% less risk of mortality than children of mothers without any education.²¹ The percentage of mothers in our study with low educational levels was higher compared to the nationwide rate, supporting the effect of the educational levels of mothers on infant mortality.¹⁰ The educational levels of women must be strongly improved in Gaziantep.

A high number of consanguineous marriages seems to be the most important cause of the infant deaths in Gaziantep. The consanguineous marriage rate (43.0%) in our research is approximately double that of the nationwide rate (23.3%).⁸ This high rate may be

responsible for some of the deaths. The study results showed that the rate of congenital abnormalities was 49% among consanguineous marriages and 35.4% among other marriages. Consanguineous marriages should decline following health education, and knowledge of genetic diseases should be increased. In addition, the rate of consanguineous marriages was significantly higher among immigrants in the study (61.3% versus 37.2%). Education programmes should particularly include districts in which more immigrants reside.

Median number of prenatal visits was 8 (range: 1-30). It was found to be 9 by one study.²² In our study, the majority of mothers had at least one follow-up during their pregnancy which is a positive finding for maternal and infant health. However, 23.7% mothers had prenatal care in more than one hospital. Follow-ups by different people and institutions may cause unnecessary repetitions as well as masking some problems. Similarly, the negation of follow-ups in more than one institution was mentioned in a study conducted in a different region of Turkey.²² Monitoring a pregnant women by the same health personnel throughout pregnancy, and consultation when necessary, could be an important criteria for a healthy pregnancy and delivery.

Even though most of the births in this research occurred in a health institution, the high frequency of private hospital usage is remarkable. According to the 2013 TDHS data,¹⁰ the percentage of women who gave birth in public health institutions was higher than that in private-sector institutions (60.2% and 37%, respectively). Although the number of births occurring in a health institution aligns with the national data in Turkey, the use of private hospital services in Gaziantep will be a worthwhile future research topic. We think that this result illustrates the problems in offering and utilising primary care, and it is related to unnecessary and high value directed towards private hospitals and specialist doctors.

There are four important risk factors related to maternal and infant mortality: an interval less than 24 months between pregnancies, pregnancies in mothers younger than 18 and older than 35 years, 4 or more pregnancies, and the presence of chronic disease in the mother. Among the risk factors for the analysed deaths, 21.9% were related to the mother's age (14.6% nationwide),⁷ 43% were related to the interval between pregnancies, 17.5% were related to the number of children, and 16.7% were related to pre-pregnancy chronic diseases (7.6% nationwide);⁷ there were also cases in which more than one risk factor was present. When analysed in detail, only 5.3% of the women had one risk factor, and 94.7% had 2 or more. These results demonstrate the importance of

and problems in following women 15-49 years old in primary care. All factors, excluding those related to income, should be prevented by effectively following women 15-49 years old and having pre- and post-natal care services performed by primary care institutions. About half of the infant deaths (prematurity, 25.4% and RDS, 21.1%) could be reduced through prenatal care treatment. An important finding from the study is that the deaths that occurred from prematurity and RDS occurred significantly between 0 and 28 days of life compared to congenital abnormalities, showing the importance of pre-natal and post-natal care and skilled birth delivery.

In our research, 43% of the pregnancies occurred within the 24 months immediately following the previous birth, and that rate is approximately two times higher than the nationwide data (TDHS 2008, 20% and TDHS 2013, 18%).¹⁰ Frequent births and pregnancies seem to be one of the most important causes of infant mortality in the study. Moreover, 27.2% of the women were pregnant again during the study, a short time after the infant's death. Birth spacing is an important, feasible and practical intervention to address these conditions, and it should be considered while developing country health programmes.²³

Another important risk factor in terms of health is the level of family income. According to the research results, 75.7% of the families were below the hunger threshold. When the monthly expense amount in Gaziantep and the poverty line are taken into consideration, most of the households encounter poverty, and there is inequality among the households.²⁴ Keeping in mind the possibility that calculation methods may differ, the economic status of the study participants seems to be worse.

Of the mothers, 13.1% remarked that there were times when their children went hungry due to lack of money, indicating extreme hunger and food insecurity. Food insecurity is defined as inadequate food access at the household level.²⁵ Of the deceased infants, 50.5% had a birth weight below 2500g in the study (36.0% nationwide),⁷ (10.4% in TDHS 2013),¹⁰ supporting the finding of food insecurity and low socioeconomic levels among families in Gaziantep.

It is known that most infant deaths occur in the first 28 days of life.²⁶ An important result of the study, in terms of the time period in which the infant death occurred, is that the mortality rate from 29-365 days (31.6%) is higher than that from 8-28 (19.3%) days. This finding is contrary to the expected rate, and it needs to be analysed. Various studies conducted in Turkey have also presented results similar to our findings.^{7,18-20} Similar results have been demonstrated in China in 2014,²⁷ which indicates

problems in primary preventive services in developing countries, particularly in rural areas. IMR was found to be 21.9 per thousand, and 38.5% of the deaths were established as early neonatal, 18.1% were late neonatal, and 43.4% were postneonatal in rural areas in China.²⁷ This result, which is also observed nationwide in Turkey, underlines the deficiency in infant follow-ups and the urgent need to improve preventive services.

The current study has its; imitations. The number and causes of infant deaths were obtained from the records and there may be missing and incorrect data. The details of prenatal care were asked from the mothers and thus recall bias cannot be ruled out. The possibility of unregistered cases is stronger in the neonatal period rather than the post-neonatal period and in out-of-hospital deaths. Besides, the study was conducted in 2013, which makes it 5 years old.

Results, however, suggest that most of the infant deaths could have been prevented by basic prevention measures that can be implemented in primary healthcare services and that are supported by secondary healthcare services. Because well-known risk factors remain, more attention is needed for prenatal care and family planning for birth spacing.

Conclusions

High consanguineous marriages, approximately double the nationwide rate, represent one of the most important causes of the infant deaths. Solving socioeconomic problems are important to improve health indicators and to decrease IMR. This solution is only possible with political support and policy consistency.

Disclaimer: None.

Conflict of Interest: None.

Source of Funding: None.

References

1. Tezcan S. Epidemiology. In: Güler Ç, Akın L eds. Halk Sağlığı Temel Bilgiler Üç Cilt [Basic Knowledge of Public Health, Expanded 2nd ed]. Ankara, Turkey: Hacettepe Üniversitesi Yayınları, 2013; pp 1958.
2. World Health Organization. Global Health Observatory (GHO) data, Infant mortality: Situation and trends. [Online] [Cited 2014 October 07]. Available from URL: http://www.who.int/gho/child_health/mortality/neonatal_infant_text/en/.
3. Zeitlin J, Mortensen L, Cuttini M, Lack N, Nijhuis J, Haidinger G, et al. Declines in stillbirth and neonatal mortality rates in Europe between 2004 and 2010: results from the Euro-Peristat project. *J Epidemiol Community Health* 2016;70:609-15. doi: 10.1136/jech-2015-207013.
4. The World Health Organization. Newborns: reducing mortality. News release. The WHO's Media Centre. [Online] [Cited 2014

- October 08]. Available from URL: <http://www.who.int/mediacentre/factsheets/fs333/en/>.
5. The World Health Organization. Children: reducing mortality. News release. The WHO's Media Centre. [Online] [Cited 2014 October 08]. Available from URL: <https://www.who.int/news-room/fact-sheets/detail/children-reducing-mortality>
 6. Republic of Turkey, Ministry of Health. Doğum Öncesi Bakım Yönetim Rehberi [Prenatal care management guide], T.C. Sağlık Bakanlığı Türkiye Halk Sağlığı Kurumu Kadın ve Üreme Sağlığı Daire Başkanlığı Ankara, 2014 [T. C. Public Health Agency of Turkey Ministry of Health and Women's Reproductive Health Department Presidency Ankara, 2014]. [Online] [Cited 2017 November 28]. Available from URL: <https://sbu.saglik.gov.tr/Ekutuphane/kitaplar/dogumonubakim.pdf>
 7. Korkmaz A, Aydın Ş, Çamurdan AD, Okumuş N, Onat FN, Özbaş S, et al. [Evaluation of the causes of infant mortality in Turkey and the national registration system] *Çocuk Sağlığı ve Hastalıkları Dergisi* 2013;56:105-121.
 8. Türkiye İstatistik Kurumu [Turkish Statistical Institute (TSI)]. Ölüm İstatistikleri, 2013 [Death Statistics, 2013]. Newsletter [Online] 2014 [Cited 2014 July 18]. Available from URL: <http://www.tuik.gov.tr/PreHaberBultenleri.do?id=16050>
 9. Başara BB, Güler C, Eryılmaz Z, Yentür GK, Pulgat E. [Yearbook of Statistics of Republic of Turkey Ministry of Health 2013], Ankara: Sentez Matbaacılık ve Yayıncılık, 2014; pp 174.
 - 10- Türkiye Nüfus ve Sağlık Araştırması TNSA-2013 [Turkish Demographic and Health Survey TDHS-2013]. Hacettepe Üniversitesi Nüfus Etütleri Enstitüsü, Ankara. [Online] 2013 [Cited 2014 December 24]. Available from URL: <http://www.hips.hacettepe.edu.tr/tnsa2013/>
 11. The World Health Organization. Global Health Observatory data repository, Probability of dying per 1000 live births: Data by WHO region- Data by country. [Online] [Cited 2018 May 15]. Available from URL: <http://apps.who.int/gho/data/view.main.182?lang=en>
 12. Yıllara göre il nüfusları, 2000-2016 [Population of provinces by years, 2000-2016]. [Online] [Cited 2017 December 01]. Available from URL: www.tuik.gov.tr/PreIstatistikTablo.do?istab_id=1590
 13. Aksan HA, Ergin I, Ocek Z. The change in capacity and service delivery at public and private hospitals in Turkey: a closer look at regional differences. *BMC Health Serv Res* 2010;10:300. doi: 10.1186/1472-6963-10-300.
 14. Türkiye İstatistik Kurumu. Bölgesel istatistikler [Turkish Statistical Institute. Regional statistics]. [Online] [Cited 2017 December 01]. Available from URL: <http://www.tuik.gov.tr/UstMenu.do?metod=kategorist>
 15. Geniş Ş. Gaziantep'te göçmen hane profilleri ve kentle bütünleşme dinamikleri [Immigrant households profile in Gaziantep and dynamics of integration to urban]. Gültekin MN (dir.), Ta Ezelden Taşkıdır... 'Antep, İstanbul, İletişim Yayıncılık 2011:335-70.
 16. Özgür S. Sağlık Alanında Araştırma Yöntemleri [Research methods in the field of health]. Güneş Tıp Kitabevleri; 2009.
 17. Okyay P, Atasoylu G, Meteoğlu D, Demiröz H, Çobanoğlu M, Beşer E. Aydın ilinde 2004 yılı bebek ölümleri ve ölü doğumlar: bildirim sorunları, tanımlayıcı özellikleri ve nedenleri [Infant deaths and stillbirths in Aydın province in 2004]. *ADÜ Tıp Fakültesi Dergisi* 2006;7:3-12.
 18. Şevket O, Karabulut A, Köseli O, Karahan T, Utku Y, Şevket A. Denizli ili bebek ölümleri: ardışık dört yılın değerlendirilmesi [Infant Mortality Rate in Denizli: Evaluation of Four Consecutive Years]. *Pam Tıp Derg* 2010;3:64-68.
 19. Balcı E, Küçük E, Gün İ, Gülgün M, Kılıç B, Çetinkaya K. Neonatal deaths at Melikgazi at Kayseri in 2006 [Infant Mortality in Melikgazi, Kayseri Province in 2006]. *F.Ü. Sağlık Bilimleri Dergisi* 2008;22:323-6.
 20. Çelik T, Altun AB, Kerkez B, Tatlı S, Özer C. Hatay ilinde 2009 ve 2010 yıllarında bebek ölüm hızları ve nedenleri [The infant mortality rates and its causes in Hatay province during the years 2009 and 2010]. *Ege Tıp Dergisi* 2012;51:111-6.
 21. Türkiye Nüfus ve Sağlık Araştırması 2008 [Turkish Demographic and Health Survey (TDHS) 2008] Hacettepe Üniversitesi Nüfus Etütleri Enstitüsü Ankara: Türkiye, 2009; pp 347.
 22. Ciceklioglu M, Soyer MT, Ocek ZA. Factors associated with the utilization and content of prenatal care in a western urban district of Turkey. *Int J Qual Health Care* 2005;17:533-9.
 23. Norton M. New evidence on birth spacing: promising findings for improving newborn, infant, child, and maternal health. *Int J Gynaecol Obstet* 2005;89:(Suppl 1):S1-S6. doi:10.1016/j.ijgo.2004.12.012.
 24. Göç Alan Kentlerde Ekonomik ve Sosyal Entegrasyon Projesi [Economic and Social Integration Project in Major Immigrant Destinations]. [Online] [Cited 2014 August 24]. Available from URL: http://www.gaziantepkentkonseyi.org.tr/dosyalar/belgeler/5q3e_qxxf.pdf.
 25. How to conduct a food security assessment: A step-by-step guide for National Societies in Africa 2nd ed. International Federation of Red Cross and Red Crescent Societies, Geneva: Switzerland, 2005.
 26. The Partnership for Maternal, Newborn & Child Health. Newborn death and illness. News release. PMNCH News and Media Centre. [Online] 2011 [Cited 2018 September 18]. Available from URL: https://www.who.int/pmnch/media/press_materials/fs/fs_newborndeath_illness/en/
 27. Ma Y, Guo S, Wang H, Xu T, Huang X, Zhao C, et al. Cause of death among infants in rural western China: a community-based study using verbal autopsy. *J Pediatr* 2014;165:577-84. doi: 10.1016/j.jpeds.2014.04.047