Adıyaman Üniversitesi Sağlık Bilimleri Dergisi, 2023;9(1):1-9
doi:10.30569.adiyamansaglik.1210911

E-ISSN: 2458-9176

ADIYAMAN ÜNİVERSİTESİ SAĞLIK BİLİMLERİ DERGİSİ
JOURNAL OF HEALTH SCIENCES OF ADIYAMAN UNIVERSITY

Research Article/Özgün Araştırma

Evaluation of infant deaths during Covid-19 pandemic in Adıyaman, a southeastern province of Turkey

Türkiye'nin bir güneydoğu ili Adıyaman'da Covid-19 pandemi sürecinde bebek ölümlerinin değerlendirilmesi

Erdoğan ÖZ[1], Osman KÜÇÜKKELEPÇE[1], Habip ALMIŞ[2], Mehmet Emin PARLAK[2], Osman KURT[1]

[1]Adıyaman Provincial Health Directorate, 02040, Adıyaman-Turkey
[2]Adıyaman University, Faculty of Medicine, Department of Pediatrics, 02040, Adıyaman-Turkey

Atıf gösterme/Cite this article as: Öz E, Küçükkelepçe O, Almış H, Parlak ME, Kurt O. Evaluation of infant deaths during Covid-19 pandemic in Adıyaman, a southeastern province of Turkey. *ADYÜ Sağlık Bilimleri Derg*. 2023;9(1):1-9. doi:10.30569.adiyamansaglik.1210911

Abstract

Aim: Evaluation of infant deaths during the Covid-19 Pandemic period in Adıyaman, a southeastern province of Turkey.

Materials and Methods: All infant mortality files submitted to Adıyaman Provincial Health Directorate Infant Mortality Investigation Commission in 2020 and 2021 were examined.

Results: 109 out of 11.019 live births in Adıyaman in 2020 and 135 of 11.979 live births in 2021 died before their first birthday. While the infant mortality rate was 9.9 per thousand in 2020, in 2021, it increased by 24% to 12.3 per thousand. There was no evidence that the Covid-19 pandemic directly increased infant mortality.

Conclusion: A significant portion of infant deaths are babies of mothers who had risky pregnancies. Therefore, all steps to protect maternal health will be the first and most effective way to reduce infant mortality.

Keywords: Infant Death; Infant mortality causes; Infant mortality rate; Covid-19; Pandemia.

Öz

Amaç: Türkiye'nin Güneydoğu ili Adıyaman'da Covid-19 Pandemi döneminde bebek ölümlerinin değerlendirilmesi.

Gereç ve Yöntem: 2020 ve 2021 yıllarında Adıyaman İl Sağlık Müdürlüğü Bebek Ölümlerini Araştırma Komisyonuna sunulan tüm bebek ölüm dosyaları incelenmiştir.

Bulgular: 2020 yılında Adıyaman'da 11,019 canlı doğumdan 109'u ve 2021 yılında 11,979 canlı doğumdan 135'i bir yaşını doldurmadan ölmüştür. 2020 yılında bebek ölüm hızı binde 9,9 olurken; 2021'de %24 artarak binde 12,3'e yükselmiştir. Covid-19 pandemisinin bebek ölüm oranını doğrudan arttırdığına dair bir kanıt bulunmamıştır.

Sonuç: Bebek ölümlerinin önemli bir kısmı riskli gebelik geçiren annelerin bebekleridir. Bu sebeple; anne sağlığını korumaya yönelik atılacak tüm adımlar, bebek ölümlerini azaltmanın ilk ve en etkili yolu olacaktır.

Anahtar Kelimeler: Bebek Ölümü; Bebek ölüm nedenleri; Bebek ölüm hızı; Covid19; Pandemi**.**

Yazışma Adresi/Address for Correspondence: Erdoğan ÖZ, Adıyaman Provincial Health Directorate, Turgut Reis District, 105th Street, No:23, 02040, Adıyaman-Turkey, E-mail: drerdoganoz@hotmail.com

Geliş Tarihi/Received:28.11.2022 **Kabul Tarihi/Accepted:**14.03.2023 **Yayım Tarihi/Published online:**23.04.2023

Introduction

According to the World Health Organization, 75% of deaths under 5 in 2018 occurred in the first year of life. The infant mortality rate, which expresses the number of babies who die before reaching the first year of age per thousand live births, has decreased by more than half in the last 30 years; it decreased to 29 per 1000 live births. The infant mortality rate was the highest in Africa, with 52 per thousand in 2018. In Europe, it is 7 per thousand.[1] In 2020, 47% of deaths under the age of 5 in the world occurred in the neonatal period. The risk of a baby dying within the first 28 days after birth in the country with the highest mortality rate is 56 times higher than in the country with the lowest.[2]

The infant mortality rate was 13.9 in 2009 in Turkey; although it showed slight increases in 2012, 2014, and 2021 compared to the previous years, it decreased to 9.1 by the end of 2021. The infant mortality rate was 9.3 in 2018; 9.1 in 2019; in 2020, it is 8.5. While the infant mortality rate was 12.9 in 2020 in the Southeastern Anatolia Region, the region with the highest maternal mortality rate and infant mortality rate, it was 13.6 in 2021.[3,4]

In pregnancies where the maternal age is below 20 or over 35, those born before the 28th week or at the 42nd week or later, and in low-development geographical regions, the infant mortality rate is higher.[5] Contrary to many studies showing that as per capita income increases, infant mortality rate decreases, a study conducted in Brazil based on 15,879 live birth data suggested that neonatal deaths are not associated with socioeconomic status.[6-9]

Whatever the cause, infant deaths have a devastating social impact, just like maternal deaths. Therefore, even the most developed countries prioritize reducing infant mortality even though infant mortality rates have decreased significantly in the last century.[10]

Materials and Methods

In the study, infant deaths in Adıyaman province, located in the Southeast of Turkey, were evaluated in 2020 and 2021, when the Covid-19 pandemic affected the world. Infant mortality, based on time of death, was examined in three periods: Those on 0-6 days from birth are in the ‘’early neonatal period’’, those on days 7-27 are ‘’late neonatal period’’ and those on days 28-365 are ‘’postneonatal period’’. According to the time of birth, babies born between 22 and 38 weeks were classified as “preterm”, those born between 38 and 42 weeks are classified as “term” and those born at or after 43 weeks are classified as “postterm”. According to birth weight, that 999 g and below are "extremely low birth weight", those between 1000-1500 g are "very low birth weight," those between 1501- 2499 g are "low birth weight", those between 2500-4000 g are "normal birth weight." Those weighing 4001 g and above are also classified as “macrosomia (large baby)”.

Type of the study

The study was planned as a descriptive retrospective study.

The sample size of the study

The records of 109 infants born and died in Adıyaman in 2020 and 2021 were examined.

Data collection tools

All infant mortality files submitted to Adıyaman Provincial Health Directorate Infant Mortality Investigation Commission in 2020 and 2021 were examined.

Data analysis

Analyzes were evaluated in 22 package programs of SPSS (Statistical Package for Social Sciences; SPSS Inc., Chicago, IL). In the study, descriptive data are shown as n and % values in categorical data and mean±standard deviation (Mean±SD) values in continuous data. Chi-square analysis (Pearson Chi-square) was used to compare categorical variables between groups. The conformity of continuous variables to normal distribution was evaluated with the Kolmogorov-Smirnov test. Mann-Whitney U-test was used to compare paired groups. The statistical significance level in the analysis was accepted as ($p<0.05$)

Ethics Committee Approval

Ethics committee approval was obtained with the decision of the Ethics Committee for Non-Interventional Procedures of Firat

University, dated 01/09/2022, and numbered 10306. The principles of the Declaration of Helsinki conducted the research.

Results

There were 11.019 live births in Adıyaman in 2020, and 109 died. While the infant mortality rate in Adıyaman was 9.9 per thousand in 2020, it was 8.5 per thousand in Turkey. In 2021, 11.979 live births took place in Adıyaman, and 135 died. In 2021, the infant mortality rate in Adıyaman increased by 24% to 12.3 per thousand. In Turkey, the infant mortality rate in 2021 was 9.1 (Table 1).

Table 1. Number of live births and infant deaths in Adıyaman

	Adıyaman			Turkey
	Number of Live Births	**Number of Infant Deaths**	**Infant Mortality Rate (‰)**	**Infant Mortality Rate (‰)**
2020	11.019	109	9.9	8.5
2021	10.979	135	12.3	9.1
Total	21.998	244	11.1	8.8

Of the infants who died in 2020-2021, 43% died in the early neonatal period, 25% in the late neonatal period, and 32% in the postneonatal period (Table 2).

Table 2. Distribution of infant deaths by periods

	2020		2021		Total		p^*
	Number	%	Number	%	Number	%	
Early neonatal	46	42,2	59	43.7	105	43.0	
Late neonatal	26	23,9	35	25.9	61	25.0	0.828
Postneonatal	37	33,9	41	30.4	78	32.0	

28% of the mothers were 35 years old and over. 45.3% of the mothers were primary school graduates or below, and 47.1% live in the province. While 25.3% of pregnancies were the first, the interval between two pregnancies was <1 year in 2.6%, 1-2 years in 25.9%, and >2 years in 70.5%. Parental consanguinity in 26.1% of the cases; 7.1% had Rh incompatibility. 81.6% of mothers were fully vaccinated for the tetanus vaccine. 5.7% of mothers smoke. There was a significant difference in smoking between 2020 and 2021 (p=0.032), but no significant difference was observed in other parameters. (p>0.05)(Table 3).

Table 3. Pregnancy characteristics and maternal obstetric history[a]

		2020		2021		Total		p^*
		Number	%	Number	%	Number	%	
Age	≤25	25	24.0	39	28.9	64	26.8	
	26-34	46	44.2	62	45.9	108	45.2	0.484
	≥35	33	31.7	34	25.2	67	28.0	
Mother education	Primary school and below	43	45.3	59	45.4	102	45.3	0.986
	Secondary school and above	52	54.7	71	54.6	123	54.7	
Living place	City	53	48.6	62	45.9	115	47.1	0.675
	County	56	51.4	73	54.1	129	52.9	
Pregnancy type	Natural	96	88.1	128	94.8	224	91.8	0.056
	Assisted reproductive techniques	13	11.9	7	5.2	20	8.2	
Time of birth	Preterm	76	69.7	98	72.6	174	71.3	0.622
	Term	33	30.3	37	27.4	70	28.7	
Number of fetuses	Singular	83	85.6	120	88.9	203	87.5	0.450
	Plural	14	14.4	15	11.1	29	12.5	
First pregnancy?	Yes	21	22.1	36	27.7	57	25.3	0.341
	No	74	77.9	94	72.3	168	74.7	
Time between pregnancies	<1 year	2	2.7	4	4.3	6	3.6	
	1-2 year	14	18.9	29	31.5	43	25.9	0.136
	>2 year	58	78.4	59	64.1	117	70.5	
Parental kinship	Yes	28	29.8	30	23.4	58	26.1	0.287
	No	66	70.2	98	76.6	164	73.9	

Rh incompatibility	Yes	4	4.3	12	9.2	16	7.1	0.154
	No	90	95.7	118	90.8	208	92.9	
Tetanus vaccine	Fully vaccinated	76	81.7	106	81.5	182	81.6	
	Incompletely vaccinated	16	17.2	19	14.6	35	15.7	0.489
	Unvaccinated	1	1.1	5	3.8	6	2.7	
Smoke	Yes	9	9.7	4	3.0	13	5.7	0.032
	No	84	90.3	131	97.0	215	94.3	
Type of birth	Cesarean section	71	74.7	88	68.2	159	71.0	0.288
	Vaginal delivery	24	25.3	41	31.8	65	29.0	
Place of birth	Training and Research Hospital	68	73.9	93	72.7	161	73.2	
	Private hospital	20	21.7	25	19.5	45	20.5	0.563
	Hospital	4	4.3	10	7.8	14	6.4	
Place of death	Training and Research Hospital	60	66.7	78	61.9	138	63.9	
	Private hospital	21	23.3	38	30.2	59	27.3	0.513
	University hospital	9	10.0	10	7.9	19	8.8	

* Chi-square analysis was applied. [a]There are missing data.

While 32.8% of the deliveries were of average weight, 53.7% of the babies were girls, and 46.3% were boys. Congenital anomalies were present in 25.4% of the babies. The need for resuscitation was observed in 47.1% of the infants, meconium in 5.8%, and hyperbilirubinemia in 24.9%. There was a significant difference only in terms of the presence of congenital anomalies between 2020 and 2021 (p=0.023), but no significant difference was observed in terms of other parameters (p>0.05) (Table 4).

Table 4. Characteristics of the baby[a]

		2020		2021		Total		p^*
		Number	%	Number	%	Number	%	
Birth weight	Extremely low weight	28	25.7	39	28.9	67	27.5	
	Very low weight	17	15.6	18	13.3	35	14.3	
	Low weight	22	20.2	36	26.7	58	23.8	0.635
	Normal weight	40	36.7	40	29.6	80	32.8	
	Macrosomia	2	1.8	2	1.5	4	1.6	
Gender	Female	56	51.4	75	55.6	131	53.7	0.515
	Male	53	48.6	60	44.4	113	46.3	
Congenital anomaly	Yes	31	33.3	27	20.0	58	25.4	0.023
	No	62	66.7	108	80.0	170	74.6	
Need to resuscitate the baby	Yes	45	47.4	61	46.9	106	47.1	0.947
	No	50	52.6	69	53.1	119	52.9	
Presence of meconium	Yes	3	3.2	10	7.7	13	5.8	0.150
	No	92	96.8	120	92.3	212	94.2	
Hyperbilirubinemia status in the baby	Physiological jaundice	18	18.9	32	24.6	50	22.2	
	Pathological jaundice	2	2.1	4	3.1	6	2.7	0.579
	No	75	78.9	94	72.3	169	75.1	

* Chi-square analysis was applied. [a]There are missing data.

The average number of days to live for all babies was 47.9±85.5 days, the average maternal age was 30.2±6.7, the number of people living at home was 3.8±1.9, the average week of gestation was 32.3±6.0, birth weight was 1907.1±1069.7, and the number of follow-ups was 8.4±3.8 between years. There was no significant difference in terms of these parameters by the years (Table 5).

Table 5. Day of death, maternal age, number of people living at home, gestational week, birth weight, and number of follow-ups

	2020	2021	Toplam	p^*
	Mean±SD	Mean±SD	Mean±SD	
Day of death	50.8±88.9	45.5±83.0	47.9±85.5	0.762
Mother age	30.7±6.8	29.9±6.7	30.2±6.7	0.435
Number of people living at home	4.0±2.1	3.7±1.8	3.8±1.9	0.302
Gestational week	32.5±6.0	32.2±5.9	32.3±6.0	0.619
Birth weight	1987.4±1123.2	1842.2±1024.0	1907.1±1069.7	0.275
Number of follow-ups	8.9±4.1	8.0±3.5	8.4±3.8	0.064

*Mann-Whitney U test was applied

The most common causes of infant death were Respiratory Distress Syndrome (RDS), (29.1%), while congenital anomaly (17.6%), prematurity (13.1%), sepsis (11.1%), pneumonia (6.6%), pulmonary hemorrhage (5.3%), necrotizing enterocolitis (4.5%), hypoxic-ischemic encephalopathy (2.5%), heart failure (2.5%), sudden infant death syndrome (0.8%) and a significant difference were observed between years in terms of the cause of infant death ($p<0.001$) (Table 6).

Table 6. Causes of death

	2020		2021		Total	
	Number	%	Number	%	Number	%
RDS	16	14.7	55	40.7	71	29.1
Congenital anomaly	32	29.4	11	8.1	43	17.6
Prematurity	19	17.4	13	9.6	32	13.1
Sepsis	9	8.3	18	13.3	27	11.1
Pneumonia	8	7.3	8	5.9	16	6.6
Pulmonary hemorrhage	4	3.7	9	6.7	13	5.3
Necrotizing enterocolitis	6	5.5	5	3.7	11	4.5
Hypoxic-ischemic encephalopathy	2	1.8	4	3.0	6	2.5
Heart failure	1	0.9	5	3.7	6	2.5
Sudden infant death syndrome	0	0.0	2	1.5	2	0.8
In the research phase	3	2.8	3	2.2	6	2.5
Other	9	8.3	2	1.5	11	4.5

The most common cause of death in the early neonatal period was RDS (34.3%), the second most common cause of death was prematurity (24.8%), and the most common cause of death in the late neonatal period was RDS (24.6%). The second most common cause of death was sepsis (18%), and the most common cause of death in the postneonatal period was RDS (25.6%), while the second most common cause of death was a congenital anomaly (23.1%). There was a significant difference between the periods in terms of the cause of death ($p<0.001$) (Table 7).

Table 7. Distribution of infant deaths by periods and causes

	Early neonatal		Late neonatal		Postneonatal	
	Number	%	Number	%	Number	%
RDS	36	34.3	15	24.6	20	25.6
Congenital anomaly	16	15.2	9	14.8	18	23.1
Prematurity	26	24.8	5	8.2	1	1.3
Sepsis	7	6.7	11	18.0	9	11.5
Pneumonia	3	2.9	3	4.9	10	12.8
Pulmonary hemorrhage	6	5.7	4	6.6	3	3.8
Necrotizing enterocolitis	3	2.9	5	8.2	3	3.8
Hypoxic-ischemic encephalopathy	2	1.9	3	4.9	1	1.3
Heart failure	1	1.0	3	4.9	2	2.6
Sudden infant death syndrome	0	.0	1	1.6	1	1.3
In the research phase	2	1.9	0	.0	4	5.1
Other	3	2.9	2	3.3	6	7.7

Discussion

It is considered that the increase in infant mortality rates in both Turkey and Adıyaman in 2021 compared to 2020 may have resulted from the indirect effect of the Covid-19 pandemic rather than the direct effect. Because the new type of Coronavirus infection is milder in children, and only 0.2% of all deaths worldwide are children under 60 months.[2] In addition, while the infant mortality rate has gradually decreased in Turkey as in the rest of the world since 2009, there has been a similar slight increase in the infant mortality rate in 2012 and 2014 compared to the previous years, just as in 2021. Despite the pandemic that affected all countries, the decrease in the infant mortality rate in the world in 2021 compared to 2020 shows that the covid-19 pandemic did not significantly increase infant mortality.[11]

The Covid-19 pandemic has significantly reduced the number of applications to health facilities for all branches due to the risk of

contamination throughout the country, province, and all over the world.[12] While the Infant Mortality Rate increased by 19.5% in Adıyaman in 2021 compared to 2020, the increase in Turkey is 7%. These data show that the Infant Mortality Rate in Adıyaman will increase at a much higher rate; it reveals the necessity of examining many factors, including the number of hospital admissions in Adıyaman, the shortening of hospitalization times due to the pandemic, the number of Syrian guests, the percentage of vaccination against Coronavirus in pregnant women, and mothers with Coronavirus infection stopping breastfeeding.[13]

It is striking that 26.1% of the babies who died in Adıyaman in 2020-2021 had kinship ties between their mothers and fathers. Because consanguineous marriage is one of the essential factors in infant mortality.[14] While this rate was 23.1% in a study in which 2008 infant mortality records in Turkey were examined, in another study conducted in Kahramanmaraş city center, first-degree consanguineous marriage between parents was 56.3%, more than twice that of Adıyaman.[15,16]

Regarding the 2008 Turkey rates, 56.5% early neonatal, 19.5% late neonatal, and 23.9% postneonatal deaths were detected.[15] In a study conducted in Bursa and published in 2019, 51% of infant deaths occurred in the early neonatal period.[17] In 2016, infant mortality rates in the United States were 50% for the early neonatal period, 24% for the late neonatal period, and 26% for the postneonatal period.[18] In a study examining infant deaths in Duzce province between 2014 and 2017, 48% of infant deaths occurred in the early neonatal period, 22.6% in the late neonatal period, and 29.4% in the postneonatal period, which did not differ significantly from the data in our study.[19]

Smoking, shown to cause infant mortality, was found in 5.7% of mothers.[20] The high rate of cesarean section in infant deaths, such as 71%, is consistent with studies showing that the cesarean section rate and infant mortality rate are directly proportional.[21] Preterm birth is a condition that increases infantile mortality.[22] The births in Adıyaman in the years 2020-2021 were preterm at 71.3%.

In addition to the studies showing that the mother's education level significantly reduces infant mortality, some studies have determined that it has no effect.[8,10,23] In our study, no correlation was found between education level and infant mortality. Births that occur without the intervention of any healthcare professional increase the infant mortality rate.[24]

However, since all deliveries in Adıyaman took place in the hospital, this was not a factor affecting the infant mortality rate in our study. In addition, due to the ease of access to hospitals with gynecologists and pediatricians, no significant difference was found between those living in the center and the districts regarding infant mortality.

In a meta-analysis study, nulliparous women under 18, compared to women aged 18-35 with 1-2 parity, stated that they had a higher rate of small for gestational age (SGA), preterm, neonatal mortality, and infant mortality rates. In addition, SGA and neonatal mortality in nulliparous women aged 18-35; preterm, neonatal, and infant mortality in women aged 18-35 with parity of 3 and above; The probability of preterm and neonatal mortality increases in women aged 35 and over with parity of three and above.[25]

However, the high mortality rate of infants at an advanced age is more common in underdeveloped countries. Because in these places, advanced age is associated with low education and income levels, and infant mortality is higher. Although low birth weight, which is one of the important causes of infant death, is seen in advanced-age births in developed countries, the ease of access to water, electricity, and health services, regular and high-quality pregnancy, and infant follow-up are more important due to the mother's education level and high- income level. As an indicator of this situation, in developed countries, it can be shown that pregnancies over 35 years of age have low birth weight and a low infant mortality rate, unlike underdeveloped countries.[7] In our study, 26.8% of the pregnant women were under 25; 28% were over 35 years old, and 25.3% had their first pregnancy.

A pregnancy interval of fewer than 18 months significantly increases SGA, preterm, and infant mortality rates. While the pregnancy interval over 60 months increases the probability of SGA, it does not affect other parameters.[25] In addition to studies showing that a short pregnancy interval reduces the infant mortality rate, some studies argue that it does not pose a risk.[26] When the fertility rate decreases, infant mortality decreases.[7] In our study, 74.7% of infant deaths were the second or later pregnancies of the mother. In 3.6% of our pregnancies, there is less than one year between two pregnancies.

In many studies, low birth weight; has been identified as one of the most important causes of perinatal deaths.[7] 65.6% of babies who died in 2020 and 2021 in Adıyaman province have low birth weights. This rate was 59% in a study conducted across Turkey in 2013.[15]

A 40% decrease in the rate of congenital anomalies in infant deaths in 2021 compared to 2020 may be because a perinatologist started to work for the first time in Adıyaman. Thanks to genetic and other professional counseling before pregnancy, pregnancies with a risk of fetuses with congenital anomalies have been largely prevented. In addition, early diagnosis of babies with congenital anomalies and termination of pregnancies, compared to the previous year, decrease the number of babies born with congenital anomalies; therefore, it may have caused a lower rate of congenital anomalies to be detected in infant deaths in 2021. Due to the lack of data supporting this decrease, it would be appropriate to conduct more detailed studies on this subject. Despite this decrease, the congenital anomaly is Adıyaman's second most common cause of infant deaths in 2020-2021.

Although the rate of sudden infant death has decreased in developed countries, it is still high. It ranks 3rd in infant mortality after congenital anomalies and low birth weight.[27] In Adıyaman, sudden infant death within two years; has been reported as the cause of death in only two infants, one in the late neonatal and the other in the postneonatal period.

Our study observed that the mortality rate in female infants was higher than in males. Contrary to our findings, a study conducted in Ethiopia found that the rate of death in boys within the first year was 50% higher than in girls.[28]

Studies show that the infant mortality rate increases as the number of households increases.[8] However, when 2020 and 2021 infant deaths in Adıyaman were compared, no significant difference was found between the number of households.

When we examine the causes of death, the diagnosis of RDS increased from 14.7% to 40.7% with an increase of 177% compared to 2020 in 2021, when the Covid-19 pandemic was especially more prominent; RDS may be recorded as the cause of death in infants whose diagnosis has not been confirmed due to the physicians' failure to always distinguish between the diagnosis of coronavirus infection or the extreme selectivity caused by the pandemic. As a result, while RDS was the 3rd in infant mortality in Adıyaman in 2020, it became the most common cause of death in 2021, in line with Turkey's overall.[27]

The Turkish Ministry of Health recommends at least eight follow-ups by family physicians, except for the follow-up when each baby is born in the hospital.[29] When the infant deaths in Adıyaman in 2020 and 2021 are examined, it is seen that the required average in the number of infant follow-ups is achieved.

Our study has an important limitation. Missing data in patient files is an obstacle to an appropriate evaluation. Despite the developing registration systems, some studies criticize irregular records and delayed notifications regarding infant deaths.[30]

Conclusion

The infant mortality rate varies from country to country and region to region within the same country, depending on many factors; it is one of the most crucial development indicators. The easiest way to reduce infant mortality is to provide frequent, regular, quality counseling and health services before and during pregnancy, especially in the first six weeks and one year after pregnancy. An essential part of infant deaths is seen in babies

of mothers who had risky pregnancies. Therefore, all steps to protect maternal health, especially during pregnancy and puerperium, will be the first and most effective way to reduce infant mortality. Taking the necessary measures to increase the education level of expectant mothers is indispensable for a permanent solution. Disadvantages of smoking and pregnancy at young or older ages; counseling services should be given to mothers, fathers, and candidates on all issues related to the importance of infant care. The most crucial point in reducing infant mortality is to produce unique solutions for regions with different dynamics.

Ethics Committee Approval

Ethics committee approval was obtained with the decision of the Ethics Committee for Non-Interventional Procedures of Firat University, dated 01/09/2022, and numbered 10306. The study was conducted under the principles of the Declaration of Helsinki.

Informed Consent

Data concerning the study were collected with the permission of the Adıyaman Provincial Health Directorate.

Authors Contrubituons

All of the authors contributed at every stage of the study

Conflict of Interests

There is no conflict of interest to declare.

Financial Disclosure

No person/organization is supporting this study financially.

Statements

These research results have yet to be presented anywhere previously. Data related to the study is available on request.

Peer-review

Externally peer-reviewed.

References

1. World Health Organization. Available at: https://www.who.int/data/gho/data/themes/topics/indicator-groups/indicator-group-details/GHO/infant-mortality Access date: August, 2022
2. World Health Organization. Available at: https://www.who.int/news-room/fact-sheets/detail/levels-and-trends-in-child-mortality-report-2021 Access date: August, 2022
3. Türkiye İstatistik Kurumu. Available at: https://data.tuik.gov.tr/Bulten/Index?p=Olum-ve-Olum-Nedeni-Istatistikleri-2019-33710 Access date: August, 2022
4. Türkiye Cumhuriyeti Sağlık Bakanlığı. Available at: https://sbsgm.saglik.gov.tr/Eklenti/44131/0/saglik-istatistikleri-yilligi-2021-haber-bultenipdf.pdf Access date: August, 2022
5. Ely DM, Driscoll AK. Infant mortality in the United States, 2017: *data from the period linked birth/infant death file*.
6. Baird S, Friedman J, Schady N. Aggregate income shocks and infant mortality in the developing world. *Review of Economics and statistics*. 2011;93(3):847-856. https://doi.org/10.1162/REST_a_00084
7. Ray D, Linden M. Health, inequality and income: a global study using simultaneous model. *Journal of Economic Structures*. 2018;7(1):1-28.
8. Bugelli A, Borgès Da Silva R, Dowbor L, Sicotte C. The Determinants of Infant Mortality in Brazil, 2010–2020: A Scoping Review. *International journal of environmental research and public health.* 2021;18(12):6464.
9. Garcia LP, Fernandes CM, Traebert J. Risk factors for neonatal death in the capital city with the lowest infant mortality rate in Brazil. *Jornal de pediatria*. 2019;95:194-200. https://doi.org/10.1016/j.jped.2017.12.007
10. Singh GK, Stella MY. Infant mortality in the United States, 1915-2017: large social inequalities have persisted for over a century. International *Journal of Maternal and Child Health and AIDS*. 2019;8(1):19. doi: 10.21106/ijma.271
11. OECD Data (Organisation for Economic Co-operation and Development). Available at: https://data.oecd.org/healthstat/infant-mortality-rates.htm Accessed in August, 2022
12. Nourazari S, Davis SR, Granovsky R, et al. Decreased hospital admissions through emergency departments during the COVID-19 pandemic. *The American journal of emergency medicine*. 2021:42;203-210.
13. Rollins N, Minckas N, Jehan F, et al. A public health approach for deciding policy on infant feeding and mother–infant contact in the context of COVID-19. *The Lancet Global Health*. 2021;9(4):e552-e557. doi.org/10.1016/S2214-109X(20)30538-6
14. Pedersen J. The influence of consanguineous marriage on infant and child mortality among Palestinians in the West Bank and Gaza, Jordan, Lebanon and Syria. *Public Health Genomics*. 2002;5(3);178-181.
15. Korkmaz A, Aydın Ş, Çamurdan AD, ve ark. Türkiye'de bebek ölüm nedenlerinin ve ulusal kayıt sisteminin değerlendirilmesi. *Çocuk Sağlığı ve Hastalıkları Dergisi*. 2013;56(3):105-121.
16. Filiz Taş, Oktay AA, Gülpak M. Kahramanmaraş İl Merkezinde Meydana Gelen Bebek Ölümlerinin Değerlendirilmesi. *Kahramanmaraş Sütçü İmam Üniversitesi Tıp Fakültesi Dergisi*. 2018:13(1);7-12. doi.org/10.17517/ksutfd.393180
17. Çatak B, Öner C. Bebek Ölümlerinin Temel Nedeneri Değişiyor mu? Kayıt Temelli Kesitsel bir Çalışma. *Turkish Journal Of Family Medicine And PrimaryCare*. 2019;13(3): 311-317. doi.org/10.21763/tjfmpc.609770
18. Gregory EC, Drake P, Martin JA. (2018). Lack of change in perinatal mortality in the United States, 2014-2016. *US Department of Health & Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics.*
19. Yılmaz M, Bayraktar F. Düzce ilinin 2014-2017 yılları arasındaki perinatal ölüm ve bebek ölümü verilerinin değerlendirilmesi/Evaluatıon of perinatal and infant mortality data in Duzce between 2014-2017. *ESTÜDAM Halk Sağlığı Dergisi.* 2020:5(1);35-42.
20. Xie RH, Gaudet L, Krewski D, Graham ID, Walker MC, Wen SW. Higher cesarean delivery rates are associated with higher infant mortality rates in industrialized countries. *Birth*. 2015:42(1);62-69. doi.org/10.1111/birt.12153
21. Shapiro-Mendoza CK, Lackritz EM. Epidemiology of late and moderate preterm birth. *In Seminars in Fetal and Neonatal Medicine.* 2012:17(3);120-125. doi.org/10.1016/j.siny.2012.01.007
22. Salihu HM, Aliyu MH, Pierre-Louis BJ, Alexander GR. Levels of excess infant deaths attributable to maternal smoking during pregnancy in the United States. *Maternal and child health journal*. 2003:7(4);219-227. doi.org/10.1023/A:1027319517405

23. Terra de Souza AC, Cufino E, Peterson KE, GardnerJ, Vasconcelos do Amaral MI, Ascherio A. Variations in infant mortality rates among municipalities in the state of Ceará, Northeast Brazil: an ecological analysis. *International Journal of Epidemiology*. 1999:28(2);267-275. doi.org/10.1093/ije/28.2.267
24. Lamichhane R, Zhao Y, Paudel S, Adewuyi EO. Factors associated with infant mortality in Nepal: a comparative analysis of Nepal demographic and health surveys (NDHS) 2006 and 2011. *BMC public health*. 2017:17(1);1-18.
25. Kozuki N, Lee AC, Silveira MF, et al. The associations of parity and maternal age with small-for-gestational-age, preterm, and neonatal and infant mortality: a meta-analysis. *BMC Public Health*. 2013:13(3);1-10.
26. Mohammed M, Akuoko M. Subnational variations in electricity access and infant mortality: Evidence from Ghana. *Health Policy OPEN*. 2022:3;100057. doi.org/10.1016/j.hpopen.2021.100057
27. National Vital Statistics Reports. International comparisons of infant mortality and related factors2010. Available at: https://stacks.cdc.gov/view/cdc/25388 Accessed on August,2022
28. Kiross GT, Chojenta C, Barker D, Loxton D. Individual-, household-and community-level determinants of infant mortality in Ethiopia. *PloS one*. 2021:16(3);e0248501. doi.org/10.1371/journal.pone.0248501
29. Türkiye Cumhuriyeti 2020 Sağlık İstatistikleri Yıllığı. Available at: https://dosyasb.saglik.gov.tr/Eklenti/43399,siy2020-tur-26052022pdf.pdf?0 Access date August, 2022
30. Cerit Ç. Porsuk AÖ. Bebek Ölümlerinin İncelenmesi: Kırklareli Örneği. *Eskişehir Türk Dünyası Uygulama ve Araştırma Merkezi Halk Sağlığı Dergisi.* 2021;6(1):60.