

# Retrospective Analysis of Out-of-Hospital Births in Ankara Emergency Medical Services

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## Abstract

**Background:** In Emergency Medical Services (EMS), out-of-hospital (OOH) births are rare but not exceptional. Our study aims to evaluate the data of patients who gave birth in OOH in the Ankara province and to analyze the prehospital obstetric organization.

**Methods:** We evaluated the records (such as age, nationality, district, type of hospital to which they were transported, and transportation time) in the Emergency Medicine Automation System (ASOS) database of 403 pregnancies who gave birth outside the hospital in Ankara between 2021 and 2023 and were transported to a hospital by ambulance.

**Results:** Between 2021 and 2023, Ankara EMS intervened in a total of 403 OOH birth cases. While 214 (53.1%) of the patients were citizens of the Republic of Türkiye, 189 (46.9%) were foreign nationals. Foreign nationals who gave birth at OOH were mostly of Middle Eastern and Asian origin. The mean age of the mothers in our study was  $26.9 \pm 5.7$  years. We found a significant difference in the incidence of OOH births in peripheral regions between years. While there were 13 (14.6%) cases in 2021, there were 62 (36.3%) cases in 2022 and 52 (36.4%) cases in 2023.

**Conclusions:** A well-designed EMS obstetric care organization can provide patients with more accessible and better service. An increase in the number of foreign nationals within the demographic structure could potentially lead to a rise in the number of out-of-hospital births.

**Key words:** Out-of-hospital births, pre-hospital, obstetrics

## INTRODUCTION

In Emergency Medical Services (EMS), out-of-hospital (OOH) births are rare but not exceptional (1). In Türkiye, pregnant women generally prefer to give birth in hospitals, but due to the unpredictable nature of birth, births outside the hospital can occur. EMS workers consider it a clinical event of importance due to the high mortality and morbidity rates associated with OOH births for both mother and baby (2, 3). The annual incidence of OOH births varies between 0.08% and 1.99% across countries (2). In a study evaluating OOH births on a national basis in the United States of America (USA), the incidence was 0.02 (4). Türkiye has limited data on OOH births, and there is no regular publication of national data. Our study aims to evaluate the data of patients who gave birth in out-of-hospital (OOH) settings in the Ankara province and to analyze the prehospital obstetric organizations.

## MATERIALS AND METHODS

### *Study Design and Participants*

Ankara EMS conducted the study. We evaluated the records (such as age, nationality, district, type of hospital to which they were transported, and transportation time) in the Emergency Medicine Automation System (ASOS) database of 403 pregnancies who gave birth outside the hospital in Ankara between 2021 and 2023 and were transported to a hospital by ambulance. We excluded cases with missing data from the study. Our study was approved by the Ankara Etlik City Hospital Ethics Committee (with approval number AEŞH-BADEK-2024-1073 and dated 30/10/2024).

### *Statistical Analysis*

IBM Corp. released IBM SPSS for Windows version 27.0 in 2020, which we used to analyze all the data. IBM SPSS Statistics for Windows, Version 27.0. Armonk, NY: IBM Corp). We used the Chi-Square (2) test to compare qualitative data while evaluating the study data, in addition to descriptive statistical methods such as frequency, percentage, mean, standard deviation, median, min-max, and IQR. The data's normality was checked with the Kolmogorov-Smirnov test, skewness-kurtosis, and graphical methods like the histogram, Q-Q plot, stem

and leaf plot, and boxplot. We used a one-way ANOVA test in the study to compare quantitative data compatible with normal distribution between groups. We used the Kruskal-Wallis test to compare data not compatible with normal distribution between groups. The statistical significance level was considered a  $p < 0.05$ .

## RESULTS

Table 1 displays the statistical data from our study. Between 2021 and 2023, Ankara EMS intervened in a total of 403 OOH birth cases. While 214 (53.1%) of the patients were citizens of the Republic of Türkiye, 189 (46.9%) were foreign nationals. Foreign nationals who gave birth at OOH were mostly of Middle Eastern and Asian origin. The mean age of the mothers in our study was  $26.9 \pm 5.7$  years, while the median age was 26 years (min 16–max 42). We evaluated OOH births by year, intervening in 89 cases in 2021, 171 in 2022, and 143 in 2023. The data indicates a significant trend in out-of-hospital (OOH) births over the years, with a notable increase in 2022. The demographic diversity among foreign nationals, primarily from Middle Eastern and Asian regions, highlights the multicultural aspect of maternal health services in the area. The mean age of mothers suggests a relatively young population, which may have implications for healthcare policy and resource allocation in maternal and child health programs. Further analysis could provide insights into the factors influencing the choice of OOH births among different nationalities.

While the least number of cases was in 2021 ( $n = 89$ ), the most were in 2022 ( $n = 171$ ). The community characteristics revealed that the majority of applications ( $n=276$ , 68.5%) originated from urban areas. Considering the hospitals to which the patients were transported, most cases ( $n=149$ , 37%) were transported to state hospitals. Transporters transported 141 (35%) patients to training and research hospitals, 103 (25.6%) patients to city hospitals, 6 (1.5%) patients to university hospitals, and 4 (1%) patients to private hospitals. The mean arrival time at the scene was  $386.6 \pm 493.4$  seconds. Table 2 displays comparisons of cases by year. We found a significant difference in the incidence of OOH births in peripheral regions between years. While there were 13 (14.6%) cases in 2021, there were 62 (36.3%) cases in 2022 and 52 (36.4%) cases in 2023. We also found a significant difference in the ar-

Table 1. Characteristics of Cases			
		<b>n</b> <b>Mean ± SD</b>	<b>%</b>
<b>Age (Years)<sup>a</sup></b>		26.9 ± 5.7	
<b>Patient's Nationality<sup>b</sup></b>	Turkish	214	53.1
	Foreign national	189	46.9
<b>Year<sup>b</sup></b>	2021	89	22.1
	2022	171	42.4
	2023	143	35.5
<b>District where the case occurred</b>	City center	276	68.5
	Periphery of the city	127	31.5
<b>Transported to...<sup>b</sup></b>	General State Hospitals	149	37.0
	Training and Research Hospitals	141	35.0
	City Hospitals	103	25.6
	University Hospitals	6	1.5
	Private Hospitals	4	1.0
Arrival at scene time (in seconds) <sup>a</sup> (Arrival at scene time- Ambulance Assignment time)		386.6 ± 493.4*	
a: Mean ± SD / Median (Min-Max), b: n / %, *: Second			

rival time at the scene: in 2021, it was 343.0 (252.5–482.5) seconds, in 2022, it was 272.0 (198.0–382.0) seconds, and in 2023, it was 271.0 (190.0–381.0) seconds.

## DISCUSSION

People may choose to give birth at home because they do not want medical intervention or because of their beliefs. Apart from these two reasons, the majority of out-of-hospital (OOH) births occur due to various factors such as inadequate care during pregnancy, lack of preparation

for childbirth, limited transportation options, living in a remote area from a health facility, and premature birth (5). There are also studies reporting that residing more than 35 kilometers away from a health facility is among the risk factors for OOH birth (6). In our study, 68.5% of the cases were in the central district, while 31.5% were in the peripheral districts. We found a significant difference in OOH births in the peripheral districts between the years. Distance to the hospital and transportation time are important factors for OOH births. A study evaluating OOH births in the USA reported a mean age of 28 years.(4) In another study conducted in Brazil (7), the mean age was

Table 2. Comparisons of Cases by Year						
		2021 (n=89) <sup>1</sup>	2022 (n=171) <sup>2</sup>	2023 (n=143) <sup>3</sup>	P	Difference
<b>Age (Years)</b>		27.5 ± 5.1	26.8 ± 5.9	26.7 ± 5.9	0.582 <sup>a</sup>	--
<b>Patient's Nationality</b>	Turkish	49 (55.1%)	88 (51.5%)	77 (53.8%)	0.838 <sup>b</sup>	--
	Foreign national	40 (44.9%)	83 (3 - 19)	66 (46.2%)		--
<b>District where the case occurred</b>	City center	76 (85.4%)	109 (63.7%)	91 (63.6%)	0.001 <sup>b</sup>	Between 1 and 2-3
	Periphery of the city	13 (14.6%)	62 (36.3%)	52 (36.4%)		Between 1 and 2-3
<b>Transported to...</b>	City Hospitals	20 (22.5%)	32 (18.7%)	51 (35.7%)	<0.001 <sup>b</sup>	Between 2 and 3
	Training and Research Hospitals	47 (52.8%)	60 (35.1%)	34 (23.8%)		Between 1 and 2-3
	Public Hospitals	19 (21.3%)	76 (44.4%)	54 (37.8%)		Between 1 and 2-3
	University Hospitals	1 (1.1%)	1 (0.6%)	4 (2.8%)		--
	Private Hospitals	2 (2.2%)	2 (1.2%)	0 (0.0%)		--
<b>Arrival at scene time (in seconds)</b> (Arrival at scene time- Ambulance Assignment time)		343.0 (252.5 – 482.5)	272.0 (198.0 – 382.0)	271.0 (190.0 – 381.0)	0.001 <sup>c</sup>	Between 1 and 2-3

a: One-Way Anova Test (Mean ± SD), b: Chi-Square Test (n (%)),c: Kruskal-Wallis Test (Median (IQR))

25.43±6.73, and in Sweden (8), the mean age was 29. The mean age of the mothers in our study was found to be 26.9 ± 5.7 years, which is consistent with the literature. Among the OOH birth cases, 214 (53.1%) were citizens of the Republic of Türkiye, while 189 (46.9%) were foreign nationals. We identify immigrants and refugees as a risk group for OOH 9. We predict that the increase in the foreign population in Türkiye will increase the number of OOH births. We also found a significant difference in the arrival time at the scene for OOH cases. [In 2021=343.0 (252.5–482.5) seconds, in 2022=272.0 (198.0–382.0) seconds, and in 2023=271.0 (190.0–381.0) seconds] This positive decrease in arrivals at the scene may be due to the increase in the number of ambulance teams at Ankara EMS in the relevant years. While Ankara EMS provided service with 168 active EMS teams in 2021, this number in-

creased cumulatively to 171 in 2022 and 177 in 2023. EMS teams are usually the first to arrive on the scene. They provide emergency care to the patients and transport them to the hospital as soon as possible. This is why EMS teams play a crucial role in pre-hospital emergency obstetric organizations. However, EMS personnel describe birth cases as one of the most stressful and challenging operational situations they find themselves in (10). We believe that establishing a telemedicine system for effective communication between EMS personnel and gynecology specialists can alleviate these concerns. EMS agencies should have continuing education programs, appropriate equipment, and obstetric emergency care protocols to improve the care of obstetric women in labor (11). Of the 1926 health-care professionals working in Ankara EMS, 1485 (77.1%) received pre-hospital birth emergencies and obstetrics

training. The rate of paramedics receiving this training is 86%. To increase these rates, training organizations continue. In addition, every ambulance team has birth kits containing materials such as clamps, thermal blankets, sponges, etc. In conclusion, a well-designed EMS obstetric care organization can provide patients with more ac-

cessible and better service. An increase in the number of foreign nationals within the demographic structure may lead to a rise in the number of out-of-hospital births. An increase in EMS teams can expedite the provision of emergency medical care to OOH births. We require additional research to supplement our limited data-driven study.

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## Abbreviations list

EMS: Emergency Medical Services (EMS)  
 OOH: out-of-hospital  
 ASOS: Emergency Medicine Automation System

## Ethics approval and consent to participate

This study was approved by the Ankara Etlik City Hospital Ethics Committee (with approval number AEŞH-BADEK-2024-1073 and dated 30/10/2024).

## Consent for publication

Our study is retrospective. It does not contain any personal data.

## Availability of data and materials

Data from the study were not stored digitally or physically.

## Competing interests

The authors have no commercial associations or sources of support that might pose a conflict of interest.

## Funding

The authors received no financial support for the research and/or authorship of this article. There is no funding source.

## Authors' contributions

Idea/Concept: SK. Design: BB, BA. Control/Supervision SK, BB, BA. Data Collection And/Or Processing: BB, SK. Analysis And/Or Interpretation: SK, BB, BA. Literature Review: SK, BB, BA. Writing The Article: BA, BB. Critical Review: SK, BB, BA. References And Fundings: BB. Materials: BB.

## Acknowledgements

None