The Relationship Of Under-Five Obesity Level With Maternal Education, Employment Status And Breastfeeding Rates In Turkey

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Abstract

Aim: In this longitudinal study, it was aimed to examine the relationship between childhood obesity level and maternal education, employment status and breastfeeding rates in Turkey.

Materials and Methods: According to the World Health Organization (WHO) and World Bank (WB) Country Reports, Turkey's childhood obesity rate (COR), Women's Working Rate with Basic Education (WWRBE), Secondary Education Women's Working Rate (SEWWR), Women's Working Rate (WWR) and Six-Month Breastfeeding Rates (SMBR) parameters were used. The most recent values from the WHO and WB datasets, WWR and SMBR parameters between 1993 and 2020; For WWRBE and SEWWR parameters, values between 2006 and 2020 were used.

Results: The UFOR value for Turkey ranged from 3.80% to 11.10% between 1993 and 2020, with a mean value of 7.55±2.82 percent. Between the same years, its value for Turkey ranged from 23.07% to 34.31% with a mean value of 28.57±3.35 percent. There was a statistically significant and positive relationship between the obesity rate under the age of five and breastfeeding rates for six months (0.844; $p < 0.01$); There was a statistically significant and negative relationship ($r = -0.695$; $p < 0.01$) with birth rates. In the year-controlled correlation analysis, there was a statistically significant and negative correlation between childhood obesity and birth rates ($r = -0.605$; $p < 0.05$). According to the results of the Generalized Linear Model (Logit Model) analysis, the effect of six-month breastfeeding rate on obesity rates under the age of five is statistically significant ($B = 0.11$; $p < 0.01$).

Conclusion: Mother's education or employment status in Turkey is not effective on obesity under the age of five. In fact, further studies are needed on these parameters, which may be the most effective in combating obesity under the age of five.

Keywords – Obesity, maternal employment, female employment, breastfeeding

I. INTRODUCTION

Obesity has become an important issue concerning public health, especially in recent years, due to the advancement of technology, the spread of sedentary life, the increase in consumption of fast foods, and unhealthy nutrition (1-3). Obesity is important not only for public health, but also because it concerns and affects the body balance and proportions of individuals and additional diseases. Morbid obesity and overweight have been reported as significant and serious risk factors in surgical operations. Excess weight is an important risk factor for many systems, especially hypertension (4), respiratory (5), heart diseases (6), skeletal and muscular system diseases (7).

Although it is so important in surgical interventions and at the same time it is an important condition that reduces the quality of life of individuals, obesity is seriously increasing globally. According to the report published by the World Health Organization

(WHO) in 2021, obesity rates are at a level that threatens health all over the world (8). For this reason, both countries and health institutions and organizations are working on the fight against obesity.

Medication against obesity, diet and exercises, and after a certain stage, surgical interventions are in question. However, today, by attributing the importance of preventive medicine, the idea that measures should be taken before individuals gain excessive weight in the fight against obesity is becoming more widespread (9-11). In this context, it is necessary to focus on the overweight situation of individuals in the early stages of their lives. In the obesity reports of the WHO and the World Bank (WB), the obesity group published jointly by both institutions is the overweight data under the age of five. Since WHO is directly involved in health as an institution, although obesity statistics are given for older ages and different groups, the parameter that the two institutions, WHO and WB, which are the authority on health-related issues around the world, have taken together is the data on overweight under the age of five. Therefore, in this study, data on individuals under the age of five were evaluated in the fight against obesity and focused on this group in the fight against obesity.

The mother is one of the most important care elements in the lives of individuals under the age of five. The mother plays an important role both in terms of giving breast milk in the first six months of the child's life, and in the whole process from the baby's first encounter with food to the nutritional habits that he will gain in the later stages of his life (12-14). Today, another issue as important as obesity, breast milk, is considered as a global phenomenon. Therefore, it can be stated that the mother plays an important role both in individuals' acquiring nutritional habits and in the fight against negative conditions such as overweight or obesity.

Along with urbanization, there has been a change in the concept of mother, and studies are carried out to encourage mothers to participate in business life and work. These practices continue today with the support of international institutions. At this point, it is expected that there will be a relationship between maternal care and the working status of the mother in the first five years of life. Because when the mother enters the working life, her education and economic status will increase and although she will gain conscious food consumption habits, the time she will devote to the child decreases. In this dilemma, it was aimed to examine the relationship between working, education and breastfeeding rates of the mother and birth rates and overweight rates under the age of five.

II. MATERIAL AND METHOD

According to the World Health Organization and World Bank Country Reports, Turkey's under-five obesity rate (UFOR), Working Rate of Women with Basic Education (WRWBE), Working Rate of Women with Secondary Education (WRWSE), Working Rate of Women (WWR) and Below Monthly Breastfeeding Rates (SMBR) parameters were used. While there are values for the years 1993-2020 for the BR, WWR and SMBR parameters; The most recent series of WRWBE and WRWSE parameters were between 2006-2020. Due to the pandemic, the most recent data was for 2020, as post-2020 data has not yet been updated. Since the research data are anonymous and provided by the most respected and reliable institutions in the world, validity and reliability studies have not been conducted separately. Again, due to the anonymity of the data, it is not suitable for ethical committee approval. Therefore, ethical committee approval was not obtained.

The World Health Organization and World Bank data and expansions used in the research are shown in Table 1.

Table 1. World Health Organization and World Bank data and expansions used in the research

Kısaltma	Açılım	Açıklama	Dünya Bankası Kodu
UFOR	Under-Five Obesity Rate	Ratio of overweight for height in individuals under the age of five (in the under-five population)	Prevalence of overweight, weight for height (% of children under 5)
WRWBE	Ratio of Working Women with Basic Education	Basic educated workforce, female (percentage of female population of working age with basic education)	Labor force with basic education, female (% of female working-age population with basic education)
WRWSE	Rate of Working Women with Secondary Education	Secondary-educated workforce, female (percentage of secondary-educated, working-age female population)	Labor force with intermediate education, female (% of female working-age population with intermediate education)
WWR	Female Employment	Labor force participation rate, female	Labor force participation rate, female (% of

	Rate	(15%+ percentage of female population aged) (national estimate)	female population ages 15+) (national estimate)
SMBR	Six Month Breastfeeding Rate	Exclusive breast milk (percentage of children younger than 6 months)	Exclusive breastfeeding (% of children under 6 months)
BR	Birth Rate	Birth rate, crude (per 1,000 people)	Birth rate, crude (per 1,000 people)

Mean and standard deviation values were used to define the research parameters. Spearman's rho correlation analysis and year-controlled partial correlation analysis were used in the relational screening model. The Generalized Linear Model (Logit Model) was used in the effect analysis. All analyzes were performed in SPSS 25.0 for Windows with 95% confidence interval.

III. RESULTS

According to WHO and WB data, the UFOR value for Turkey between 1993 and 2020 ranged between 3.80% and 11.10%, with an average value of 7.55±2.82 percent. Between the same years, the value of WWR for Turkey ranged between 23.07% and 34.31% and had an average value of 28.57±3.35 percent. Breastfeeding rate had a range of 7.10% to 41.60% and a mean of 23.33±12.87 for 1993-2020. The birth rate had a range of 15.78% to 24.28% and a mean of 19.45±2.74 for 1993-2020. The WRWBE value had a 19.73-29.40 percent change and a mean of 25.49±3.49 percent between 2006 and 2020. The WRWSE value had a change of 29.55-38.09 percent and a mean of 34.31±2.90 percent between 2006 and 2020.

Table 2. Changes of research variables over time, mean and standard deviation values

	Min	**Max**	**Mean**	**Std. Deviation**
UFOR	3.80	11.10	7.55	2.82
WRWBE	19.73	29.40	25.49	3.49
WRWSE	29.55	38.09	34.31	2.90
WWR	23.07	34.31	28.57	3.35
SMBR	7.10	41.60	23.33	12.87
BR	15.78	24.28	19.45	2.74

UFOR: Under-Five Obesity Rate, WRWBE: Female Working Rate with Basic Education, WRWSE: Female Working Rate with Secondary Education, WWR: Female Working Rate, SMBR: Six Month Breastfeeding Rate, BR: Birth Rate.

According to the results of Spearman's rho correlation analysis, there was a statistically significant and positive relationship between obesity rate under the age of five and breastfeeding rates for six months (0.844; $p<0.01$); There was a statistically significant and negative relationship ($r=-0.695$; $p<0.01$) with birth rates. In the year-controlled correlation analysis, there was a statistically significant and negative correlation between childhood obesity and birth rates ($r=-0.605$; $p<0.05$) (Table 3).

Table 3. Spearman's rho and partial correlation analysis results for the relationship between childhood obesity and research variables

	Spearman's rho correlation		**Year controlled correlation**	
UFOR	**r**	**p**	**r**	**p**
WRWBE	-0.047	0.869	0.515	0.059
WRWSE	0.035	0.900	0.473	0.088
WWR	0.138	0.485	0.530	0.051
SMBR	0.844**	0.000	0.284	0.326
BR	-0.695**	0.000	-0.605*	0.022

UFOR: Under-Five Obesity Rate, WRWBE: Female Working Rate with Basic Education, WRWSE: Female Working Rate with Secondary Education, WWR: Female Working Rate, SMBR: Six Month Breastfeeding Rate, BR: Birth Rate.

According to the results of the Generalized Linear Model (Logit Model) analysis, the effect of six-month breastfeeding rate on obesity rates under the age of five is statistically significant (B=0.11; p<0.01). On the other hand, the effect of birth rates on obesity under the age of five was not statistically significant (p>0.05) (Table 4).

Table 4. Results of the Generalized Linear Model (Logit model) analysis of the effect of six-month breastfeeding rate and birth rate on childhood obesity

Parameters	B	Std. Error	95% Wald Confidence Interval		Hypothesis Testing		
			Min	Max	Wald X^2	df	p
(Intercept)	504.51	526.37	-527.15	1536.17	0.919	1	0.338
SMBR	0.11	0.04	.045	0.18	10.45	1	0.001
DO	-1.12	0.83	-2.74	0.49	1.85	1	0.174
Yıl	-0.24	0.25	-.736	0.26	0.88	1	0.349
(Scale)	1.58	0.42	.935	2.67			
Akaike Information Criteria (AIC): 102.24; Bayesian Information Criteria (BIC): 108.90; X^2: 28.00							

SMBR: Six Month Breastfeeding Rate, BR: Birth Rate.

According to the change in overweight rates of children under the age of five in Turkey between 1993 and 2020, it is seen that there has been a serious increase especially since 2003. Although there was a decrease in 2018, the incidence of overweight under the age of five has increased nearly threefold in the last two decades (Figure 1).
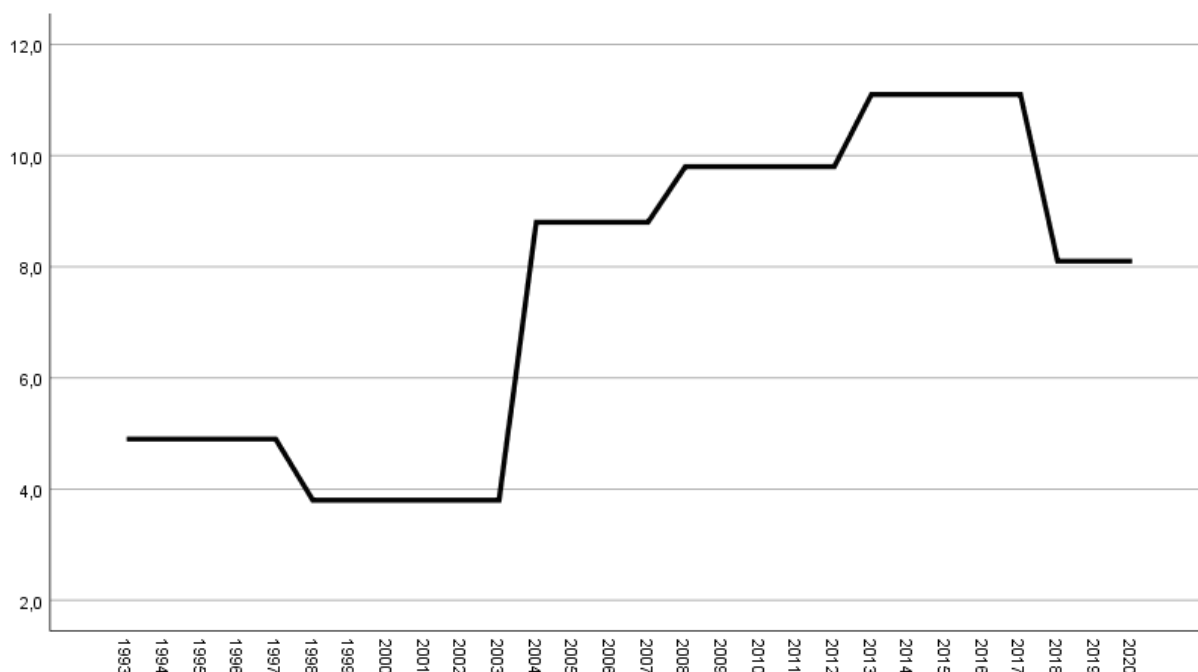

Figure 1. Change of obesity rate under five years old by years

IV. DISCUSSION

Childhood obesity is an important public health problem and a global issue. Obesity is a health problem that not only negatively affects the quality of life of individuals and accompanying diseases or a treatment process, but also can prevent situations that require surgical operations. In this area, both nutrition and physical activities and trainings that will enable mothers to be more knowledgeable are supported. The main purpose of all these studies is to focus on the fight against obesity from the first stage in the fight against obesity, starting from shaping the metabolism of individuals and acquiring their eating habits (15-18). In the education and studies given in this context, the mother's working and education level and the issue of breastfeeding are the main variables that come to the fore.

In general, in developed and developing countries, with urbanization, there is a sedentary life and a standard of living where individuals do less physical activity. This situation is more common especially in countries and regions where urbanization is rapid (19-21). According to the data set we examined in our research, the rate of overweight in children under the age of five has increased statistically significantly since 1993 in Turkey. This rate, which was 4.9% in 1993, was recorded as 11.1% in 2018 and 8.1% in 2020. It is possible to state that this variable, which was on an upward trend until 2018, was affected by the irregular migrations it received after 2018 due to wars.

Breast milk is one of the most important issues in the fight against obesity and many health problems. Many health institutions, especially WHO, support practices and promote breast milk, both financially and in terms of equipment and equipment. Although there are studies reporting that breast milk provides a healthier eating habit in general, there are also studies reporting that it has no effect (22-25). In our study, only six-month breastfeeding rates and birth rates affected the overweight rate in children under the age of five. There was a statistically significant and negative relationship between birth rates and the rate of overweight children. This shows that as birth rates increase, the proportion of children under the age of five who are overweight also decreases. Migration after the war in Turkey in recent years, the decrease in birth rates of resident citizens with urbanization, and the fact that immigrants are included in the statistical results in obtaining total birth data in hospitals may have an impact on the decrease in the rate of overweight children under the age of five, despite the increase in birth rates. This effect is also seen in the year-controlled correlation results. In our study, according to the results of multivariate analysis, six-month breastfeeding rate was the only effective factor on overweight in children under the age of five in multivariate analysis. Mother's education and employment status did not have a significant effect on overweight in children under the age of five.

In studies conducted between the education and employment status of the mother and the nutritional levels of the children, studies reporting the effect of mothers' education on children's more conscious nutrition and the negative effects of working status are the majority (26-28). In our study, the effects of women's basic education, secondary education, participation in employment and female employment rates on obesity under the age of five were not significant. In fact, while it is expected that the mother's education and working status will have a positive contribution to gaining more conscious eating habits and achieving a higher standard of living, this effect was not seen in our study or, more generally, in Turkey's post-1993 data. Considering that mothers with more conscious and high economic status can be used effectively in the fight against obesity under the age of five, it can be stated that this potential is not used sufficiently.

The most important limitation of the research is the limited data and the inconsistencies between the information given by the ministry of health and official data sharing after the immigration, as seen in the decrease in obesity rates especially since 2018. The rates of having a child by working or educated women, or the working and education rates of mothers are data that are not kept regularly not only in our country but also in the global sense. This is the most important limitation of the research.

Despite all these limitations, the research is important in the fight against obesity, since medical fields are related to every field, including surgery, and public health, and there is no study that previously examined maternal education and working status in the fight against obesity. The literature is important in terms of pointing out the variables that can be very effective in the fight against obesity and being a source for further research.

V. Conclusion

Although there are studies reporting the effect of maternal education and awareness on healthy nutrition, mother's education or employment status in Turkey is not effective on obesity under the age of five. In fact, further studies are needed on these parameters, which may be the most effective in combating obesity under the age of five.

References

[1] Gupta N, Heiden M, Aadahl M, Korshøj M, Jørgensen MB, Holtermann A. What Is the Effect on Obesity Indicators from Replacing Prolonged Sedentary Time with Brief Sedentary Bouts, Standing and Different Types of Physical Activity during Working Days? A Cross-Sectional Accelerometer-Based Study among Blue-Collar Workers. *PLoS One*. 2016;11(5):e0154935. Published 2016 May 17. doi:10.1371/journal.pone.0154935

[2] Gába A, Pedišić Ž, Štefelová N, et al. Sedentary behavior patterns and adiposity in children: a study based on compositional data analysis. *BMC Pediatr*. 2020;20(1):147. Published 2020 Apr 2. doi:10.1186/s12887-020-02036-6

[3] Moon JY, Wang T, Sofer T, et al. Objectively Measured Physical Activity, Sedentary Behavior, and Genetic Predisposition to Obesity in U.S. Hispanics/Latinos: Results From the Hispanic Community Health Study/Study of Latinos (HCHS/SOL). *Diabetes*. 2017;66(12):3001-3012. doi:10.2337/db17-0573

[4] Hall JE, do Carmo JM, da Silva AA, Wang Z, Hall ME. Obesity, kidney dysfunction and hypertension: mechanistic links. *Nat Rev Nephrol*. 2019;15(6):367-385. doi:10.1038/s41581-019-0145-4

[5] Tomic D, Shaw JE, Magliano DJ. The burden and risks of emerging complications of diabetes mellitus. *Nat Rev Endocrinol*. 2022;18(9):525-539. doi:10.1038/s41574-022-00690-7

[6] Ren J, Wu NN, Wang S, Sowers JR, Zhang Y. Obesity cardiomyopathy: evidence, mechanisms, and therapeutic implications. *Physiol Rev*. 2021;101(4):1745-1807. doi:10.1152/physrev.00030.2020

[7] Çataltape A, Baş S. Pregnancy-Related Sacral Stress Fractures: A Single Center Experience of 23 Cases. *Indian J Orthop*. 2022;57(2):269-276. Published 2022 Dec 17. doi:10.1007/s43465-022-00800-7

[8] World Health Organization. Nutrition, overweight and obesity. Factsheet - Sustainable Development Goals: health targets. https://apps.who.int/iris/bitstream/handle/10665/341982/WHO-EURO-2021-2574-42330-58595-eng.pdf

[9] Boone-Heinonen J, Messer LC, Fortmann SP, Wallack L, Thornburg KL. From fatalism to mitigation: A conceptual framework for mitigating fetal programming of chronic disease by maternal obesity. *Prev Med*. 2015;81:451-459. doi:10.1016/j.ypmed.2015.10.012

[10] Jung P, Warne DK. Integration of the preventive medicine specialty in the rural and Tribal public health workforce. *Prev Med*. 2020;139:106187. doi:10.1016/j.ypmed.2020.106187

[11] Nawaz H, Petraro PV, Via C, et al. Lifestyle medicine curriculum for a preventive medicine residency program: implementation and outcomes. *Med Educ Online*. 2016;21:29339. Published 2016 Aug 8. doi:10.3402/meo.v21.29339

[12] Sánchez C, Franco L, Regal P, Lamas A, Cepeda A, Fente C. Breast Milk: A Source of Functional Compounds with Potential Application in Nutrition and Therapy. *Nutrients*. 2021;13(3):1026. Published 2021 Mar 22. doi:10.3390/nu13031026

[13] Hampel D, Dror DK, Allen LH. Micronutrients in Human Milk: Analytical Methods. *Adv Nutr*. 2018;9(suppl_1):313S-331S. doi:10.1093/advances/nmy017

[14] Lyons KE, Ryan CA, Dempsey EM, Ross RP, Stanton C. Breast Milk, a Source of Beneficial Microbes and Associated Benefits for Infant Health. *Nutrients*. 2020;12(4):1039. Published 2020 Apr 9. doi:10.3390/nu12041039

[15] Bagnall AM, Radley D, Jones R, et al. Whole systems approaches to obesity and other complex public health challenges: a systematic review. *BMC Public Health*. 2019;19(1):8. Published 2019 Jan 3. doi:10.1186/s12889-018-6274-z

[16] Jaacks LM, Vandevijvere S, Pan A, et al. The obesity transition: stages of the global epidemic. *Lancet Diabetes Endocrinol*. 2019;7(3):231-240. doi:10.1016/S2213-8587(19)30026-9

[17] Scott-Sheldon LAJ, Hedges LV, Cyr C, et al. Childhood Obesity Evidence Base Project: A Systematic Review and Meta-Analysis of a New Taxonomy of Intervention Components to Improve Weight Status in Children 2-5 Years of Age, 2005-2019. *Child Obes*. 2020;16(S2):S221-S248. doi:10.1089/chi.2020.0139

[18] Bray GA, Heisel WE, Afshin A, et al. The Science of Obesity Management: An Endocrine Society Scientific Statement. *Endocr Rev*. 2018;39(2):79-132. doi:10.1210/er.2017-00253

[19] Du W, Wang H, Su C, Jia X, Zhang B. Thirty-Year Urbanization Trajectories and Obesity in Modernizing China. *Int J Environ Res Public Health*. 2022;19(4):1943. Published 2022 Feb 9. doi:10.3390/ijerph19041943

[20] Mehata S, Shrestha N, Ghimire S, Atkins E, Karki DK, Mishra SR. Association of altitude and urbanization with hypertension and obesity: analysis of the Nepal Demographic and Health Survey 2016. *Int Health*. 2021;13(2):151-160. doi:10.1093/inthealth/ihaa034

[21] Hales CM, Fryar CD, Carroll MD, Freedman DS, Aoki Y, Ogden CL. Differences in Obesity Prevalence by Demographic Characteristics and Urbanization Level Among Adults in the United States, 2013-2016. *JAMA*. 2018;319(23):2419-2429. doi:10.1001/jama.2018.7270

[22] Lokossou GAG, Kouakanou L, Schumacher A, Zenclussen AC. Human Breast Milk: From Food to Active Immune Response With Disease Protection in Infants and Mothers. *Front Immunol*. 2022;13:849012. Published 2022 Apr 5. doi:10.3389/fimmu.2022.849012

[23] Alexandre-Gouabau MC, Moyon T, David-Sochard A, et al. Comprehensive Preterm Breast Milk Metabotype Associated with Optimal Infant Early Growth Pattern [published correction appears in Nutrients. 2020 Jan 07;12(1):]. *Nutrients*. 2019;11(3):528. Published 2019 Feb 28. doi:10.3390/nu11030528

[24] Duale A, Singh P, Al Khodor S. Breast Milk: A Meal Worth Having. *Front Nutr*. 2022;8:800927. Published 2022 Jan 26. doi:10.3389/fnut.2021.800927

[25] Dror DK, Allen LH. Overview of Nutrients in Human Milk. *Adv Nutr*. 2018;9(suppl_1):278S-294S. doi:10.1093/advances/nmy022

[26] Kristo AS, Sikalidis AK, Uzun A. Traditional Societal Practices Can Avert Poor Dietary Habits and Reduce Obesity Risk in Preschool Children of Mothers with Low Socioeconomic Status and Unemployment. *Behav Sci (Basel)*. 2021;11(4):42. Published 2021 Mar 24. doi:10.3390/bs11040042

[27] Jeon H, Salinas D, Baker DP. Non-linear education gradient across the nutrition transition: mothers' overweight and the population education transition. *Public Health Nutr*. 2015;18(17):3172-3182. doi:10.1017/S1368980015001640

[28] Augustine JM, Negraia DV. Can Increased Educational Attainment Among Lower-Educated Mothers Reduce Inequalities in Children's Skill Development?. *Demography*. 2018;55(1):59-82. doi:10.1007/s13524-017-0637-4