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Research Article

Comparison of Obesity Rates in Early Childhood (4 to 80 months) by Parental Socioeconomic Status Using National Cohort Dataset in Korea

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SUMMARY

Purpose: Child obesity has been on the rise and become a worldwide health issue. Low socioeconomic status (SES) is known as an influencing factor for childhood obesity, but relevant studies on a national level are scarce in Korea. The purpose of this study was to identify the prevalence of obesity for each age group by parental SES and analyze the trends of changes in weight status using a Korean national cohort dataset.

Methods: In Korea, children are eligible for the National Children Health Examination, a mandatory seven-time health checkup for those aged 4 to 80 months. This study tracked 4 to 9-month-old children up to 80 months through seven distinct age groups. A total of 12,362 children had received all seven health exams consecutively. Parental SES was categorized as three stages according to national classifications. *Z* scores of weight-for-height (for children aged < 24 months) and body mass index (for children aged ≥ 24 months) were used for detecting overweight and obesity.

Results: Children with low parental SES showed the highest prevalence of overweight and obesity in all age groups, although there was no consistency in statistical significance. Also, normal and underweight children of 4 to 9 months with low parental SES showed the highest change rate to either overweight or obesity, although no consistency of statistical significance was observed.

Conclusions: Low parental SES can affect the weight status of offspring from early childhood. Thus, early obesity prevention interventions should be provided especially for children in low-income families.

Introduction

Child obesity has been on the rise and become a worldwide health issue. The World Health Organization reported that among those aged 0 to 5 years, the number of overweight children reached 42 million globally in 2013 [1]. Many countries have attempted to estimate the prevalence of overweight and obese children using nation-level databases. Orsi et al [2] analyzed the National Health and Nutrition Examination Survey and reported that the prevalence of obese children aged 2 to 5 years rose from 7.2% in 1988 to 1994 to 10.4% in 2007 to 2008 and 12.1% in 2009 to 2010. In Korea, according to a recent report, the prevalence of overweight and obesity in children aged 24 to 80 months is 11.3% for overweight and 6.6% for obesity, and in children under 24 months, the prevalence of overweight is 8.3% [3].

People who are overweight or obese during early childhood are more likely to become obese in adolescence and adulthood [4]. Additionally, overweight and obese children are more likely to develop metabolic diseases, such as type II diabetes mellitus and cardiovascular diseases [5], and psychosocial problems, such as low self-esteem, depression, and negative self-image [6].

Childhood obesity is caused by interactions between genetic factors and environmental factors [2,7]. Environmental factors, such as the socioeconomic status (SES) of families have significant impacts on the weight status of children [8]. Globally, there has been a strong interest in studying the relationship between SES and obesity. In the United States and some countries in Europe where the prevalence of childhood obesity has drastically increased recently, this phenomenon has been conspicuous in low-income families [8,9]. Furthermore, according to Pediatric Nutrition Surveillance System data from the Centers for Disease Control and Prevention (CDC), the obesity rate among children aged 2 to 4 years

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was 14.4% in low-income families in 2010 [10]. In the 2013 Analysis of Children Reality Report of Korea, most health indicators have improved, but the obesity rate has varied by socioeconomic status, showing a negative correlation between the two indicators [11].

In Korea, the child poverty rate was reported to be 13.4% as of 2012, and this rate is twice of that in Norway (5.3%), the country with the lowest poverty rate in the Organisation for Economic Co-operation and Development countries [12]. Childhood is an important stage in which children acquire lifetime habits; during this time, the patterns of development, maturation and metabolic processes are mostly established [4,5,7]. For economically vulnerable families, caregivers are more likely to participate in economic activities, which makes it hard for them to take care of their children [13]. Because of this, children tend to be exposed to unhealthy behaviors, such as increased unhealthy food choice and sedentary lifestyle [8]. Eventually, children in low-income families are likely to develop health issues, including weight gains, and these are known to affect health status throughout their lifetime [8,9,13].

An understanding of childhood obesity among low-income groups is paramount to preventing childhood obesity and reducing health disparities. However, there has been a paucity of nation-level cohort studies that provide an overview of the incidence of obesity in low-income children in Korea. Moreover, most existing studies have utilized cross-sectional data for analyses, providing a narrow scope of information limited to certain periods of time, whereas a longitudinal study using national data could provide more specific information on the effects of SES on the weight status of children over time.

In this study, a national cohort database provided by the Korea National Health Insurance Corporation (KNHIC) was used. This study aimed first, to identify the prevalence of overweight or obesity of children in each age group according to parental SES and second, to analyze the rate of weight status changes to either overweight or obesity according to different SES groups by tracking normal or underweight children aged 4 to 9 months. A good understanding of this relation will provide baseline knowledge for developing programs for the prevention and management of overweight or obesity in early childhood for economically vulnerable groups.

Methods

Study design

This is a nationwide cohort study using the KNHIC database.

Study materials and sample

Korea has a national health insurance system, and all Koreans are legally obliged to become members of the system. KNHIC has a database that contains data on qualification, and National Children Health Examination (NCHE). The qualification data contains all members' and their dependents' information on age, gender, health insurance contribution, and division of health insurance contributions into a total of 20 levels. NCHE, for which children aged 4 to 80 months are eligible, started in 2007 and is composed of seven consecutive health exams by age groups (4 to 9 months, 9 to 18 months, 18 to 30 months, 30 to 42 months, 42 to 54 months, 54 to 66 months, and 66 to 80 months).

In this study, the KNHIC qualification data from 2008 and NCHE data from 2007 to 2013 were used. The number of the registered members in the 2008 qualification data was 49,572,803. Among the members, the number of children who attended the NCHE at least once from 2007 to 2013 was 2,213,602. Among these, those whose ages overlapped between different age groups ($n = 63$) and those whose nationality was non-Korean ($n = 3,999$) were excluded. The number of children after the exclusions was 2,209,540. The number of children who fully completed the recommended seven exams was 12,388. Among these, the children without parents' health insurance contribution information ($n = 26$) were also excluded from the dataset. The final number of children analyzed was 12,362 (Figure 1).

Ethical considerations

All personally identifiable information was voided from the data to ensure confidentiality. A research proposal was submited to the KNHIC in advance of obtaining data for this study and approved. KNHIC provided researchers who, prior to being involved in this study, signed a pledge for confidentiality with the data after eliminating all personally identifiable information. The data was transferred only to specified computers that were restricted to pre-approved researchers for the study purposes only. This study was approved by the Institutional Review Board of Seoul National University (IRB no. E1504/002-014).

Definition of variables and measurement

Overweight and obesity in children

According to the 2007 Korean National Growth Charts published by the Korea Centers for Disease Control and Prevention (KCDC), overweight is defined as a weight-for-height above the 95th percentile in children aged less than 24 months and a body mass index (BMI)-for-age above the 85th percentile and below the 95th percentile in children aged 24 months or greater. Obesity is defined as a BMI-for-age above the 95th percentile in children aged 24

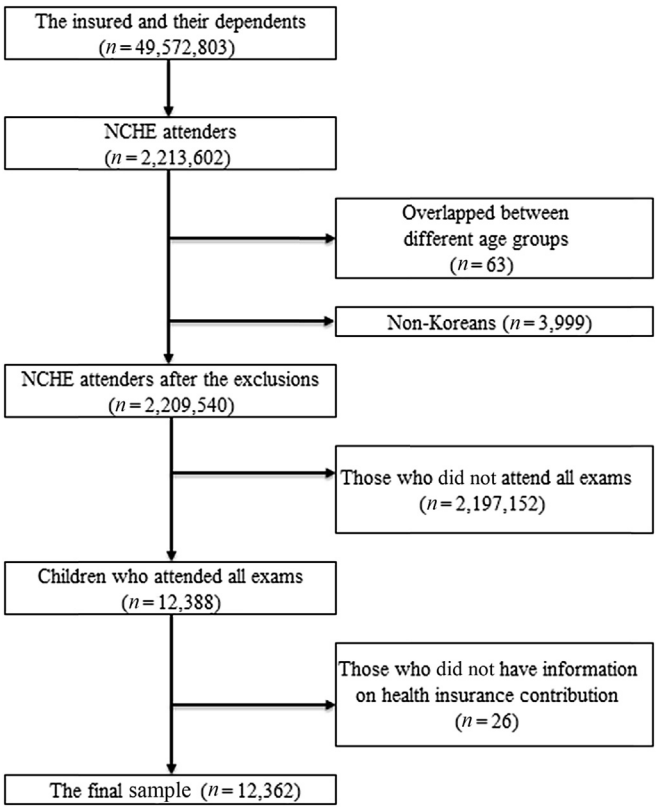


Figure 1. Flowchart of study sample. *Note.* NCHE = National Children Health Examination.

months or greater [14]. The KCDC adopted the criteria of the CDC [14] and applied them to Korean children.

Z scores facilitate comparisons across ages and sexes, and allow the mean and standard deviation to be calculated for a group of measures and the description of the relative status of children at extremes of the distributions [14,15]. To estimate *Z* scores, the lambda-mu-sigma statistical procedure (lambda for the skew, mu for the median, & sigma for the generalized coefficient of variation) was applied to the smoothed percentile curves. The 2007 KCDC Growth Charts provide the values of L, M, and S by sex and age in months.

Under normally distributed curves, percentiles are compatible with *Z* scores. The 95th percentile is equal to a *Z* score of 1.65, and the 85th percentile is equal to a *Z* score of 1.04 [16]. In this study, for children aged less than 24 months, normal and underweight was defined as a weight-for-height *Z* score below 1.65, and overweight was defined as a weight-for-height *Z* score above 1.65. For children aged 24 months or more, normal and underweight was defined as a BMI-for-age *Z* score below 1.04, overweight as a BMI-for-age *Z* score above 1.04 and below 1.65, and obesity as a BMI-for-age *Z* score above 1.65.

Parental SES

The variables from the 2008 qualification data, health insurance contributions and division of health insurance contributions, were used as an index of parental SES. The variable, division of health insurance contribution that has levels 1 through 20, was categorized into quartiles. In this study, parental SES was defined with three groups, low-income (quartile 1), middle-income (quartiles 2 & 3), and high-income (quartile 4) groups.

Data analysis and statistical methods

First, a cross-sectional analysis was conducted to determine the prevalence (%) of overweight and obesity by age groups. Differences in the prevalence of overweight and obesity in the low-income, middle-income, and high-income groups were examined. The linear-by-linear association was conducted to test the differences among different SES groups. Next, logistic regression analysis was conducted to examine the association between the weight status (overweight & obesity) and SES. Two dummy variables were used to code the middle-income and high-income groups, while the low-income group was used as a reference. Odds ratios (ORs) and 95% confidence intervals (CIs) were estimated. Statistical tests were conducted at a p of .05.

Second, a cohort analysis was done using a dataset of normal and underweight children who were followed six times. The prevalence of weight status change to either overweight or obesity was identified. ORs and 95% CIs were additionally measured by conducting univariate logistic regression.

Results

Sample characteristics

The number of children examined was 12,362. The KCDC defines childhood obesity after 24 months of age. Children aged 18 to 30 months are candidates for the third NCHE exam. In this study, thus, the sample was divided into two groups, those who aged less than 24 months and those aged 24 months or greater, according to the KCDC definition of childhood obesity. The numbers in each group were 9,579 and 2,783, respectively.

The prevalence of overweight in the 4 to 24-month group and overweight or obesity in the 24 to 80-month group is shown in Table 1. The number of overweight children aged 4 to 24 months decreased as they got older, whereas the prevalence of overweight or obesity in the 24 to 80-month group increased by the 42 to 54-month period, followed by a decrease from the 54-month to 66-month period.

Table 1 *Characteristics of Subjects (N = 12,362).*

Classification	Ages (mo)	*n* (%) Underweight & normal weight[c]	*n* (%) Overweight[d]	*n* (%) Obesity[e]
Children	4–9	11,174 (90.4)	1,188 (9.6)	–
	9–18	11,913 (96.4)	449 (3.6)	–
	18–24[a]	9,313 (97.2)	266 (2.8)	–
	24–30[b]	2,617 (94.0)	117 (4.2)	49 (1.8)
	30–42	11,036 (89.3)	918 (7.4)	408 (3.3)
	42–54	10,197 (82.5)	1,510 (12.2)	655 (5.3)
	54–66	10,114 (81.8)	1,503 (12.2)	745 (6.0)
	66–80	10,199 (82.5)	1,380 (11.2)	783 (6.3)
Parental SES		*n* (%) Low Quartile 1	*n* (%) Middle Quartile 2 & 3	*n* (%) High Quartile 4
		1,609 (13.0)	7,586 (61.4)	3,167 (25.6)

Note. SES = socioeconomic status.
[a] $n = 9,579$.
[b] $n = 2,783$.
[c] For children aged 4 to 24 months, weight for height Z-score <1.65 and for children aged 24 to 80 months, BMI Z-score <1.04.
[d] For children aged 4 to 24 months, weight for height Z-score ≥1.65 and for children aged 24 to 80 months, 1.04 ≤ BMI Z-score <1.65.
[e] For children aged 24 to 80 months, BMI Z-score ≥1.65.

The SES of the sample is also shown in Table 1. The numbers of each group were as follows: low-income group, 1,609 (13.0%); middle-income group, 7,586 (61.4%); and high-income group, 3,167 (25.6%). The study sample was less populated in the low-income group compared with the number from the statistics based on the entire Korean population.

Prevalence of overweight and obesity in children by parental SES

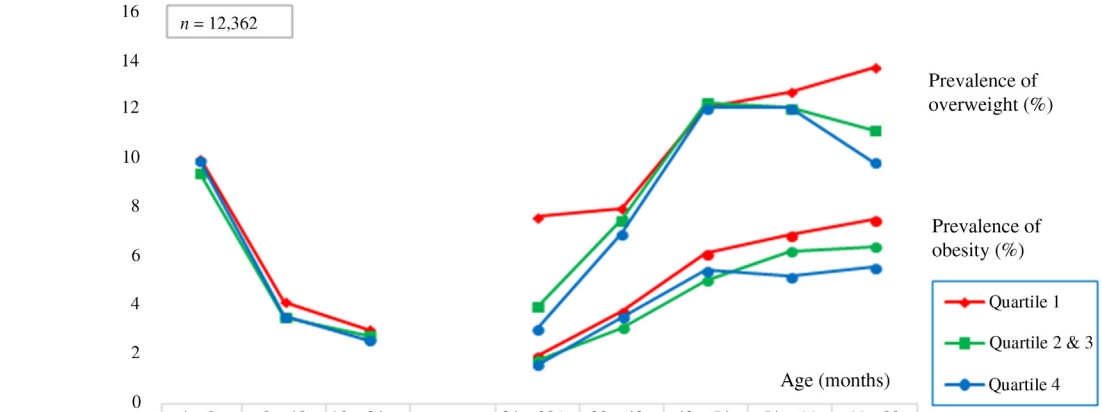
Among children aged less than 24 months, the prevalence of overweight was the highest in the low-income group. Similarly, among children aged 24 months or greater, the prevalence of obesity and that of overweight and obesity combined were the highest in the low-income group. Trends of overweight by SES were as follows: the prevalence of overweight decreased in the 54 to 66-month and 66 to 80-month periods in the middle-income and high-income groups, whereas that of the low-income group still increased (Table 2 & Figure 2). Not all age groups revealed statistical significance. The results showed that only in the 24 to 30-month and 66 to 80-month periods were statistically significant in the distribution of normal, underweight, overweight, and obesity by parental SES.

The results were similar when the univariate logistic regression model was tested (Table 3). The age groups showing statistical significance were the 24 to 30 months and 66 to 80 months groups. Among those aged 24 to 30 months, the ORs for overweight or obesity was 0.56 [95% CI (0.38, 0.82)] in the high-income group compared with those in the low-income group, but the middle-income group showed no statistical significance. The ORs for overweight or obesity among those aged 66 to 80 months were 0.82 [95% CI (0.72, 0.93)] in the middle-income group and 0.74 [95% CI (0.64, 0.85)] in the high-income group compared with those in the low-income group. The results were similar in other age groups, in which the ORs of the middle-income group and high-income group were below 1 compared with the low-income group, but the results were not statistically significant.

Table 2 *Differences of Prevalence of Overweight and Obesity by Parental SES (N = 12,362).*

Ages (mo)	Classification	Parental SES			χ^2	*p*
		Low	Middle	High		
4–9	Underweight	38 (2.4)	151 (2.0)	49 (1.5)	0.99	.320
	Normal	1,410 (87.6)	6,722 (88.6)	2,804 (88.5)		
	Overweight	161 (10.0)	713 (9.4)	314 (9.9)		
9–18	Underweight	60 (3.7)	262 (3.4)	99 (3.13)	0.04	.847
	Normal	1,482 (92.1)	7,055 (93.0)	2,955 (93.3)		
	Overweight	67 (4.2)	269 (3.5)	113 (3.6)		
18–24	Underweight	79 (6.3)	402 (6.8)	158 (6.5)	0.23	.632
	Normal	1,138 (90.7)	5,338 (90.4)	2,198 (90.9)		
	Overweight	38 (3.0)	165 (2.8)	63 (2.6)		
24–30	Underweight	21 (5.93)	93 (5.5)	57 (7.6)	7.22	.007*
	Normal	299 (84.5)	1,491 (88.7)	656 (87.7)		
	Overweight	27 (7.6)	67 (4.0)	23 (3.1)		
	Obesity	7 (2.0)	30 (1.8)	12 (1.6)		
30–42	Underweight	90 (5.6)	417 (5.5)	176 (5.6)	0.51	.474
	Normal	1,330 (82.7)	6,364 (83.9)	2,659 (84.0)		
	Overweight	128 (8.0)	570 (7.5)	220 (6.9)		
	Obesity	61 (3.8)	235 (3.1)	112 (3.5)		
42–54	Underweight	64 (4.0)	267 (3.5)	118 (3.7)	0.21	.649
	Normal	1,251 (77.7)	6,003 (79.1)	2,494 (78.7)		
	Overweight	195 (12.1)	933 (12.3)	382 (12.1)		
	Obesity	99 (6.1)	383 (5.0)	173 (5.5)		
54–66	Underweight	69 (4.3)	296 (3.9)	109 (3.4)	3.37	.066
	Normal	1,224 (76.1)	5,904 (77.8)	2,512 (79.3)		
	Overweight	205 (12.7)	916 (12.1)	382 (12.1)		
	Obesity	111 (6.9)	470 (6.2)	164 (5.2)		
66–80	Underweight	65 (4.0)	313 (4.1)	119 (3.8)	15.59	< .001*
	Normal	1,202 (74.7)	5,940 (78.3)	2,560 (80.8)		
	Overweight	221 (13.7)	847 (11.2)	312 (9.8)		
	Obesity	121 (7.5)	486 (6.4)	176 (5.6)		

Note. SES = socioeconomic status.
[a]*n* = 9,579; [b]*n* = 2,783.
*$p < .05$.



	4 – 9	9 – 18	18 – 24 a		24 – 30 b	30 – 42	42 – 54	54 – 66	66 – 80
Quartile 1	10.01	4.16	3.03		7.63	7.96	12.12	12.74	13.74
Quartile 2 & 3	9.4	3.55	2.79		3.99	7.51	12.3	12.07	11.17
Quartile 4	9.91	3.57	2.6		3.07	6.95	12.06	12.06	9.85
Quartile 1					1.98	3.79	6.15	6.9	7.52
Quartile 2 & 3					1.78	3.1	5.05	6.2	6.41
Quartile 4					1.6	3.54	5.46	5.18	5.56

Figure 2. Differences of prevalence of overweight and obesity by parental socioeconomic status. *Note*. [a]*n* = 9,579; [b]*n* = 2,783.

Table 3 *Odds Ratio of Overweight or Obesity by Parental SES—Cross Sectional (N = 12,362).*

Category		4–9 mo	9–18 mo	18–24 mo[a]	24–30 mo[b]	30–42 mo	42–54 mo	54–66 mo	66–80 mo
Middle income	OR	0.98	0.95	0.92	0.74	0.93	0.96	0.94	0.82*
(quartile 2 & 3)[c]	95% CI	0.82, 1.15	0.77, 1.17	0.85, 1.13	0.52, 1.05	0.80, 1.07	0.85, 1.10	0.83, 1.07	0.72, 0.93
High income	OR	1.06	1.00	0.93	0.56*	0.92	0.97	0.93	0.74*
(quartile 4)[c]	95% CI	0.88, 1.28	0.79, 1.27	0.73, 1.17	0.38, 0.82	0.78, 1.08	0.84, 1.12	0.78, 1.04	0.64, 0.85

Note. SES = socioeconomic status.
[a]*n* = 9,579; [b]*n* = 2,783; [c]reference is low income (quartile 1).
*Statistically significant.

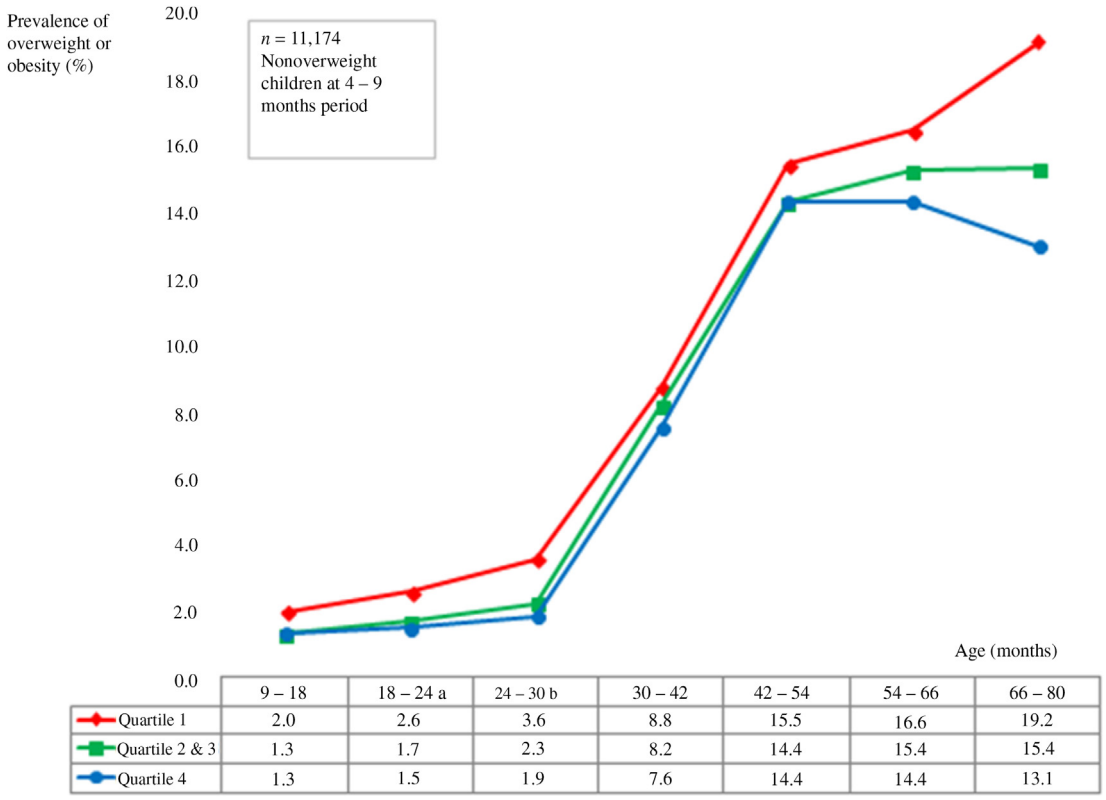
Trends of weight status in children by parental SES

The number of normal and underweight children in the 4 to 9-month period (a weight-for-height *Z* score below 1.65) was 11,174. We traced and analyzed this group, and found that they were more likely to become overweight or obese in all six subsequent exams when they belonged to the low-income group compared with the other SES groups. This tendency was clear after 42 months, and the difference increased as the children got older (Figure 3). Since there is no defined obesity in children aged less than 24 months, we only counted overweight children aged 9 to 24 months (a weight-for-height *Z* score above 1.65); for those aged 24 months or greater, we counted children who were either overweight (a BMI-for-age *Z* score above 1.04 and below 1.65) or obese (a BMI-for-age *Z* score above 1.65) were counted.

The higher the income group the children belonged to, the less likely they were to become overweight or obese when the logistic regression model was tested (Table 4). Only two age groups, 24 to 30 months and 66 to 80 months, showed statistical significance. For children in the 24 to 30-month period, the OR for overweight or obesity in the high-income group was 0.49 [95% CI (0.32, 0.76)] compared with the low-income group. The ORs for overweight or obesity in the 66 to 80-month period among those who were not overweight at 4 to 9 months old were 0.80 [95% CI (0.70, 0.92)] in the middle-income group and 0.71 [95% CI (0.61, 0.83)] in the high-income group compared with those in the low-income group. Not all age groups showed statistical significance, but the rate of change to either overweight or obesity among normal and underweight children in the 4 to 9-month period was likely to be low in the middle-income and high-income groups compared to that of the low-income group.

Discussion

In the present study, NCHE data from 2007 to 2013 was used, and those who attended all seven NCHEs were tracked. The main objectives were to examine the prevalence of overweight or obesity by parental SES in early childhood and to analyze the prevalence of changes from normal and underweight to either overweight or obesity across different parental SES groups. The prevalence of overweight and obesity was highest in children in the low-income group. Similar results have been found in previous literature. One study found that the risk of obesity in children decreased in families



	9 – 18	18 – 24 a	24 – 30 b	30 – 42	42 – 54	54 – 66	66 – 80
Quartile 1	2.0	2.6	3.6	8.8	15.5	16.6	19.2
Quartile 2 & 3	1.3	1.7	2.3	8.2	14.4	15.4	15.4
Quartile 4	1.3	1.5	1.9	7.6	14.4	14.4	13.1

Figure 3. Trends of changes to overweight or obesity in nonoverweight children in 4 to 9 months. *Note.* [a]$n = 9{,}579$; [b]$n = 2{,}783$.

Table 4 *Odds Ratio of Expected Overweight or Obesity by Parental SES—Longitudinal (N = 11,174).*

Category		9–18 mo	18–24 mo[a]	24–30 mo[b]	30–42 mo	42–54 mo	54–66 mo	66–80 mo
Middle income (quartile 2 & 3)[c]	OR	0.94	0.89	0.70	0.97	0.95	0.95	0.80*
	95% CI	0.73, 1.22	0.71, 1.11	0.47, 1.03	0.83, 1.15	0.82, 1.10	0.83, 1.10	0.70, 0.92
High income (quartile 4)[c]	OR	1.00	0.90	0.49*	0.92	0.94	0.92	0.71*
	95% CI	0.75, 1.34	0.70, 1.16	0.32, 0.76	0.77, 1.10	0.80, 1.11	0.78, 1.07	0.61, 0.83

Note. SES = socioeconomic status.
[a]$n = 9{,}579$; [b]$n = 2{,}783$; [c]Reference is low income (quartile 1).
*Statistically significant.

with a higher SES [17], and other studies have also revealed the association between the social class of families and the weight status of children aged 9 to 24 months [8]. These trends are similar in Korea as well. Previous studies have revealed that overall health indicators have gotten better, whereas the obesity or overweight rates of children aged 0 to 2 years and 2 to 5 years varied by economic status [11].

Causes of a high prevalence of childhood obesity in low SES groups are explained in a number of studies. Access to healthy food is restricted in economically vulnerable groups, and children in these groups are more likely to be left alone by caregivers and exposed to unhealthy food choices, such as fast food, causing nutritional imbalances [18]. Additionally, these children are less likely to be physically active and more likely to be exposed to unhealthy environments [19]. The caregivers in low income families have difficulties in encouraging and monitoring the physical activities of their children, because the caregivers mostly participate in economic activities during daytime [20]. Also, community environment is not sufficiently safe and suitable programs are not appropriately organized for their children's physical activity where the low-income groups reside. Therefore, parents let their children stay at home where they can be easily controlled and supervised [19,21]. As a result, the physical activity time of children decreases and sedentary activity time increases.

The number of children who were normal or underweight (weight-for-height *Z* scores below 1.65) between 4 months and 9 months period was 11,174. We tracked this group of children six times up to the point when they reached 66 to 80 months old; in all six times, the change rates to either overweight or obesity were highest in the low-income group compared to the other SES groups. The results were the same when the logistic regression model was applied, and in the 24 to 30-month and 66 to 80 month periods, the results were statistically significant. In a previous study which used a nationally representative sample of birth cohort in the United States, Jones-Smith et al [22] found that an SES-associated disparity in overweight and obesity began early for White, Hispanic, and Asian Americans. They tracked US children at birth, 9 months, 24 months, 4 years, and 5 years old. As a result, in the case of Asian and Hispanic Americans, the gap of the disparity of SES in overweight and obesity became wider as the age of children increased, which was similar to this study's result. However, results should be interpreted with care since there is a paucity of relevant literature, and further studies and investigations should be undertaken. Early childhood is a period of time when children acquire behaviors and developmental patterns that can affect them throughout their lifetime [4]. Children belonging to vulnerable populations are likely to be delayed in achieving expected developmental tasks at each stage throughout their lifetime [7,19]. Based on this study's result that children in low SES of families are at high risk of becoming overweight or obese even if the children are normal weight, we concluded that childhood obesity prevention interventions should be made as early as possible, especially for those who are in the low-income group.

This study was subject to a few limitations. First, representativeness of the sample was questionable, because only the children who completed all seven recommended NCHE exams were selected as our sample for longitudinal analysis. Second, there is a possibility of underestimation of the association between early childhood obesity and the SES of the family. The children who belonged to the first quantile were approximately 13.0% in this study, which was less than the estimated rate from national statistics. Low income families may have limited health management skills and accessibility to healthcare, compared to higher income groups [19,23], which might have exerted indirect effects to the study results. Third, the indicator of parental SES was limited to the income of fathers, since there were not enough variables that can estimate parental SES in the data. Indicators of SES of families include family income, the level of education, occupation, residence, and so on [13]. Some studies report that the income of family members can be used as a suitable measure to estimate SES [13], however, the best option would be repeating the analysis using other indicators of SES along with family income.

Despite these limitations, the present study highlights the feasibility and applicability of the study results. First, existing studies are mostly cross-sectional, which means that causal relationships are difficult to infer, whereas this study used longitudinal cohort data, which provide baseline knowledge to develop systematic supporting plans from a broader perspective. Second, early childhood were divided into seven periods in months, enabling examination of the trends of the relationship between parental SES and weight status of children by age groups. It is remarkable and significant in that, the change rates from normal and underweight to either overweight or obesity were significantly higher in the low SES group than the other income groups. Third, both Korean-specific and international obesity classification standards were applied in this study, so the result could be used as a reference when comparing the results to those for other countries. Fourth, the present study has first attempted to merge two separate, population-based datasets, qualification and NCHE. This is meaningful in that an intergenerational factor for the weight status of offspring could be identified for the first time. Lastly, most existing studies were based on the relationship between SES and weight status in school-aged children, adolescents, or adults, whereas this study examined weight status changes in early childhood in relation to SES. The results, thus, provided evidence of the necessity of early preventive interventions against childhood obesity for children with low parental SES.

Conclusions

The present study analyzed national cohort data provided by KNHIC and demonstrated that low parental SES could affect the weight status of offspring from early childhood. Early obesity prevention interventions should be provided, especially for children in low-income families. Further research is required to provide information or mechanisms to demonstrate a more detailed relationship between low SES and childhood obesity. Effective childhood obesity prevention strategies should be developed based on the results. A good understanding of the relationship of childhood obesity and parental SES will bring many implications for practice and policies for the prevention and management of childhood obesity.

Conflicts of interest

The authors declare that they have no competing interests.

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