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Childhood Obesity: Risk Factors, Associated Morbidity and Service Utilization

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Executive Summary

Obesity is a major public health problem due to its short- and long-term implications. The scale of the problem has increased over the years and there is abundant evidence linking overweight with numerous chronic illnesses, shorter life expectancy and reduced quality of life. In the developed world, obesity is recognized as the second leading cause of preventable mortality (after smoking). It is an economic burden and in many developed countries, the financial cost of obesity ranges from 2%-7% of health expenditure. The financial costs can be divided into three elements: the costs of treating obesity and medical care for associated morbidity; indirect costs to the patients (linked to associated morbidity and reduced quality of life); and indirect costs to society (due to absence from work and premature death). Expenditure on overweight/obese adults is considerably greater than expenditure on adults of normal weight. Consequently, addressing the issue of obesity is, in many countries, a top priority and special emphasis is placed on preventing obesity among children. The consensus is that children, adolescents and their parents should be the top priority target population for obesity prevention programs. The focus on children is linked, inter alia, to the considerable increase in the proportion of obesity in that group, to the morbidity associated with childhood obesity, the link between obesity/overweight in childhood and obesity/overweight in adulthood, and recognition of the fact that it is easier to change habits and assume a healthy lifestyle at a young age.

Childhood obesity in developed countries has increased in recent years. Between 1980 and 2000, the number of obese children in the United States doubled, and 15% of all 15-year-olds are now obese. In Israel, where little research has been conducted on the subject, high percentages of overweight and obesity have been found among 6-year-olds (29%) and 88% of these (about a quarter of all 6-year-olds) showed the same at age 10. Among the studies on older children, a national health and nutrition survey¹ conducted in 2003-2004 found that among seventh to twelfth graders, 7.7% of the boys at 4.1% of the girls had a BMI indicating overweight. A study of obesity trends among army recruits found a threefold increase in the percentage of overweight individuals between 1967 and 2003, from 1.2% to 3.8%. A study of children in the Negev found that obesity in 6-7-year-olds constituted a significant risk factor for obesity at age 17-18.

Studies have shown that overweight and obesity are the result of multiple mutually dependent factors. One of the independent factors is heredity. The impact of other factors can be seen at various levels: the child, the family, the school, and the macro-societal level (the physical, economical and cultural environment in which the child lives).

¹ The health and nutrition survey of young people, which included a self-report on morbidity, was conducted among students in seventh to twelfth grade, while the current study focuses on a younger age group (4-11-year-olds).

The literature reveals that child obesity is linked to obesity throughout life – a recognized morbidity risk factor. The review of the literature shows that in the short term, the morbidity rate of obese children is higher than that of children of normal weight. In the long term, child obesity is linked to lower socioeconomic status in adulthood (education, income and achievements). Medically, there is a connection between childhood and adult obesity, particularly among children with at least one obese parent. Childhood obesity has also been found to be connected to cardiovascular risk factors in adulthood. Note that these studies had difficulty distinguishing between the impact of childhood obesity and that of obesity in adulthood.

Only a few studies have investigated health service consumption among obese children. The rate of consumption by obese children was found to be greater than by children of normal weight – for example hospitalization for obesity-related illnesses. Obese children with no specific associated morbidity are likely to make greater use of health services due to their subjective perception of poor health, emotional distress or social problems. However, only a few studies document the difference in service consumption between obese children and children with normal weight, either in Israel or abroad.

The review of the literature reveals the need to examine the causes² and health outcomes of obesity and its implications for health service consumption among young children (aged 4-11) in Israel, given the limited information available in the country. It is important to examine whether the links found in other countries are applicable in Israel, in regard to the causes of obesity, morbidity associated with childhood obesity, and use of health services. The answer is not self-evident, given cultural, social and environmental differences between the countries, which are likely to affect the causes of obesity as well as the patterns of morbidity.

Study Goals

The overall goal of the study was to examine the factors causing overweight and obesity and the health consequences and implications regarding health service utilization among young children (aged 4-11) in Israel. Five specific objectives were defined: (1) To identify the risk factors for overweight and obesity associated with parents and family characteristics; (2) To identify risk factors for obesity associated with the child; (3) To identify associated morbidity and psychosocial problems connected to child obesity; (4) To examine the correlation between obesity in children and health-service utilization; (5) To assess the extent of screening to identify morbidity associated with overweight/obesity.

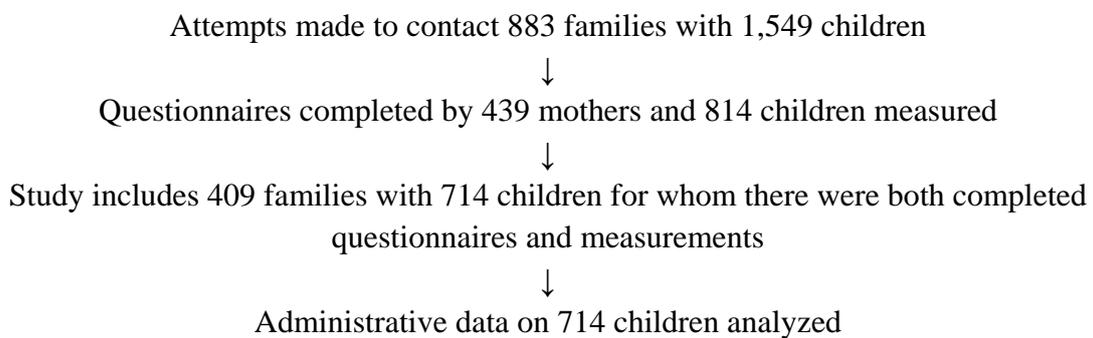
Study Methods

The study population comprised two groups of families with children aged 4-11 registered in Maccabi Healthcare Services: one living in a small town in which the population is mostly

² There are many interlinked reasons for obesity and it is therefore important to examine their combined influence, which has been done in only a few of the studies.

middle class, religious (modern Orthodox), and with relatively large families; the other living in one area in a large city and much more heterogeneous. Altogether, 883 families met the study criteria and the data were collected between November 2007 and September 2009.

The study data were collected from three sources: a self-report questionnaire completed by the mothers; a home visit by interviewers who weighed and measured the children; and the Maccabi Healthcare Services' computerized database of associated morbidity and utilization of health services in 2007-2008. Altogether, 439 questionnaires were completed (50% response rate) and 814 of the 1,549 children (52%) of the study age cohort were measured. The study included 714 children from 409 families, for whom both sources of data were available, i.e., they had been weighed and measured and questionnaires had been completed about them.



Overweight/obesity was defined according to BMI. The children's BMI was calculated according to their height and weight as measured. According to the standard tables, the cut-off points for overweight and obesity were calculated separately for boys and girls and according to age, based on the American CDC categories. The parents' BMI measurement was calculated according to the mothers' self-report questionnaires. The weight categories of the parents were determined by the standard cut-off points: Normal weight: BMI of up to 25; Overweight: 25-29.99; Obesity: 30 and over. Data on morbidity and use of services were collected from the Maccabi computer database, which includes data on all health matters such as diagnoses, hospitalization, lab tests, medications, referrals to consultants. All data can be linked to members using their ID number.

Statistical analysis was carried out separately at family and child levels. At the family level, we looked at factors related to there being at least one overweight or obese child in the family; at the child level we looked at the factors related to the children's weight status. The statistical analysis at family level was conducted using the SPSS program for independent observations. The data analysis at the child level was conducted using STATA for a cluster analysis taking into account the dependency among the observations (several children in the same family).

Main Findings

Risk factors for overweight/obesity: Thirty percent of the families in the study had at least one overweight or obese child. Among the children in the study, 11.9% were overweight and 8.3%,

obese. A multivariate analysis of the mothers' questionnaires revealed that the following variables (at the family level) have a positive independent effect (high risk) on there being at least one overweight or obese child in the family: Father is of Asian/African origin (OR=1.93); father immigrated to Israel after 1995 (OR=2.87); mother's report of having been overweight in the past (OR=1.92); mother's agreement to a great/very great extent with the statement "Sometimes, when I start to eat, I simply can't stop" (OR=1.90); mother's agreement to a great/very great extent with the statement "I don't eat certain foods because they're fattening" (OR=1.94). The following variables were found to have a negative independent effect (low risk) on there being at least one overweight or obese child in the family: Father has a college education (OR=0.50); mother is over 40 (OR=0.57). In addition, a bivariate analysis of the Maccabi databases revealed that the chronic morbidity rate among fathers with an overweight or obese child (16%) was double that in families with no overweight or obese children (7%). The study also examined risk factors for obesity/overweight at the level of the child. A multivariate analysis revealed that the following variables have a positive independent effect (high risk) on a child's being overweight or obese: A high score in the emotional feeding measure (contrary to what was expected, less emotional feeding on the part of the mother) (OR=2.03); a high score in the food diversity measure (not a fussy eater) (OR=2.47); child eats a main meal at daycare center or afternoon enrichment center at least once a week (OR=1.71); child spends more than an hour a day reading or doing homework (OR=1.80). Being in the 7–11 age group had a negative independent effect (low risk) on the child's being overweight/obese (OR=0.49).

Associated morbidity with overweight and obesity at a young age: A bivariate analysis of the data from the Maccabi databases revealed a tendency to greater morbidity among obese and overweight children than children of desirable weight, particularly in the 7-11 age group. Sixty-eight percent of the overweight and obese children had two or more diagnoses, compared with 46% of children of normal weight. Higher morbidity rate differentials were found in areas of morbidity noted in the literature to be associated with child obesity: dermatology, gastroenterology, asthma, orthopedics and psychosocial problems.

Correlation between child obesity and health-service utilization: A bivariate analysis of the data from the Maccabi databases revealed that overweight/obese children consume greater quantities of medications in two of the seven treatment groups examined: medication for coughs and asthma. It was also found that greater use was made of lab tests for children aged 7-11 regarding three types of test (out of the 10 examined), which were conducted to ascertain the possible reasons for the obesity and its complications: liver function, thyroid function and blood lipids. Higher rates were also found in kidney function tests. The correlation between overweight/obesity and service utilization is particularly noticeable in the 7-11 age group. No connection was found between overweight/obesity and the number of visits to physicians in the community, emergency medical stations, emergency rooms, outpatient clinics, day hospitals and full hospitalization.

Extent of screening tests to identify obesity-related morbidity and other problems: Even the diagnosis of overweight/obesity itself is low in children's medical records (only 11%). While higher rates of morbidity and lab tests are recorded among overweight/obese children, it is not possible to know whether these findings indicate the physician's initiative to identify associated morbidity or whether they were conducted in response to symptoms with which the child presented. The absence of recorded diagnoses of hypertension – a not uncommon complication of overweight/obesity with no external symptoms – leads us to suspect that the higher rate of tests conducted for overweight/obese children has more to do with response to symptoms than with the attempts to identify associated morbidity.

Study Limitations

This study has several limitations. First, the study population is not necessarily representative of all families in Israel with children of this age, as it consisted of families from a single health plan in only two communities. While this limits our ability to generalize the findings, it gives us a direction that can be pursued in later studies. Moreover, even though limited to only two communities, the population included families with a range of educational levels and other background characteristics. Second, in a cross sectional study design we cannot determine causality. We can, however, look at associations, which can later be tested in a longitudinal study.

Recommendations and Implications

As reported in the literature, our study found that child obesity is connected to a variety of characteristics at the level of the family and of the child. What distinguishes this study is that it examined the connections among the population of children in Israel and at the same time examined a large number of factors in various fields and identified those with an independent effect on overweight/obesity. The findings noted above indicate family and child-related characteristics that put them in the obesity-risk category. Family-related characteristics include demographic variables (origin, immigration, education, mother's age), mother's history of being overweight, and her eating patterns being characterized by control problems (too much or too little). Other characteristics have to do with the child him/herself: not being a fussy eater and eating a variety of foods, maintaining an inactive leisure-time lifestyle, eating a main meal at daycare or afternoon enrichment center at least once a week. The study findings also show that already from an early age (4-11), being overweight/obese increases the risk of associated morbidity and greater utilization of health services compared to children of normal weight. These findings are similar to findings in other countries.

The study has several important implications: (1) Given the findings about the risk factors for obesity, parents should be given information, particularly those in the groups at risk, about the risk factors and implications of child obesity and must be helped to change behaviors so as to prevent it; (2) Medical staff should be informed about the risk factors and implications of child obesity, in order to improve monitoring of such children so as to prevent or reduce obesity, to identify it in its early stages and to treat it; (3) The documentation of children's BMI data should

be improved and the pro-active monitoring of overweight/obese children's medical condition should be encouraged even when the children do not present symptoms of illness; (4) Finally, a follow-up study is recommended, to examine the findings of the present study among a national representative sample of children in order to improve the possibility of generalizing the findings. It is also recommended that a follow up study be conducted to deepen the understanding of risk factors identified in the current study.

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