

Childhood obesity: current literature, policy and implications for practice

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The problem: In most of the industrialized world, a childhood obesity epidemic is evident, with the numbers rising each year.

Purpose: To discuss the current literature in relation to childhood obesity and to provide health practitioners, especially nurses, with the fundamental knowledge that is imperative in the recognition of children who are at risk and thereby tailor appropriate interventions.

Method: Databases that were accessed for current literature included CINAHL, Science Direct and ProQuest. Keywords used in the search included obesity, childhood, health, relevant national statistics, policy and health risks. The literature was confined to the past 10 years with emphasis on the past 5 years. The 50 most pertinent papers from a variety of countries were chosen, and 35 papers that represented key areas of relevance were selected as the basis of this article. This selection of papers dictated the key areas of discussion such as the acknowledged factors in childhood obesity.

Findings: Although childhood obesity may be related to specific cultural and national circumstances, universal themes emerged from the literature review. These include social factors, exercise, advertising, public policy and the importance of partnerships in policy.

Conclusion: Any country that has a high rate or increasing rate of childhood obesity must acknowledge core factors that contribute to this serious health problem. Furthermore, public policy and community partnerships that include all health professionals have a responsibility in the prevention of childhood obesity. This can be implemented through education, research and advocacy of all nurses involved with children and families.

Keywords: Advocacy, Childhood, Environment, Factors, Obesity, Overweight, Pandemic, Prevention, Public Health, Public Policy

Methodology

The methodology employed for the literature review was a database search of current literature. The databases that were accessed were CINAHL, Science Direct and ProQuest, and they

are specific to health-related literature. Keywords that were used in the search included obesity, childhood, health, relevant national statistics, policy and health risks. The literature was confined to the past 10 years with emphasis on the past 5 years to remain as contemporary as possible. The 50 most pertinent papers from a variety of countries were chosen, and 35 papers that represented key areas of relevance were selected as the basis of this article. This selection of papers dictated the key areas of discussion such as the acknowledged factors in childhood

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Table 1 Literature consulted arranged by category

Diseases associated with childhood obesity
Aye & Levitsky (2003)
Baur (2006)
Cole et al. (2000)
Chronic Disease Notes and Reports (2005)
Ebbelung et al. (2002)
Keinan-Boker et al. (2005)
Lauer et al. (1997)
Lissau et al. (2004)
Medalie et al. (1974)
Strauss (2000)
Zametkin et al. (2004)
Social factors
Broedsgaard (2006)
Christakis & Fowler (2007)
Gibson et al. (2007)
Lindsay et al. (2006)
Martorell et al. (1998)
Zimmet (2006)
Stender et al. (2005)
Factors
Young & Nestle (2002)
Rolls et al. (2000)
Prevalence
Lobstein & Frelut (2003)
McCarthy (2004)
WHO (2005)
Public policy
Lobstein & Baur (2004)
Lobstein et al. (2004)
Nestle (2006)
Whitzman (2006)
Y-net (2005)
Advertising and media
Egberts & Riley (2004)
Halford et al. (2004)
Matheson et al. (2004)
Environment and physical activity
Brownson (2001)
McMurray et al. (2000)
Roberts (2000)
Sallis & Glanz (2006)
Timperio (2004)

obesity. Relevant topics included disease conditions associated with childhood obesity, social factors, other factors, prevalence of childhood obesity, public policy, advertising and media, environment and physical activity. Table 1 at the conclusion of this article summarizes the key areas by content.

A global problem

Establishing a definition for childhood obesity or overweight has been contentious. However, body mass index can be used as an

Table 2 Percentage of overweight/obese children (Lobstein & Frelut 2003; McCarthy 2004; WHO 2005)

Nation	Age (years)	Percentage of overweight/obese children
Hungary	11–14	6
Poland	11–14	18
Australia	6–13	30
New Zealand	6–13	30
USA	6–13	25.5
Israel	6–13	13.9
Ireland	6–13	24.7
France	6–13	11.4
Greece	6–13	28.7

index to identify children at risk for obesity with 25–30% considered to be overweight and results greater than 30% deemed to be obese (Cole et al. 2000).

Worldwide estimates currently identify 18 000 000 overweight children (Ebbelung et al. 2002), reaching crisis proportions in Europe. Approximately 10–30% of European children between the ages of 7 and 11 years and 25% of adolescents are overweight or obese (Lobstein & Frelut 2003).

Of particular concern is the upward trend in countries that have traditionally experienced low rates of overweight (Lissau et al. 2004). Table 2 indicates the extent of overweight or obesity in children in a number of countries between the ages of 6 and 13 years. For countries in Eastern Europe, rates are climbing substantially. Hungary has reported that 20% of children between the ages of 11 and 14 years are obese and that 6% of these children have already presented with hypertension (World Health Organization, WHO 2005), while in Poland rates have increased from 8% to 18% from 1994 to 2000. Generally, European data indicate that children from Mediterranean countries have a higher prevalence for overweight than northern Europe where rates tend to be within the 10–20% range.

In the Middle East, the situation is critical. Eighteen per cent of all children are overweight and 7% obese (Lobstein & Frelut 2003). In Israel, the rate of 13.9% is on the rise and recently, Israel has climbed to third place after the USA and Greece for percentages of overweight children in general (Keinan-Boker et al. 2005).

In the Oceania region, Australia's current rates in children are among the highest in the developed world with 10% of children obese and 20% overweight (Barnett 2006). In New Zealand, 20% of children between the ages of 5 and 14 years are overweight with another 10% obese. Approximately, 31% of Maori and Pacific Islander children are affected (Baur 2006).

In North America, results from the years 1999–2002 National Health and Nutrition Examination Survey (NHANES) in the USA indicate that an estimated 16% of children and adolescents aged 6–19 years are overweight. This data represent an increase of 45% from previous studies among 1988–1994 (National Center for Health Statistics, United States Department of Health and Human Services). Both in the USA and in Brazil, an additional 0.5% of all children became overweight each year (Lobstein et al. 2004). Mexico is poised to overtake the USA in obesity rates in the near future and is 1.5 times more common in Mexican American women, (<http://www.4woman.gov/minority/hispanicamerican>). The values exceeded the 75th percentile for Mexican Americans (Martorell et al. 1998).

Despite the obvious paradox of food shortages and obesity, WHO findings indicate that 14.9% of children under the age of five in Swaziland are overweight (WHO 2005). Consequently, the obesity problem can be seen as a worldwide threat to health. Therefore, nurses must be aware of the factors and consequences associated with this trend. They must also appreciate the significant national and regional differences.

Factors

Ethnicity

Multiple factors are associated with the development of childhood obesity including ethnic origin and socio-economic groups; however, these vary from country to country. Australian studies have identified children whose families come from homes of either European or Middle Eastern background to be more likely to become obese. Furthermore, children from lower socio-economic status are more likely to develop obesity as well (Gliksman et al. 1990). In the USA, African American families were identified as the highest risk group for developing obesity in childhood and adulthood (Anderson & Butcher 2006).

While data in Israel for children do not exist, the findings for adults are suggestive of a pattern that is likely to develop in children when considering the importance of parental behaviour as a role model for children (Keinan-Boker et al. 2005).

Indeed, certain ethnic groups have associated being overweight with good health (Stender et al. 2005). Clearly, the cultural variation may differ from country to country and needs to be determined by specific research that is culturally sensitive but can provide important specific information with regard to ethnic groups that are at risk.

Social factors

A recent study of social networks found that the chance of becoming obese increased by 57% if a friend was obese or sibling (Christakis & Fowler 2007). While this study was limited to

adults, the implications may be significant for children as well, if similar findings in future studies are parallel.

The role of family provides another significant risk factor. In a recent Australian study of 329 children between the ages of 6–13 years, childhood obesity was not necessarily linked to negative life events, poor family function or maternal depression. However, the structure of the single parent family with the mother as the single parent who is overweight increased the likelihood of a child becoming overweight or obese (Gibson et al. 2007). Consequently, these findings may carry implications for many other countries with regard to single parent families, in particular, if the mother is overweight. Learned behaviours are fostered through role modelling by parents; if parents overeat, then children are likely to do so. Furthermore, children with one or two obese parents are respectively either 40% or 80% more likely to develop obesity (Broedsgaard 2006).

Exercise and energy expenditure

Decreased energy expenditure coupled with increased caloric intake remains a significant factor. The explosion of affordable technology such as cell phones, handheld computer games and so on has promoted a sedentary lifestyle for contemporary children (McMurray et al. 2000). The issue of the sedentary lifestyle constitutes an important environmental factor on children's physical activity levels.

Exercise is important for children to help maintain appropriate metabolic rate, improve overall psychological outlook and may be an aid in controlling appetite (Roberts 2000). Safety of the built environment including safe places for activity is a clear link to children's physical activity levels. Children are aware of the places in which activity is encouraged and where it is discouraged or prohibited (Sallis & Glanz 2006). The ability to be outdoors was found to be the strongest correlate with physical activity in children. There are also suggestions that lower income neighbourhoods in the USA have fewer parks, fitness clubs and sports fields than more affluent neighbourhoods, thereby linking socio-economic factors with low physical activity (Brownson 2001). This may be equally so in other countries. Heavy traffic and the need to cross roads have been demonstrated to lead to a decreased physical activity rate (Timperio 2004). Without safe places to play, children are likely to spend their time being inactive; therefore, promotion of a safe environment can encourage more physical activity in children.

Food portions and parental knowledge

Along with the decrease in exercise and increase in nutrient intake, food portion size has increased for a number of years. Young & Nestle (2002) found that many fast food outlets now exceed recommended sizes. Other studies indicate that the more

people are offered to eat, the more they are likely to eat. Evidence suggests that expecting larger portion sizes and consuming them may be a learned behaviour. In a study by Rolls et al. (2000), younger children up to the age of 5 years did not increase the amount of food ingested when offered larger portions.

A lack of parental knowledge concerning the nutritional value of various products or the inability to correctly decipher packaging label contents may contribute to inappropriate food choices. Many parents believe that juice is a healthy fluid option for children and offer juice rather than soft drinks; however, children who drank more than 12 ounces of juice per day were found to be at higher risk for the development of overweight than their peers who did not drink juice (Lindsay et al. 2006). Thus, one can conclude that drinking juice may well encourage children to develop a preference for sweetened drinks and may become a lifetime habit.

Fast food advertising on television targets children with visual and auditory messages that encourage the consumption of fast food that is primarily high in fat and sugar. Many of these food items do not meet recommended dietary intake. A number of children snack on food that is also high in fat and sugar while watching television (Matheson et al. 2004). A disturbing trend that has been noted is that children tend to eat more such food items after being exposed to television advertising (Halford et al. 2004). Thus, advertising must be considered as an environmental factor that promotes childhood obesity (Egberts & Riley 2004).

In summary, the import of the media factor not only promotes consumption of poor food choices but also is compounded by the sedentary lifestyle, which encourages viewing of such advertisements.

Health issues

Multiple health risks are associated with overweight and obesity that are specific for children. While cardiovascular disease continues to be the major cause of death in adults, atherosclerotic plaque has been observed in children as young as 3 years of age (Stender et al. 2005). Equally troubling is the increase of insulin resistance and type 2 diabetes in children. Previously considered an adult disease, there has been a dramatic increase in its development in children, with overweight closely linked as the cause. The research on its relationship to overweight children is relatively new but has been clearly documented (Lauer et al. 1997).

High rates of hypertension, asthma, musculoskeletal discomfort because of excess weight on joints, shortness of breath and obstructive sleep apnoea have all been documented in overweight children (Waters & Baur 2003). Persistent childhood overweight not only affects musculoskeletal function, but is likely to alter mobility, contribute to muscle and bone disorders and

affect normal growth and development patterns (Aye & Levitsky 2003).

Additional health problems associated with obesity include a number of cancers. These include breast cancer, colon cancer and kidney cancer (Chronic Disease Notes and Reports 2005). Furthermore, until recently, the most common cause of cirrhosis of the liver was alcohol; this has now been overtaken by obesity as a direct result of the liver overloaded with fat. This will lead to a new health crisis of cirrhosis as a direct result of the obesity pandemic (Zimmet 2006).

Mental and social health issues

Psychologically, obese children have been found to have lower self-esteem and are more likely to indulge in risk-taking behaviours such as smoking and drinking (Strauss 2000). A second psychological consequence for children is the perception of social discrimination that not only adds to lower self-esteem but may also result in depression. Obese children have a more negative body image than their peers and often believe that they have been responsible for their obesity. Adults have been found to stigmatize obese children citing that they are untidy and lack self-control (Zametkin et al. 2004).

The longer-term implications are that overweight and obese children are more likely to have poorer outcomes in both academic and social attainment and may be at higher risk for mental health problems. Therefore, the health of children including physical, mental and social well-being is likely to be profoundly affected by overweight and obesity.

Public policy for treating childhood obesity

Currently, the results in obesity prevention among children worldwide have been disappointing. The fact that a large number of children still suffer from obesity and overweight stands as a harsh testimony to the failure to prevent the current health crisis. Therefore, public policy should be modified in order to acknowledge that treatment generally has poor results for children already suffering from obesity. Public policy should be directed towards changing eating habits to lead to better health and obesity prevention (Drohan 2002; Zabinski et al. 2003).

There is no viable treatment option for childhood obesity; consequently, the best option currently available to address this problem remains prevention. This is substantiated by a lack of evidence-based interventions that have achieved success. It follows that prevention and intervention must be currently based on expert opinions (Lobstein & Baur 2004). Considering the scope of the childhood obesity crisis, it also follows that broad-based policy must be directed at the community level and include institutions that are directly associated with children.

Public policy goals should aim to ensure that obesity is addressed by policymakers across all systems and throughout all levels of government, in order to create a supportive atmosphere in tackling this important issue and raising community awareness. Healthy public policy that promotes prevention helps all citizens to identify and choose behaviours related to this health problem and can help prevent obesity. Governments can support policies that reinforce healthy eating and physical activity, but they must also be communicated by healthcare workers and parents. The ultimate goal must be to provide a shift in lifestyle behaviours.

Supportive environments

In order to implement this principle, several actions should be taken. First, the policymakers within the health system, local authorities, stakeholders within the educational framework and volunteer organizations, who are interested in the recognition of the childhood obesity damage and prevention, need to be influenced to deal with the health aspects of the obesity phenomenon. There needs to be an examination of the consciousnesses of each action, financial investment, resource allocation and further actions of social nature. The previously cited organizations' representatives should be involved in the work of strategic committees dealing with children's health in general, and childhood obesity, in particular. Political and public lobbying should be encouraged to promote the issue of childhood obesity prevention.

Supportive environments are those that enable a healthy lifestyle to be attained. Supportive environments are guaranteed by enacting and enforcing safety regulations by banning advertisements through legislation, limiting advertisement of high-fat, high-salt and high-sugar food products and so on. A periodical and systematic evaluation of the environmental and social changes and their influence on health that guarantees actions for the public is essential. In Israel, the Ministry of Health cooperates with the Manufactures Association, and the Food Industries Association, and is working to reduce the salt and fat quantities in food products being marketed. In January 2006, two members of the 'Knesset', the Israeli parliament, proposed a new law banning the advertisement of unhealthy food products, before prime time. The proposal was formulated in recognition of the government responsibility to the public and as part of the parliamentary struggle against childhood obesity in Israel. This proposal seeks to reform the consumers' protection law (food commercials aimed at children), which specifies the general guidelines that advertisements for children should be made only with consideration of the responsibility that is imperative. According to this proposal, responsibility in advertisement is divided in to two main aspects. The first is the provision of

accurate information. The advertiser is obligated to inform the public of the risks and nutritious facts of the advertised products. The second aspect limits product advertisement, including the importance of the time of the day and the incorporation of celebrities and animated figures in the advertisements.

Advertising and the media

In order to maintain fairness in the limitations imposed on advertisements, the proposal sought a professionally balanced public committee to decide which products the legislation should include. Committee members are to include relevant government representatives, public representatives, representatives of the consumers' council and public health specialists in the field of children's nutrition, child psychologists and an academic researcher in the field. In order to maintain the above-mentioned balance, representatives of the industrial association were included (Y-net 2005). Such a broad coalition approach may be suitable in other countries.

Comprehensive research conducted recently in England supports such legislation and found that advertisement of food products directly influences the consumer behaviours of children and their food preferences. Considering the risk factor in the exposure of children to television commercials and consumption of nutrition-poor snacks that children watch commercials directly aimed at them for 22 min per day, a similar approach would be suitable as a beginning preventative measure. Another study conducted by Tamir et al. (2003) examined the media's influence on health habits. It was found that 20% of adolescents' knowledge on healthy eating habits has risen as a result of viewing health programmes. Children who watched these health programmes could point out that one should consume fewer multi-glucose products and the importance of choosing healthier options.

More controversial has been the call for measures to control marketing to children. Sweden has banned the use of cartoons to promote food to children. Similar bans in the Netherlands make it illegal to market sweets to children younger than 12 years. Other bans that have yet to be introduced may address celebrity endorsements, false health claims on packaging and marketing in schools (Nestle 2006). Additional bans are most likely to come about if there is a coalition of parents and healthcare workers demanding that governments take action.

An interesting phenomenon regarding advertising has emerged on Australian television during the hours that are considered 'children's viewing'. While the number of high-fat food advertisement has decreased, the characters or logos associated with such companies appear in advertisements related to pool and road safety. Children readily identify with these characters

and logos, and a covert message is apparent to children whether or not the high-fat food is being advertised.

Community activity

An important part for activating plans of care and prevention of obesity is community activity and collaboration with the community. The Israeli Minister of Health can direct its different bureaus to receive information on the statistics of obesity. This same principle applies to any other government that clearly takes the problem of childhood obesity seriously and chooses to work with consumers and the community. Community resources can be then used to develop plans for the prevention of childhood obesity, according to available local data including explicit cultural risk factors.

Public plans should help regulate the energy consumed and spent. Such plans should encourage the public to expend more nutrition energy and to limit consumption of high-fat, salt and sugar nutrition energy. The course of action from the government perspective should be addressed at the family level and should not limit itself to the individual. Considering the risk factor of one or both parents being obese and that children generally do not prepare meals and cannot physically reach locations in which they can take part in physical activities, the family approach is fundamental (Schwimmer et al. 2003).

Worldwide urban planning must encourage walking to school, shops, friends' homes. Children have increasingly been prevented from doing so by parental fears for their safety. While parents must exercise a degree of caution for their children in navigating streets, the risk is that inactive children may become inactive adults (Whitzman 2006). This may lead to a vicious cycle of more children being driven, to more vehicles crowding the road and thereby, validating parental fears. Urban planning for health and well-being must consider better footpaths and shorter distances to schools, shops and open spaces such as parks. Therefore, governments, both national and local, must work together to change policies to create more 'livable' neighbourhoods that enable healthier lifestyles and foster more exercise within the course of the day. Local grants may encourage individual communities to address some of these issues while further research can evaluate improved health outcomes where they are undertaken.

Tackling childhood obesity must become a national health priority. Strategies that are employed must reach all children and families. Nurses and midwives therefore can contribute to the dialogue and policy development relevant to preventing childhood obesity. They can be effective at the local level such as schools, childcare centres, prenatal classes and small communities as well as municipal institutions. Likewise, nurses and midwives must be part of the policymaking process at the national

level. Fundamentally, there is both collective and personal responsibility that underscores the approaches to the prevention of childhood obesity, and nurses have a role to play in the collective and personal responses at the community level. Nurses can be involved in programme development, delivery, research and act as role models for their communities.

Clinical and research implications

Eating habits are acquired in early childhood and embedded by adolescence; therefore it is imperative that educational programmes for nutrition begin with antenatal care. Midwives can provide health education to expectant parents that encourage the development of healthy eating habits even before birth. This focus on sound nutrition and exercise can be further fostered in childcare centres, schools and kindergartens by early childhood nurses and school nurses. Nurses can work with teachers to develop programmes that are developmentally appropriate and experience-based. School and community nurses can work with parents and children and can advocate to ensure that healthier food is served in school cafeterias. They can help create new opportunities to get to know and make healthy food as part of nutrition education classes, and encourage 'health days' at school. Raising student awareness of the importance of breakfast and its recommended ingredients should be part of such programmes. A creative way in raising awareness could include preparing and serving a healthy and balanced breakfast in early morning classes. Nurses can integrate technology into such programmes by adding useful information onto school websites, podcasts and newsletters for children and parents.

Midwives and early childhood nurses must actively engage with mothers while children are infants. Mothers should be encouraged to breastfeed so that infants learn their satiation point and self-regulate their eating; this may be critical to preventing obesity in childhood. Furthermore, midwives and early childhood nurses are well placed to discuss healthy nutrition with new mothers, assess their knowledge and help them to make confident and informed choices for their children. Research must be undertaken and acknowledge the significant factors of culture on eating habits. Thus, nurses and midwives must apply principles of cultural safety in any programme they initiate.

Influencing children to adopt better eating habits will help them in their development and growth and will help prevent future problems. It should be noted that such programmes should not try and choose specific foods, but should enable a more general understanding among parents, children and adolescents, consider cultural variations and empower them to make healthier choices with confidence.

Consequently, it is imperative to include the assistance of skilled professionals, such as dietitians, nurses, medical doctors

and other consultants who have particular expertise in children's health as well as students and parents, in implementing educational programmes. Nursing curriculum, then, should include the fundamental issues, factors and implications of childhood obesity to help prepare future clinicians for practice.

Nurses must address another significant aspect of the problem of overweight and obesity in children and encourage more physical activity. Research conducted in Brock University (Ontario, Canada) has found that overweight children who do not engage in physical activity, are much sicker, and therefore, tend to miss more days at schools. Physical activity should be practised to complement sound nutrition, as weight loss essentially consists of eating less and exercising more (Ebbelung et al. 2002). Caution should be exercised in all of these areas to avoid inadvertently creating an erroneous obsession about weight, dieting or body image in children, lest it encourage equally harmful behaviours such as bulimia. Rather, the focus should avoid the terms 'lose weight' or dieting and seek to encourage children and families to achieve the healthiest state possible. Thus, care provider activities should strive to develop more sports activities in community centres, safe bicycle riding lanes, decrease costs associated with sports participation, health workshops and more national sports events that reward participation. School sports in particular should aim towards encouraging all children to take part, to spend the lesson time being active rather than taking turns.

Thus, nurses and midwives should continue to work with children, families and parents on individual levels, but can also apply the principles of healthy eating and exercise to communities such as schools. The provision of education is insufficient to ensure change and therefore, clinicians should serve as role models for clients to encourage a change in attitude and ultimately, practices. Thus, each clinician must examine personal habits that may require change or adjustment. Finally, clinicians can serve as lobbyists and encourage their communities to apply for grants to support health programmes, and provide input to legislators on local and national government level in terms of media, urban planning for safe exercise areas and assist in media releases in material that relates to childhood obesity prevention.

Conclusion

The alarming worldwide trend of childhood obesity is a cause for deep concern to all health professionals engaged in working with children. While there are cultural variations in the factors that are associated with children becoming overweight or obese, many are similar in a variety of countries. Because treatment has not been proven to be effective for the most part, it follows that nurses, along with all health professionals, have a stake in the prevention of childhood obesity. Ongoing research and a com-

prehensive understanding of causes, factors and the many issues associated with the current obesity pandemic best achieve this. It also follows that nurses should serve as advocates, educators and supporters for children and their families and take part in the development of health policies and their implementation in order to address the greatest threat to child health in this century.

Healthy eating and exercise must become part of an overall lifestyle pattern from an early age. Midwives can prioritize this important aspect of obesity prevention in antenatal classes, follow-up home visits with new mothers and post-partum checks. In early childhood, nurses can work within childcare settings to encourage healthy eating and exercise patterns for children. They may also work with staff and parents to develop policy concerning snacks at childcare and recommendations for birthday parties. They may also influence parents and childcare workers to become positive role models for children. Such health education can be conducted within the childcare setting for the children at a developmentally appropriate level. Further information can be disseminated to parents and staff through leaflets and websites. A chat room or blog could be established where questions could be posted for the nurse to respond to all the parents who access the information by computer. Thus, the information can be widely accessed at a time convenient to parents. The same principle can be applied to school settings in at a more sophisticated level. Nurses can work with staff to ensure that nutritious and appetizing food and beverages are available to children at school and encourage healthy practices. The message should be reinforced in sports lessons so that lessons are designed for all children to be active rather than activities where they take turns and may sit for a great deal of the lesson. Nurses must work in partnership with parents and educational staff to lobby local government for assistance, reward positive behaviours and changes within educational settings. Finally, all nurses and midwives as well as other health professionals must serve as positive role models for the communities they serve.

Author contributions

All three authors have contributed to this article; our work was divided into different sectors of the literature review. Several sections of the preparatory writing were completed by each member of the team; however, final drafts were completed together.

References

- Anderson, P.M. & Butcher, K.F. (2006) Childhood obesity: trends and potential causes. *The Future of Children*, **16** (1), 19–45.
- Aye, T. & Levitsky, L. (2003) Type 2 diabetes: an epidemic disease in childhood. *Current Opinion in Pediatrics*, **15**, 411–415.

- Barnett, A.H. (2006) How well do rapid-acting insulins work in obese individuals? *Diabetes, Obesity and Metabolism*, **8** (4), 388–395.
- Baur, L. (2006) The millennium disease. In *The Millennium Disease* (Barnett, G., ed.). Australian Parliament House, Launceston, pp. 4–6.
- Broedsgaard, A. (2006) 'Obese mothers' experiences and assessments of their own obesity and their children's risk of developing overweight – a qualitative phenomenological study. Presented at Western European Nurses' Research Meeting, Copenhagen, October 12, 2006.
- Brownson, R. (2001) Environmental and policy determinants of physical activity in the U.S. *American Journal of Public Health*, **91**, 1995–2003.
- Christakis, N. & Fowler, J. (2007) The spread of obesity in a large social network over 32 years. *The New England Journal of Medicine*, **357** (4), 370–379.
- Chronic Disease Notes and Reports (2005) Centers for disease control and Prevention. **17** (2), 43–45.
- Cole, T., Bellizzi, M., Flegal, K. & Dietz, W. (2000) Establishing a standard definition for child overweight and obesity worldwide: international survey. *British Medical Journal*, **320**, 1–6.
- Drohan, S.H. (2002) Managing early childhood obesity in the primary care setting: a behavior modification approach. *Pediatric Nursing*, **28** (6), 599–610.
- Ebbelung, C.B., Pawlak, D.B. & Ludwig, D.D. (2002) Childhood obesity: public health crisis, common sense curve. *The Lancet*, **360** (10), 473–482.
- Egberts, K. & Riley, M. (2004) Food advertisements during children's and adult's viewing times: a comparative study. *Asia Pacific Journal of Clinical Nutrition*, **13**, 60–62.
- Gibson, L., et al. (2007) The role of family and maternal factors in childhood obesity. *Medical Journal of Australia*, **186** (11), 591–595.
- Gliksman, M.D., Dwyer, T. & Wlodarczyk, J. (1990) Differences in modifiable cardiovascular disease risk factors in Australian schoolchildren: the results of a nationwide survey. *Preventive Medicine*, **19** (3), 291–304.
- Halford, J., et al. (2004) Effect of television advertisements for food consumption in children. *Appetite*, **42** (2), 221–225.
- Keinan-Boker, L., et al. (2005) Overweight and obesity prevalence in Israel: findings of the First National Health and Nutrition Survey (MABAR)'. *Israel Medical Association Journal*, **7**, 219–223.
- Lauer, R.M., Clarke, W.R. & Burns, T.L. (1997) Obesity in childhood: the Muscatine Study. *Acta Paediatrica*, **38** (6), 432–437.
- Lindsay, A., Sussner, K., Kim, J. & Gortmaker, S. (2006) The role of parents in preventing childhood obesity. *The Future of children*, **16** (1), 169–186.
- Lissau, I., et al. (2004) Body mass index and overweight in adolescents in 13 European countries, Israel and USA. *Archives of Pediatrics and Adolescent Medicine*, **158** (1), 29–40.
- Lobstein, T. & Baur, L. (2004) Policies to prevent childhood obesity in the European Union. *European Journal of Public Health*, **15** (6), 576–579.
- Lobstein, T. & Frelut, M. (2003) Prevalence of overweight among children in Europe. *Obesity Review*, **4**, 195–200.
- Lobstein, T., Baur, L. & Uauy, R. (2004) Obesity in children and young people: a crisis in public health. *Obesity Reviews*, **5** (Suppl. 1), 4–85.
- McCarthy, M. (2004) Curbing the obesity epidemic. *The Lancet*, **367**, 1549.
- McMurray, R., Hurrell, J. & Deng, S. (2000) The influence of physical activity, socioeconomic status, and ethnicity on the weight status of adolescents. *Obesity Research*, **8**, 130–139.
- Martorell, R., Kettel Khan, L., Hughes, M. & Grummer-Strawn, L. (1998) Obesity in Latin American women and children. *The Journal of Nutrition*, **128** (9), 1464–1473.
- Matheson, D., et al. (2004) Children's food consumption during television viewing. *American Journal of Clinical Nutrition*, **79** (6), 1088–1094.
- Medalie, J.H., Papier, C. & Herman, J.B. (1974) Diabetes mellitus among 10 000 adult men A five year incidence and associated variables. *Israel Journal of Medical Science*, **10**, 681–697.
- Nestle, M. (2006) Food marketing and childhood obesity – A matter of policy. *The New England Journal of Medicine*, **354** (24), 2527–2529.
- Roberts, S. (2000) The role of physical activity in the prevention and treatment of childhood obesity. *Pediatric Nursing*, **26** (1), 33–41.
- Rolls, B., Engell, D. & Birch, L. (2000) Serving portion size influences 5-year-old but not 3-year-old children's food intakes. *Journal of the American Dietetic Association*, **100** (2), 232–234.
- Sallis, J. & Glanz, K. (2006) The role of built environments in physical activity, eating and obesity in childhood. *The Future of Children*, **16** (1), 89–108.
- Schwimmer, J.B., Burwinkle, T.M. & Varni, J.W. (2003) Health-related quality of life of severely obese children and adolescents. *Journal of the American Medical Association*, **289**, 1813–1819.
- Stender, S., Burghen, G. & Mallare, J. (2005) The role of health care providers in the prevention of overweight and type 2 diabetes in children and adolescents. *Diabetes Spectrum*, **18**, 240–245.
- Strauss, R. (2000) Childhood obesity and self-esteem. *Pediatrics*, **105** (1), 15–16.
- Tamir, D., et al. (2003) Television entertainment and health education for children in Israel. *Health Education*, **103** (4), 245–253.
- Timperio, A. (2004) Perceptions about the local neighborhood and walking and cycling among children. *Preventive Medicine*, **38**, 39–47.
- Waters, E. & Baur, L. (2003) Childhood obesity: modernity's scourge. *Medical Journal of Australia*, **178** (9), 422–423.
- WHO (2005) Fact sheet Copenhagen 2005, the challenge of obesity in the WHO European Region. 3.
- Whitzman, C. (2006) Planning for health and wellbeing, obesity: an Australian perspective. In *The Millennium Disease* (Barnett, G., ed.). Australian Parliament House, Launceston, pp. 32–33.
- Y-net (2005) *Proposal for a Law against Fat Food Advertising before 21:00*. Available at: <http://www.ynet.co.il/articles/0,7340,L-3043595,00.html> (accessed 25 March 2005).
- Young, L. & Nestle, M. (2002) The contribution of expanding portion sizes to the U.S. obesity epidemic. *American Journal of Public Health*, **92**, 246–249.
- Zabinski, M.F., et al. (2003) Overweight children's barriers to and support for physical activity. *Obesity Research*, **11**, 238–246.
- Zametkin, A., Zoon, C., Klein, H. & Munson, S. (2004) Psychiatric aspects of child and adolescent obesity: a review of the past 10 years. *Journal of the American Academy of Child and Adolescent Psychiatry*, **43** (2), 134–150.
- Zimmet, P. (2006) Obesity: an Australian perspective. In *The Millennium Disease* (Barnett, G., ed.). Australian Parliament House, Launceston, pp. 7–11.