

## **Application of the Epidemiological Model: Community-based Interventions for the Management of Obesity in Children and Young Adults**

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### **Abstract**

*Healthy People 2010* identifies that one of the ten leading health indicators representative of the relative state of health of Americans is overweight and obesity ([www.healthypeople.gov](http://www.healthypeople.gov)). The Institute for Medicine (IOM, 2005) has identified obesity in children and young adults as having reached epidemic proportions in the United States. This problem is noted nationally throughout the United States and is evidenced on individual state (i.e. Virginia), regional (i.e. the Hampton Roads area of Virginia) and local levels (i.e. Norfolk and Virginia Beach). The epidemic proportions of the obesity in children and young adults require interventions beyond that of the traditional one-to-one intervention format. A community focused intervention strategy must be employed to target aggregate level health promotion. This community-based format supports approaches aimed at intervention at points in the natural history of obesity in the prepathogenic stages; this primary prevention can be planned and implemented with focus on modification of agent, host or environmental factors that are significant in the presence of obesity in children and young adults in a particular community. Obesity prevention strategies such as nutritional intervention following an epidemiologic model can be implemented on the local and regional levels to address the health problems related to obesity. Integration of the epidemiologic model within community-based programs provides the format for focusing on the obesity epidemic. Selected exemplars will be presented to illustrate these approaches.

### **Introduction**

Obesity has been transformed from being considered the result of an individual's lack of self-control to being identified as a dilemma in relation to global wellbeing. A dilemma in which obesity serves as the source of a myriad of health concerns (Eberwine 2002 ). Specifically, obesity is identified as an epidemic in the United States (Dietz and Gortmaker 2001) and concern is mounting in other countries and cultures (Haslan and James 2005). The concomitant health risks and costs associated with obesity are a major focus of health promotion and wellness agendas.

Obesity may be defined in terms of Body Mass Index (BMI)  $\geq 95^{\text{th}}$  percentile (Dietz and Gortmaker 2001), and although this is a valid definition, it excludes the complexity of obesity as a bio-psycho-social disease process. Obesity, as a physical, social and environmental disease is a prime example of the holistic nature of an illness process. The three key determinants of the

expression of obesity are genetic predisposition, dietary intake, and energy expenditure. Obesity has become a significant public health problem (Haslan and James 2005). Results of the 1980 National Health Examination II and the 1994 National Health Examination Survey III support the determination that while the genetic base of the population did not substantially change over that period of time, the environmental variables of calorie intake and energy expenditure accounted for the 100% increase in number of children and adolescents determined to be obese. This increase correlates with an accounting of 10-15% of children and adolescents in the United States as being obese (Dietz and Gortmaker 2001).

A component of the obesity epidemic which is of particular concern is the rise in obesity rates among children and adolescents (Mercer 2005). The physical costs alone of obesity are well known and evident in the medical community. Complications of adult obesity include cardiovascular disease, stroke, diabetes and hypertension (Ignatavicius and Workman 2006). In accordance with the explosion in childhood obesity, it is projected that the expression of these obesity-related health outcomes will be evidenced by an earlier onset and perhaps an accelerated severity. In addition to the physical consequences of childhood obesity, psychosocial and economic consequences abound. Such consequences include discrimination, prejudice, discontentment with body-image, and poor self-esteem (Loke 2002). Each of these outcomes will have an immeasurable impact on global health and health care systems. Obesity prevention is paramount, with early and effective interventions for obesity management a close second.

### **Application to Nursing**

Integrating nursing, wellness, and nutrition is central to designing effective interventions to combat obesity. Our universe, our world and humankind are manifestations of seemingly infinite relationships and interactions. Chemistry, physics, and mathematics are acknowledged

as the scientific foundation for these interactions. The social sciences, such as psychology and sociology, exert an incalculable effect upon the expression of the physical sciences within the realm of humanity. Nursing integrates the physical and social sciences. In addition to the laws and principles of pure science, social sciences such as sociology, psychology, economics and political science are identified by nursing as also being essential dynamic components of a whole being. The integration of the physical and social sciences is the basis for the practice of Nursing. The discipline of Nursing is focused on the wellness of individuals, families, groups and communities as expressed within and between their internal and external environments. Nursing identifies the concept of Holism as the integration of the physical and social sciences resulting in the wellness of the individual. Further, nursing incorporates the constructs of family, groups, and community within the overriding concept of the individual. Given this holistic perspective, the fusion of wellness, nutrition, obesity and epidemic is a manifestation of the intricacy of such relationships and interactions (Craven and Hirnle 2003) .

Because of this holistic approach, the practice of Nursing is ideally suited to address the obesity epidemic. Nursing roles such as manager of care, educator, and advocate, in alignment with the perspective of lifespan wellness, provide practical bases for designing and implementing strategies to address the obesity epidemic among children and adolescents. Commensurate with the nature of Nursing, such strategies could address the needs of individuals, families, groups and communities, thus revealing Nursing an indispensable contributor in combating the childhood and adolescent obesity epidemic.

Nursing has an established position in the community and in the provision of primary care. Indeed, nursing practice has a renewed focus on health promotion within community settings as evidenced by wellness centers, parish nursing, school-sponsored health promotion

programs and church-affiliated health ministries (Craven and Hirnle 2003, Ignatavicius and Workman 2006). For example, Nursing is excellently positioned to facilitate programs developed and offered through school systems, industry, and community service organizations.

The self-esteem, body-image, and social interaction problems associated with childhood obesity are well within the purview of Nursing. Lifestyle and nutritional assessment and instruction are likewise well within the purview of Nursing. The physical, social, and emotional consequences of obesity have long been in the forefront of Holistic nursing practice. Nursing well recognizes the human costs that will be encountered if childhood and adolescent obesity progresses unabated. Nursing will be addressing the ruinous associated health consequences.

The advent of Type 2 Diabetes Mellitus in children and adolescents (Loke 2002, American Obesity Association) is a growing concern to Nursing. Type 2 Diabetes Mellitus in the adult population continues to be a focal point for nursing practice. However, there is emergent concern for the future wellbeing of obese children, the risks for developing Type 2 Diabetes Mellitus, and the potential onset of major complications at an earlier age.

### **Application of the Epidemiology Model**

Determination and implementation of effective interventions to combat obesity must be of a multi-factorial nature. Unfortunately, the resolution of the obesity epidemic is a complex process when one views the causative patterns of the disease of obesity. The use of an epidemiologic approach to the prevention of obesity and early recognition and/or prompt treatment of obesity is beneficial for numerous reasons. The epidemiological perspective allows the care provider to examine health outcomes, in this case obesity, using scientific method. Additionally, the determinants of health events influencing obesity such as causative agent

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exposures (ie excess calorie food availability), host behaviors (ie individual decisions not to exercise or to over-eat), host characteristics (ie age, developmental level, lifestyle factors) and the environmental context (ie lack of social support, access to health care service) can be analyzed using the model. (Stanhope and Lancaster, 2004)

Prevention of obesity, utilizing an epidemiologic point of view, uses knowledge that disease does not result when the elemental factors constituting the epidemiologic triangle (agent, host, environment) are in equilibrium. The adolescent who is not obese is experiencing a balance in calorie consumption and calorie expenditure (the causative agent) while appropriately choosing age-related exercise (a host factor) who is living in a home where familial social support (the environment) is present. Obviously, obesity is a complex disease; the clinician can observe that obesity is caused by the result of the interactions of complex, interrelated factors and cannot be related to a single causative factor. When there are changes in only one of the elements of the epidemiologic triangle there can be increased risk of the individual's experience of the disease of obesity. Children with normal weights who have maintained balanced caloric intake and expenditures as they make appropriate dietary decisions are susceptible to weight gain and potential obesity when their lives at home suddenly becomes stressful; the only element in the epidemiologic triangle to be altered in this instance is the environment—yet affected children become obese.

Prevention of obesity is preferred in all instances. Primary prevention, when susceptible individuals are not obese, involves strategies and actions designed to prevent obesity and related pathological changes. Nutrition education, health education and dietary counseling are primary prevention strategies intended alter risk/susceptibility so that the balance of the epidemiologic triangle is sustained. When persons begin to experience the pathological changes associated with

obesity, the health care provider must intervene at the secondary level of prevention. Secondary prevention focuses on early diagnosis and intervention for affected individuals. Through secondary prevention, obese individuals experience intervention when their medical condition is diagnosed at a stage when they are able to receive treatment early in the pathologic process; this early and prompt treatment supports optimal opportunities for return to non-obese health state. Health screening and periodic examinations are critical components of secondary prevention. Children need regular monitoring of such indicators as blood pressure, height and weight, body mass index, plasma glucose levels, funduscopic examinations and peripheral nerve sensation evaluation. Tertiary prevention, the third level of prevention, addresses interventions that limit disabilities associated with obesity and rehabilitation of diseases and injuries associated with obesity such as hypertension, hyperlipidemia, bone/joint difficulties, hyperinsulinemia, peripheral vascular disease, cardiovascular disease or diabetes. (Ho, Pacaud and Leung 2006)

### **Examples of Community-based Regional Interventions**

As in other regions, effective interventions to prevent or manage obesity, especially among children and adolescents, seems to be lagging behind desired outcomes. The obesity epidemic is real and it has an unyielding grip on the “victims”. The reasons for the epidemic remain entrenched in our social systems: food is comfort, food is affordable, food is abundantly available, food is abundantly portioned, food advertisement results in profit, food choices are frequently ill-informed choices, and physical activity is waning. The classic imbalance between energy source intake and energy expenditure output is perpetuated.

Community-based interventions to combat obesity in children and adolescents are emerging. Neighborhood civic centers, schools and churches offer on-site programs to educate

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individuals and families about risks for developing obesity and strategies to reverse the process. Many services are focused the prevention and treatment phases of the epidemiological model.

The Young Men's Christian Association (YMCA) provides individual and family activity programs to either prevent or manage obesity. Activities are designed to attract participants of all ages and gender (the YMCA is no longer exclusive to males). Hampton Roads is comprised of seven cities in southeastern Virginia. The area is fortunate to have at least one YMCA in each locale, with several of the larger areas supporting more than one YMCA facility. Each facility currently offers several programs and structured activity sessions promoting healthy lifestyles, physical fitness, and weight loss. Programs include *Kids in Motion*, *Kid Fitness*, *Teen Strength Class*, *Teen Spin*, and the *Interactive Zone*. *Kids in Motion* is a planned physical activity program for preschool-aged children. One goal of the program is to provide the children with a model and early opportunity to integrate fitness into their daily lives. Although no participation numbers are available, the program, as are all of the YMCA programs, is described as being very popular. *Kid Fitness* is an after-school group activity program offered two afternoons a week for 90 minutes per session. Strength-building and endurance are program goals associated with the *Teen Strength Class*. These classes are offered on Saturdays and the participants, in small groups, work with a personal trainer. A stationary bicycles with tension and program variations are used in the *Teen Spin* activities. The bicycles are able to simulate different terrains correlating with a variety of physical demand levels. The *Interactive Zone*, the newest of the YMCA activities, becoming a favorite among children and adolescents (teens). The activities are patterned after the video game format. The video game format is familiar and inviting to the children. However, instead of passively manipulating a hand control, the participant has to move and "interact" with

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the video action. The average attendance at the regional YMCA's is reportedly 80 – 100 children per day at each facility (Bestercy 2006).

An innovative game called *Dance, Dance Revolution* is also being used in selected elementary schools (Suffolk VA, Driver Elementary) and high schools (Virginia Beach, VA Green Run High). This dance program uses sound speakers, lighted rubber practice discs, with electronic scoring pads tied to a popular musical video arcade game. Students actively move and “stomp” (more movement ) on the discs to the music, lights and directions of the video game which is flashed on the gymnasium walls while they are earning points through their activity to win the video game. This game involves coordination of feet and eyes and causes students to participate in cardiovascular activity. Student participants report while the game is “sweaty” that is enjoyable to them while they're performing the game. (Bowers 2006)

Hampton Roads is fortunate to host a health care facility solely dedicated to the wellbeing of children. The Children's Hospital of the Kings Daughters (CHKD), through the Consortium for Infant and Child Health (CINCH) programs offers medically supervised educational and activity programs for overweight children. The *Healthy You Weight Management Program* was initiated in 2001 and requires a physician referral for entry. The 10 week program focuses on individual and family education regarding healthy food choices, portion control, and exercise. The exercise portions of the program occur in partnership with the YMCA and the *Kid Fitness* and *Teen Spin* activities (Bestercy 2006, Children's Hospital of the King's Daughters). Over 500 children have been served by the *Healthy You Weight Management Program* since its 2001 inception. Most participants post-test as being more knowledgeable about weight control, and show as making healthier lifestyle choices (dietary and activity). Successful weight management during the 10 week program is defined as continuum of zero weight gain to the loss of several

pounds during the classes. One year follow-up has revealed that weight loss has been maintained. CHKD is currently developing criteria and methodology for long-term follow-up (Benson 2006).

Regional institutions for higher education are also involved in promoting healthy lifestyles and obesity prevention and management. Norfolk State University has begun a program entitled the Healthy Spartan Initiative (Hardy 2005). Hampton University requires all students to complete activity physical education coursework. For several years, the Healthy Hamptonians (<http://www.hamptonu.edu>) project has offered educational and activity programs promoting wellness, obesity prevention, and weight management. As with other universities, the Student Center houses a state of the art workout facility.

### **Conclusion**

The school is recognized as a pivotal environment to teach about healthy lifestyle choices, wellness, health promotion, obesity prevention, and obesity management. The Healthy Schools Program, begun as an alliance between the Clinton Foundation and the American Heart Association has just been funded through the Robert Wood Johnson Foundation (RWJF) to develop state-wide school programs promoting healthier living, especially in terms of weight management. The RWJF funding will enable the programs to be developed in 13 states with projected expansion. Each state will receive \$8 million to fund the programs. The goals of the Healthy Schools Program are

- improved nutritional value of foods consumed by children, both inside and outside of the school environment;
- increased physical activity access using school and community facilities throughout the school day, afternoon, and evening;

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- instruction on healthy lifestyles; and
- programs for staff wellness ( Alliance for a Healthier Generation).

In addition to the school focus, the alliance has begun dialogues with food vendors, food service personnel, and health equipment manufacturers to initiate a cohesive effort to address the obesity and health concerns

(Alliance for a Healthier Generation).

The problem of childhood obesity is multi-faceted. It needs to be addressed on a personal, family, group and community level. Although there is intense media coverage of the obesity epidemic and the crisis among children and adolescents, the public response is just beginning to emerge. Unfortunately, past recognition and action related to emerging health and wellness crises has often been minimized until the financial impact emerges. The problems of driving while intoxicated and substance abuse were social ills for many years before there was public admission of the severity of the costs and community, and even political, action ensued. In general, resources appear to be disjointed and relatively unknown to the public at large. Individuals and families needing the services may have difficulty identifying and accessing the services. Medically-sponsored services require private pay with partial medical insurance reimbursement. Some civic services require a membership fee. School-based services are not widely available at this time.

Community-based interventions for obesity prevention and weight management for children and adolescents must be accessible, affordable, convenient, non-threatening, and effective. The alliances developing among philanthropic funding sources, educational systems, healthcare systems, political systems, local community services, and the media should be just the multi-faceted approach needed.

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