Exploring Obesity

In Rockbridge County

Antoinette Kitch

Washington and Lee University

Table of Contents

Obesity as an illness is misunderstood. The common misconception is that obesity is an individual's problem and that obesity stems only from irresponsible nutrition. Evidence reveals that the reality of obesity as a disease that is influenced

by a number of different social factors out of the individual's control. These social factors are disproportionately affecting the poor, predisposing the impoverished to this disease more so than the general public. Research has also led me to believe that poverty limits an individual's capability to treat this illness (in addition to predisposes individuals to this illness). According to the evidence put forward in this report, there appears to be apt possibility for intervention and prevention of obesity and overweight status. Due to the implications of poor health on opportunity of individuals, measures should be taken to buffering these social factors and limit obesity and overweight prevalence. I will be analyzing the effect of social determinants specific to Rockbridge County as it pertains to the low-income residents that the Rockbridge County Free Clinic currently serves (up to 200% of the poverty line). Understanding, preventing and buffering the effect of these social determinants will be vital to successfully limit the prevalence overweight and obese individuals within Rockbridge County.

Defining Obesity

It is important to consider "overweight status" as the precursor for obesity– similar factors are responsible for these statuses, similar consequences stem from these statuses and similar initiatives for prevention are needed. Adult obesity status can be defined by a Body Mass Index (BMI) score of 30 or higher; overweight status is defined by a BMI range of 25-29.9 (CDC, 2010). Since BMI measurements are simply a ratio score of height versus weight for a given age, they do not measure fat directly and thus errors exists (e.g. BMI for muscular athletes may reach obesity

status). Further criteria is needed to establish that if this ratio is dangerous to an individual's health and due to the unhealthy deposition of fat—a high waist circumference (i.e. the "apple" body shape), having high blood pressure and minimal to no physical activity are further defining factors of obesity and overweight status. By this definition, not only are one third of Americans overweight, one third of all Americans that are overweight qualified for obesity status (Jurdak et al., 2008). This equates to over 33 million obese people in the United States as of 2008.

This does not stratify the population by poverty status. Data show that obesity status is correlated to and exacerbated by poverty status. Both obesity and (highly co-morbid) type 2 diabetes follow a socioeconomic gradient; studies observe an inverse linear relationship between socioeconomic status (Drewnowski, 2009) and prevalence. Even though obesity rates have climbed steadily over the whole population, higher obesity rates are correlated to low income, low education, minority status, and poverty prevalence of the area (Drewnowski, 2009). It may be that these factors confound each other over a lifetime (e.g. low education leading to low income); however, statistically, these two aspects have an individual effect on obesity prevalence within an area (as cited in Drewnowski, 2009). More interestingly, inequalities access have been identified as a mediator of SES and obesity status for many reasons.

Prevalence

In 2010, no state had an obesity rate less than 20 percent (CDC, 2010). The Rockbridge Area obesity statistics look very similar to the national average (28.60%

and 27.80% respectively; “Health indicators”). Perhaps the most alerting statistic is that this previously adult epidemic has trickled down to a vulnerable population—our children. Near twenty percent of children in impoverished homes in America are obese (2008; CDC, 2010). Although the childhood obesity rate for Rockbridge County as a whole was unavailable the Rockbridge Area schools did receive governmental funding for more exercise programs from their BMI results (“Watching the Weights”). Buena Vista City had 22 to 52 percent of children in Kindergarten through fourth grade established as already clinically obese in 2010 (“Watching the Weights”). At its lowest, this statistic matches the national average, but at the height of its range, Buena Vista Children double national obesity rates. In Lexington City, the preschool obesity rate reached 14.1%-18% in 2009 (Food Environment). A considerable amount of these children are living at or under the 100 percent poverty line (17% in Rockbridge County), and 22 percent of children qualify for free lunch program in 2012, meaning they fall under 130 percent of the poverty line (Population). Due to the high correlation between poverty status and obesity recognized nationally, it is plausible that the poverty status of Rockbridge County may explain the high rates of childhood obesity in the Rockbridge county area. Nevertheless, all children who attend public school are at risk of poor school nutrition and exercise programs; since children are a vulnerable population because they cannot advocate for themselves, fighting factors that introduce obesity into the home is in the public interest as well.

Consequences

Obesity and overweight status in themselves are not killers but are precursors for other deathly diseases. Common co-morbid disease states are not accounted for in this cost such as the development of cardiovascular disease, cancer and diabetes. Maternal diet is a large factor for the cognitive wellbeing of the child thus dietary habits of the obese can be harmful to children (Agin, 2009). The effects continue after birth as bad habits are passed down—children born to obese mothers are significantly more likely to develop childhood obesity (Strauss & Knight, 1999). This is particularly dangerous because those who develop childhood obesity are at a higher risk of developing other potentially terminal diseases (e.g. coronary heart disease, atherosclerosis, and colorectal and breast cancers) as an adult.

Above the medical cost, economies may suffer from lower productivity and societal participation as obesity rates climb. Research has found links between obesity and cognitive decline. The Western Diet defined as high fat, cholesterol and refined carbohydrates and sugars within the diet, is a large factor in obesity and has been found to have behavioral changes in rats that signify cognitive degeneration. Memory deterioration has been associated with central adiposity, one of the diagnoses of obesity (Dr. S. Blythe, personal communication, March 16, 2012). A decline in cognition means less economic productivity. The immensity of this issue has high economic ramifications; nationwide the healthcare cost of obesity reached $140 billion in 2010 and has only continued to climb. These facts translate to Rockbridge County as well. The comparable cost of obesity in Rockbridge County for 2010 alone would be $10, 481, 874 (see calculation 1; U.S. Census, 2012). This does not include the extra cost to society for treatment of highly comorbid diseases,

which combined, cost the United States roughly 147 billion per year (CDC, 2010). I do not have the data on what percentage of the population has these comorbid diseases and therefore could not calculate the relative cost for Rockbridge County, but if you assume the same percentage in Rockbridge County as the nation, then the money lost in total for preventable disease in Rockbridge County could easily surpass 20 million. The societal toll of obesity rates rise above sheer healthcare costs and blend into the national economical welfare. Clearly, economic ramifications argue that obesity is no longer merely an individual's problem, but a social problem.

Causes: Societal Factors

Food Cost

Agricultural technology provided a mechanism of more efficient food processing that contributed to the development of energy-dense foods (Drewnowski, 2009). Technology created these energy-dense processed foods by packing food with refined grains, added sugars and fats at a low development cost. These Frankenstein foods provide palatable and cheap answers to the budget shopper—for an alternative cost. The problem with these foods is that the calories consumed are "empty," or energy dense and nutrient poor, and are causing unhealthy weight gain which packs fat cells around vital organs (i.e., central adiposity). This low-budgeted diet may feed mouths, but it also maintains a consumer's overweight and obesity status. Unfairly, these foods end up lining those shopping carts of families with limited or no access to nutritional food.

The most devastating realization; however, is that even those with the education and intention to purchase nutritious food are further constrained by financial limitations. The average cost of one meal in Rockbridge County is $2.44 ("Food Insecurity"). National averages say that low-income families allot $4 or less to each person of their families meals per day, which is less then two meals a day per person in the Rockbridge Area assuming the average cost of a full meal (Drewnowski, 2009). As shown in Figure 1, it is clear that only foods that are on the top leftmost corner are financially accessible to typical low-income families (Drewnowski, 2009).

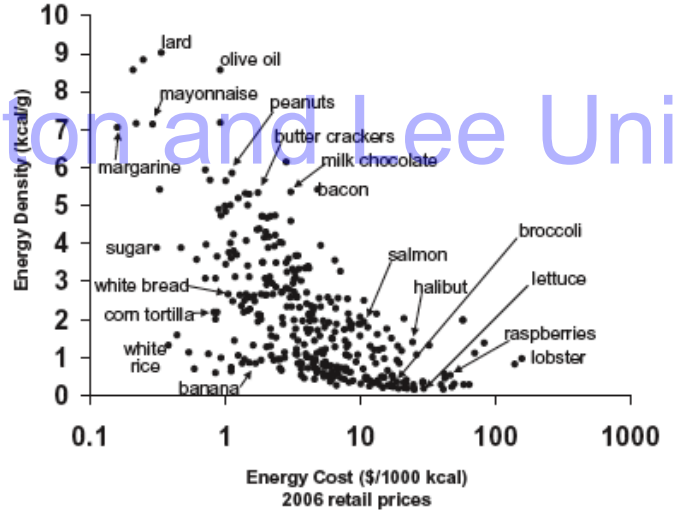

Figure 1. Relationship between energy density of selected foods (kcal/g) and energy costs (US$/1,000 kcal). Food Priced from Seattle supermarkets in 2006.

As shown above, there can be up to an a thousand percent difference in cost between fruits and vegetables and added fats and sugars.

Persons who choose unhealthy food may appear to be uneducated about what is healthy or unhealthy. For example, when given the same amount of money to shop for groceries, an unhealthy shopper versus health conscious shopper will end up with widely different nutritional contents of their shopping cart; the unhealthy shopper will choose a cart amounting to three times the calories and near seven fold the fat content of foods chosen by the healthy shopper (Kupillas & Nies, 2007). These unhealthy, obesogenic foods end up in the typical meals of low-income Rockbridge families even after educational intervention, according to the patient interviews on nutrition. Although educated on healthy foods, one participant explained the supposed preference for unhealthy foods as the ability to get a higher amount of food in the cart for a given price. According to one person interviewed, providing enough food to fill her children trumps health concerns.

Previous data presented in the food cost situation also further characterizes the link between food insecurity and high BMI. In Rockbridge, food insecurity extends to above the SNAP-Benefits range of 130 percent of the poverty line, and even above the eligibility for USDA food (185 percent). In 2011, 31 percent of food insecure individuals received USDA food (but not SNAP benefits) and 26 percent above all food aid levels were still food insecure (185 percent; "Food Insecurity"). This speaks to the need of financial programs in combination with educational intervention. Cost is a more effective barrier to access than education (this is true for diabetic patients in the area as well as explained in interviews); however, lack of education also impedes informed decisions.

Geographical Issues

The fact that Rockbridge County is a rural area leads to a number of automatic issues. Rural residents more commonly develop obesity status than their urban counterparts (Jackson et al., 2005). Rural areas lack the aggregation of resources due to geographical separation or size of the needy population (L. Simpson, personal communication, March 22, 2012). The existing food deserts are often exaggerated by lack of transportation infrastructure. This deficit in resources may be due to the lower average income in rural counties than urban counties ($38,725 and $49,847 respectively in 2010, "Rural Income"). If income relates linearly to the availability to resources, as it does with county taxes and public school systems, then Rockbridge County's average income of $23,753 would put it at a large disadvantage for resources that could help prevent obesity (U.S. Census, 2012). Effective installment of Community Economic Development programs could stimulate the economy and provide apt employment opportunities within Rockbridge County, which would increase the areas ability to prevent and treat obesity and related diseases.

On top of financial constraints of residents, geographical issues promote further food insecurity. Food deserts are defined as areas with limited access to healthy foods; the 2009 Congress Report considered affordability of healthy food at a supermarket or large grocery store, as well number of poor people and dependent persons without vehicles further than one kilometer away from this large supermarket or large grocery store (Food Desert). Supermarkets are used because they usually have the larger healthy food to snack ratio in shelf-space analysis

(shown to be a dependable measure of access to nutritional foods; Glanz et al., 2007). Furthermore, proximity to supermarkets is inversely related to BMI suggesting the relationship to access (Farley et al., 2009). This report's definition accurately depicts low-income residents access to healthy food and was used by the USDA to highlight food deserts for Rockbridge County in Figure 2 below.

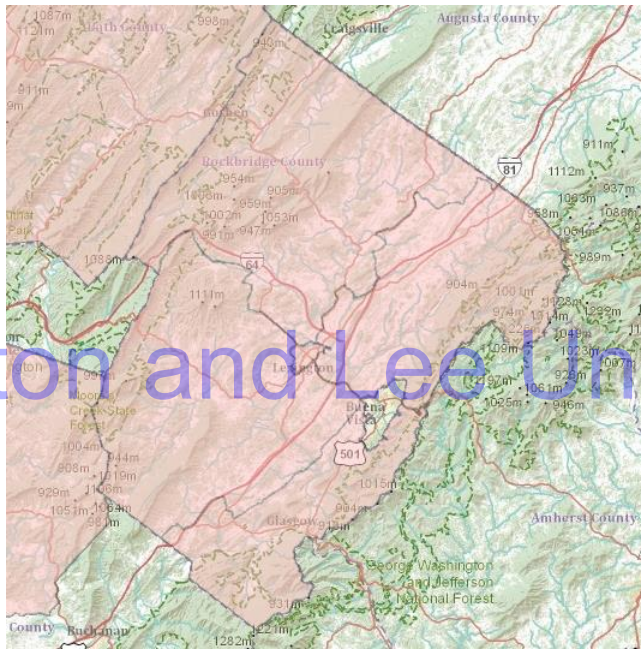

Figure 2. Food Deserts of Rockbridge County in 2009 as USDA defined.

By this criteria, food deserts in this county are extensive. When I re-mapped food deserts within the area using the more conservative definition of 10 miles distance versus 1, only The Natural Bridge Area and Goshen remained as food deserts (figure to come via GIS). The 25 percent of all food outlets in the Rockbridge

County Area which qualify as healthy food stores are missing in these two areas ("Population"); healthy food outlets in the area are limited to Walmart, Organic Cool Springs, The Healthy Food Co-Op, Food to You, Food Lion, Kroger, Shenandoah Food, Publix and specialty stores such as Donald's Meet Processing, Rockbottom Dairy and Wade's Mill. "Healthy," defined in scientific studies, is a store that carries fresh produce, whole grains, and low fat dairy and protein (Glanz et al., 2007; Farley et al., 2009). In contrast, 42 percent of all restaurants in Rockbridge County are fast food restaurants ("Population"). Included in the 25 percent of healthy food stores (as well as in my calculations) are the local Farmer's Markets. The USDA *Food Environment Atlas* indicates that 3 Farmers Markets occur within Rockbridge County Area: Rockbridge Farmers Market in Rockbridge County, the Buena Vista Farmers Market in City of Buena Vista, and the Lexington Farmers Market in the city of Lexington.

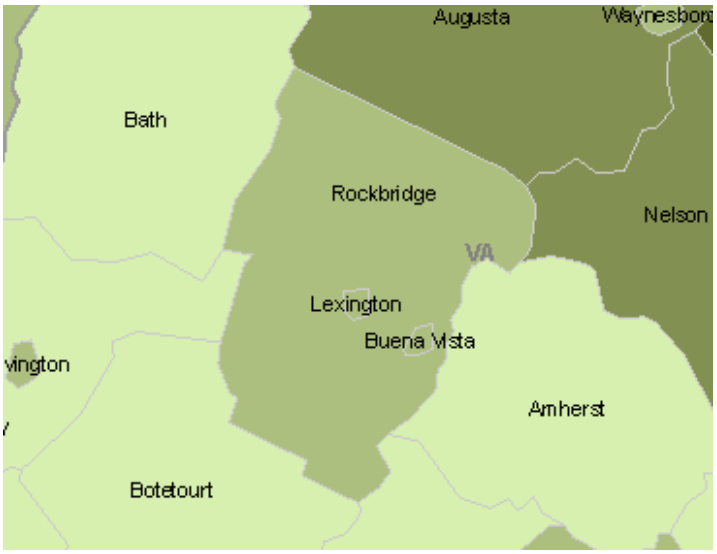

Figure 3. Amount of farmers markets available in 2010 by county (pale = 0, light green = 1, dark green = 2-3).

As of 2011, The Rockbridge Farmer Market will be accepting EBT and SNAP benefits for payment of foods. Although this is a step forward in the right direction, this only allows for one location where residents can use their assistance programs to help purchase healthy food: The Virginia Horse Center. This is an area where 1.8 percent of low-income residents do not own cars and thus cannot get to the Farmers Markets for fresh food (Food Desert). This vehicle ownership rate is the second highest percentage within Rockbridge County after the city of Lexington (2.2%; Food Desert). The Virginia Horse Center is close in proximity to the City of Lexington, but not close enough for residents to walk. This one EBT acceptor location creates an issue for low-income Lexington city residents who do not have cars. The only alternative transportation methods available to low-income residents in Rockbridge County are Rockbridge Area Transportation System (RATS) and the Maury River Express. Both these methods take advanced planning, and the Maury River Express does not currently make a stop at the Virginia Horse Center.

Rockbridge County also has three food pantries (one in Lexington City, One in Glasgow and one in Buena Vista). These food pantries are among many programs that use food from the USDA as well as food donated from Walmart, Food Lion and Kroger. Although not all healthy foods are put into the community's hands, the quality of the produce at these locations is surprisingly higher than the expectation; in fact, Food Pantries have had a surplus of viable produce and food availability, the problem now is getting this food into the hands of the needy (J. Davidson, personal

communication, March 29, 2012). The Maury River Express stops directly in front of the Lexington and Buena Vista Food Pantry, yet interviews conducted in the area shows that awareness of these resources limit the amount of impact they can have on the community (D. Breidung, personal communication, April 9, 2012). Outreach would be a simple solution to this problem.

Capability Poverty

Cost and geographical issues that feed into obesity are not necessarily separate from issues of capability. Capability as defined by Amartya Sen is assessed through a number of factors that directly affect a person's ability to do something. One of these factors and the one of my particular focus is how a certain factor effects the distribution of opportunity (Sen, 1999). An example is that those who are not educated on how to cook are capability impoverished because their lack of learned skill limits their ability to feed themselves. Fortunately, those who are capability impoverished have the opportunity to be fostered to become capable, according to Sen. For example, people who are unable to cook because they have not learned could prepare food via educational intervention. People with limited access to food geographically can utilize community programs that deliver groceries for free requested and can cook from home (e.g. WeGoShop.com explained in *Future Implications and Solutions*). Unfortunately, those who are inherently limited in some form, such as the elderly or disabled, would not benefit much from educational intervention—instead they are dependent upon efficient programs that will meet their nutritional needs.

Dietary Norms

Cultural implications of the area can work for or against a healthy diet. Since social norms of what type of food are eaten and how they are prepared directly affect the health of individuals, this is an aspect of considerable study. Globally, diets have been "westernized," which refers to the incorporation of processed foods and fast food establishments into the diet. This has been a recent shift seen by our parents generation and is assumed to be the main cause of childhood obesity in our generation. Rockbridge County is becoming continually more inclined to the fast food culture. Residents who used to eat what they grew on their farms growing up feed themselves and their family's fast food on a regular basis (Anonymous, personal communication, March 19-23, 2012). The abundance of these fast food restaurants in Rockbridge County and the cheap prices of their food increase the probability of low-income individuals participating in this fast food culture. Social norms such as this fast food culture is a huge issue not only because of the health implications, but because social norms have a profound effect on building habits, whether healthy or unhealthy (Fisher & Dube, 2011). Intervention against these social norms is difficult and can often be unsuccessful.

Exercise Norms

Another social norm that can work against or for promoting a healthy lifestyle is the exercise culture of a particular area. Harvard's Men's Health Journal wrote a recent article of the trends of Obesity within the United States and cited exercise culture as the main cause of the epidemic. Adults today are three times as sedentary as adults 50 years ago (CDC, 2012). Overall, three quarters of Rockbridge

County residents meet the minimum federal adult exercise recommendations, but the demographics of the other quarter of the population is unknown. It is likely that this quarter is made up of the elderly who face physical barriers to exercise, the obese who by definition do not participate in physical activity, and the impoverished. The *Food Environment Atlas* only identified one recreational fitness facility in Rockbridge County shown below in Figure 4.

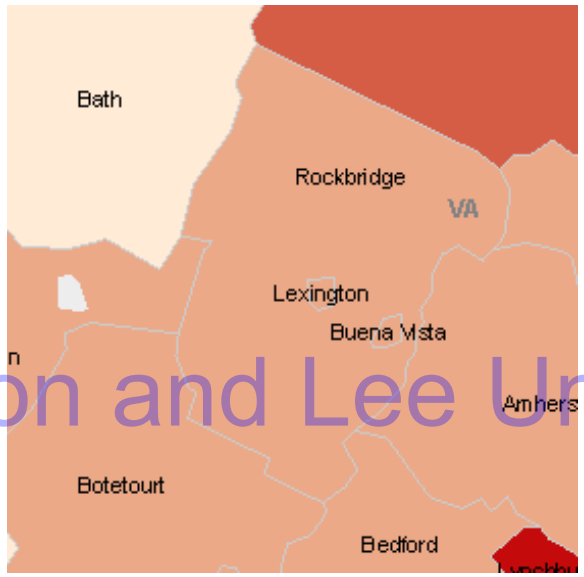

Figure 4. Amount of recreational fitness available in 2008 by county (pale = 0, light pink = 1-2, dark pink = 3-7, red = 8-723).

This does not take the vast trails and fields of the country that are readily available. Even with these multitudes of self-initiated opportunities, the Rockbridge area statistic for adult (complete) physical inactivity as of 2009 had reached 29 percent ("Population"). It is more likely that exercise is not an issue of facility availability but rather an issue of structured exercise. In this sense, we face the

geological barriers similar to the Farmers Market. If these facilities are not readily available and convenient, people are not inclined to use fitness facilities. It does not matter how many are available. More so, if the culture of the area does not place an importance on exercise, it is the challenge of social norm interventions. Although physical education programs are growing, there is very little health education in the Rockbridge County schools. This fact most likely plays into the above prevalence of adult sedentary life. More programs in schooling and adult education would be necessary to create a healthy exercise culture.

Treatment

Treatment of obesity is in national interest, as treatment would increase an individual's ability to participate in society and lower the cost to society. The goals of treatment of both obesity and overweight individuals are to reach and maintain a healthy weight so that these individuals can have a higher rate of functioning and an improved health status. However, treatment of obesity can be costly; most surgical and prescription treatments are completely inaccessible to those who are uninsured, although this issue may relieve itself within the new Obamacare regulations. For those who do not choose the expensive surgery or medications (i.e. medications, Lap-band surgery and gastric bypass surgery), this means a commitment to a lifetime lifestyle change. "Maintenance" is perhaps the most difficult part and this is why individuals who change their lifestyle are more successful in keeping the weight off. The Mayo Clinic review of treatment options includes dietary changes, exercise and activity, behavior change, prescription

weight-loss medication and weigh-loss surgery and the success of these treatments is fully dependent upon the individuals level of obesity status, health status and willingness to participate (Mayo Clinic).

Attached to limited resources innate to a rural community, there is the moral issue of treatment. Health is a special good; unlike other economic goods, healthcare carries a "moral importance" because of the impact heath status has on an individual's opportunity (Daniels, 2008). For all programs geared towards the underprivileged, funding plays a large role on the opportunity of individuals. This is the case of the Free Clinic—their funding, facilities and workforce can only meet the specific needs of some. So then, how should the clinic choose who should get these new services? It is a philosophical argument of cost-effective gradients versus favoring treatment to those who are most needy of treatment versus care as a human right equal to all. The Government uses QALY (Quality Adjusted Life Years), and although it may have its flaws, on a large scale medicine needs this compromise between the crass cost-effective approach and the human entitlement approach. Due to the nature of the Free Clinic and the following proposed programs being rooted in grants, it is important to maximize the effect of these programs on the community. It is also vital to realize that the Free Clinic may not have the infrastructure to meet all the issues associated with obesity within the area, and thus the Free Clinic should work as an advocate for other agencies of the area that may better accommodate some programs.

Future Implications and Solutions

The Free Clinic serves as a source for nutritional education for adults with diabetes in Rockbridge County. The diabetic patients seen by the Free Clinic are typically diabetic due to their lifestyle (i.e. Type II). Considering obesity and type II diabetes are highly co-morbid, there are overweight and obese individuals benefiting from this the Free Clinics nutritional intervention. Through their Group Medical Program for Diabetics, diabetes patients are required to sit in a 90-minute appointment where they receive check-ups and are given their medication, and dedicate 30 minutes to nutritional education. The recommendations at the Free Clinic are more stringent than typical weight control dietary intervention—diabetic patients not only need to lower their intake of food, exercise and eat healthy, they need to focus on limiting sugar intake and creating the correct balance of protein and carbohydrates in each meal. Acknowledging that the success of dietary intervention is constrained to patient compulsion rate, if all overweight patients followed these stringent dietary constraints then weight management could be very successful. Unfortunately, obesity prevention is not currently a billable service, so the funding from becoming a Community Health Center could not be used for this type of program; however, legislation changes may augment prevention to incorporate this type of prevention in the future. Nevertheless, since the infrastructure is already there, it is possible that new government funding could open up currently used funding for non-billable services: a Medical Program of Weight Management.

It is possible that this program could provide structured exercise for the Rockbridge County residents, something that is clearly lacking in this area. Something as simple as getting volunteers to lead a walk or jog would not only promote a better exercise culture, but would create a positive social norm within this community. Through the leadership of the Free Clinic, leaders could empower the community members of the group to take turns to organize something weekly for the group exercise. Compulsion in the program could be solidified with something as simple as the diabetes Program, prescribing weight-loss drugs only to individuals who participate in the program; or providing free fresh produce to those who come. The Free Clinic could easily coordinate with one of the food pantries of the area, with Campus Kitchen, or even with the Rockbridge famer's market to organize this type of outreach. Walmart donates an abundance of food to the local pantries that are not bound the USDA requirements, thus anyone with "need as the organization sees fit" can use this food ("Hunger Forum"). This Medical Program of Weight Management would expand upon existing programs within the community, which lowers the overhead costs of implementation to very minimal cost. The creation of this program fosters the capability of individuals to make healthy decisions, provides a healthy exercise culture, and would buffer some of the geographical barriers low-income individuals experience when trying to access healthy foods.

Although nutritional education and exercise is important, and although in the case of obesity prescription and surgical treatment may be necessary, this is the extent of intervention the Free Clinic could manage. The Free Clinic should and will

continue focus on treatment of co-morbid diseases, use referrals to a nutritionist, and create weight management programs when funding allows. The programs within Rockbridge County are successful in some ways, but considering the data of this report, Rockbridge is in need of expansion and creation of new services. I propose, as Community Health Center, that the Free Clinic take on a large Public Health role to focus on expanding and maximizing the services available in Rockbridge County. They will also be in tune with the community's needs and thus be able to effectively advocate on behalf of their patients.

One form of advocacy is an extended route for the Maury Express. One of the requirements of a Community Health Center is apt transportation for access of services. While using funding to meet this requirement, the Free Clinic would be promoting increased access to healthy foods as well. Since the Maury Express stops at the Free Clinic, Hospital, and Lexington and Buena Vista food pantries already it makes sense to expand the services instead of creating a new form of transportation. By creating a country line that meets up with key locations already on route, clients without a car would be more able to use the services in the community. It can be assumed that those most affected by the conservative measure of food deserts would also be most estranged from the Maury Express lines, and thus the Free Clinic could recommend these areas (The Natural Bridge and Goshen) as the most urgent. Again this expansion would buffer not only the food access issue, but also transportation issues of the Free Clinic clients who live too far away from bus stops.

The inaccessibility of the EBT certified Farmer's Market of Rockbridge County is a further issue. Programs exist which incentivize grocery stores to open in low-income areas; however, this scale of intervention is too large for the Free Clinic to consider. Since access geographically and financially is a large barrier for the community, the Free Clinic should advocate for the Maury Express to create a stop at the Virginia Horse Center. An even more effective set up would be promoting a EBT certified Farmer's Market on-site at the Free Clinic that would allow clients to partake in services at the Free Clinic and purchase healthy foods. This would minimize travel costs and promote a healthy food environment. The Free Clinic could offer a subsidy on prescriptions to those who purchase fresh produce at the Farmers Market as an incentive for their clients. Farmers market cooperatives often have funding available for outreach programs, such as the Farm-to-School network.

Since the Farm-to-School implementation in 2007 for Virginia, there has been a 300% increase in Virginia grown food served within the school system (Epstein et al., 2011). Local produce means less processing and less preservatives (if any). This program was implemented in Rockbridge County School system but curiously, was not in Lexington and Buena Vista City Schools. According to the high children obesity rates, there is clearly a need for more nutritional foods within these school systems. This is an advocacy role that the Rockbridge Area Free Clinic should take particular interest in, considering the success childhood intervention would have in curbing the communities future health costs. There is a high use of governmental food aid programs such as WIC, SNAP and the free breakfast and lunch programs. In fact a large number of children utilize school breakfast and

lunch programs whether they access them free or not (20-40% of participants get free lunch; 500,000-1,000,000 students participated in free lunch and half participated in free breakfast in 2010; Food Environment). This provides possibility for large impact. A variety of recommended "treatments" for childhood obesity involve changing or limiting the effect of the social factors mentioned in this report via school nutritional interventions. For example, because children respond especially well to changes in the food environment, limit obesogenic foods within schools is one of the Mayo Clinic's premiere recommendations (e.g. increase availability of water and reducing availability of sugar drinks in schools; Mayo Clinic).

Furthermore the public schools do not partake in any considerable nutritional education, and minimal physical education (due to previous lack of resources). Although Rockbridge county school's physical education programs are growing due to recent funding, this lack of exercise culture in previous years is reverberated in the sedentary adult culture of today. The residents of Rockbridge lack structured exercise in all levels of education. The Free Clinic could play a large leadership role in organizing hikes, walks and jogs for their members in order to promote fitness and health. More importantly, the Free Clinic could help organize neighborhood-walking groups, which would create a new social norm of a healthy exercise culture.

Currently, the Rural Reach program delivers food to a selection of food insecure individuals in the area. Their participants are mostly elderly and can no

longer cook for themselves or shop for themselves in order to cook ("Hunger Forum"). Why only a selection of food insecure individuals is met is due to geographical issues; a lot of time individuals are too dispersed for a driver to deliver food efficiently. Other states have programs available that deliver groceries for free if they shop online. This would mean that clients would need to have access to the Internet, which is a separate issue; however, with Internet access programs such as WeGoShop.com allows for local purchasing and delivery of goods. The site relies on volunteers to head up a program in that area. If the delivery persons were strictly volunteer and tips were promoted, paying costumers such as middle income busy moms who could tip would cover some of the overhead cost (along with fundraising efforts). If this program was widely utilized by all socioeconomic levels and accepted EBT cards, it could be turned into an effective non-profit business.

Amazon.com and soap.com allows individuals to purchase online and deliver the purchases via postage, but there is a minimum buying price for free shipping ($25 and $39 respectively). When money is constrained, such as food insecure or impoverished families one of two problems could occur: one is that reaching this minimum amount is probably not plausible; and the other is if it is plausible, this amount may represent the total amount available to buy groceries for one month, presenting a rationing problem later on for the families. The local instigation of grocery shopping and deliver such as WeGoShop.com is more practical for meeting the needs of the impoverished and food insecure.

Conclusion

Rockbridge County's health status is currently ranked 57th (of 131) in Virginia ("Population"). Within the limitations of a rural county, Rockbridge County has developed some solutions to cushion the social determinants of obesity, but these resources are scarce and hard to access especially for the low-income population. Gaps in access to resources unequally affect the poor and therefore affect their quality of life, opportunity for employment and capability to prevent and treat unhealthy weight gain. Due to an injustice of unequal access to healthy food (and not due to the irresponsibly of the individual) the community has an obligation and interest in promoting dietary and environmental interventions to reduce obesity and overweight status.

Appendix

Calculation 1:

Population of United States 2010: 308, 745, 538
Obesity Rate of United States 2010: 27.6%
Population of Rockbridge County 2010: 22,397
Obesity Rate of Rockbridge County 2010: 28.6%

Calculated obese population of United States 2010: 85,213,768
Calculated obese population of Rockbridge County 2010: 6,380

Calculated cost of obesity per person in United States 2010 (divide cost by people): $1,642.93

Calculated cost of obesity in Rockbridge County 2010 (cost per person in United States multiplied by population of obese in Rockbridge): $10,481,874

Works Cited

Agin, D. P. (2009). *More than genes, what science can tell us about toxic chemicals, development, and the risk to our children*. New York, NY: Oxford University Press, USA.

CDC. (2010, June 21). Defining Obesity. Retrieved from http://www.cdc.gov/obesity/defining.html

CDC. (2012). Surgeon General Executive Summary: Physical Activity and Health. Retrieved from http://www.cdc.gov/nccdphp/sgr/

Daniels, Norman (2008). *Just Health: Meeting Health Needs Fairly*. Cambridge University Press.

Drewnowski, A. (2009). Obesity, diets, and social inequalities. *Nutrition Reviews, 67*, S36-S39. JSTOR.

Epstein, H. Gude, M. L, Guzman, P. & Williams, C. (2011). Local Food System Assessment. *Lenowico Planning District*, 1-48. Google Scholar.

Farley, T. A., Rice, J., Bodor, J. N, Cohen, D. A., Bluthenthal, R. N. & Rose, D. (2009). Measuring the Food Environment: Shelf Space of Fruits, Vegetables, and Snack Foods in Stores. *Journal of Urban Health, 86*(5), 672-682. Scopus.

Fisher, R. J. & Dube, L. (2011). Development and validation of an eating norms inventory. Americans' lay-beleifs about appropriate eating. *Appetite, 57* (2), 365-376. PubMed.

Food Insecurity & Food Cost in the US: Virginia. *Map the Meal Gap* (2011). Feeding America: U.S.

Glanz, K., Sallis, J. F., Saelens, B. E. & Frank, L. D. (2007). Nutrition Environment Measures Survey in Stores. *American Journal of Preventative Medicine, 32*(4), 282-289. Scopus.

Hunger Forum: Rockbridge County. (2012, Feb 29). Volunteer Resource Room, Washington and Lee University.

Jackson, J. E., Doescher, M. P., Jerant, A.F. & Hart, L. G. (2005). A National Study of Obesity Prevalence and Trends by Type of Rural County. *The Journal of Rural Health, 21*(2), 140-148. PubMed.

Jurdak , N., Lichtenstein , A. H. & Kanarek , R. B. (2008). Diet-induced obesity and spatial cognition in young male rats. *Nutritional Neuroscience*, *11*, 48-54. PubMed.

Kupillas, L. M. & Nies, M. A. (2007). Obesity and poverty: are food stamps to blame? *Home Health Care Management Practice*, 20 (1), 41 – 19. SAGE.

Mayo Clinic. (2012). Obesity. Retrieved from http://www.mayoclinic.com/health/obesity/DS00314

Population Health Institute, University of Wisconsin. (2012). County Health Rankings & Roadmaps. In *Rockbridge County*. Retrieved from http://www.countyhealthrankings.org/

R. Gallardo (2012, Feb 23). Rural Income Decline—But Catch Up. *Daily Yonder*. Retrieved From http://www.dailyyonder.com/rural-incomes-decline-catchup/2012/02/23/3778

Sen, Amartya. (1999). *Development as Freedom*. New York: Random House.

Strauss, R. S. & Knight, J. K. (1999). Influence of the Home Environment on the Development of Obesity in Children. *Pediatrics*, *103*(6), e85. PubMed.

U.S. Census Bureau (2012). 2010 Demographics. Retrieved from http://2010.census.gov/2010census/index.php

USDA. (2012). Food Desert Locator. In *Rockbridge County*. Retrieved from http://www.ers.usda.gov/data/fooddesert/about.html

USDA. (2012). Food Environment Atlas. In *Rockbridge County*. Retrieved from http://www.ers.usda.gov/FoodAtlas/

Virginia Department of Health. (2010). *Health indicators*. Richmond, VA: U.S.

Watching the Weights in Local Schools. *The News-Gazette* (Feb 2 2011). Lexington, VA: U.S.