

ACCESS & AFFORDABILITY IN PUBLIC HEALTH POLICY TO INCREASE ADHERENCE OF CANCER PREVENTION GUIDELINES

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ABSTRACT: Children residing in low income, food insecure neighborhoods are faced with increased obstacles in adhering to cancer prevention guidelines (CPGs). CPGs focus on nutrition and physical activity to maintain a healthy body weight. The geographic, economic, structural, and social conditions place low socioeconomic status (SES) youth at increased risk. Targeted public health policies and programs are needed to increase adherence within low SES communities. What are the unmet needs of children living in low SES, food insecure neighborhoods, that prevent adherence to cancer prevention guidelines? Research efforts must include qualitative methodology, to identify unique obstacles that present health risks. Exploratory methods will likely uncover social determinants of health (SDH) facing populations and therefore require ethnographical field research for greater depth in understanding and theory development. Results indicate that cancer prevalence is increasing globally, many cancers are preventable, higher SES households adhere to CPGs more easily than those in low SES households, children rarely meet daily fruit and vegetable recommendations, both cancer survivors and families without a cancer history are largely unaware of CPGs, and lastly, living, working, and recreational environments hold great capacity in a community's ability to adhere to CPGs. The overwhelming conclusion: a need for development and implementation of targeted intervention programs for specific community obstacles to increase access to and quality of nutrition, recreational space, and the resilience to meet and maintain a healthy bodyweight.

Keywords: cancer prevention guidelines, socioeconomic status, public health, cancer

Poor, limited access areas, which lack sources of healthy and affordable food, will not meet cancer prevention guidelines without intensive public health intervention at the government, state and community levels. The World Cancer Research Fund and the American Institute for Cancer Research (WCRF/AICR) developed a widely accepted set of guidelines for cancer prevention (Miles, 2008). While models for assessing population adherence to the guidelines exist, there are obvious obstacles, supported by the results of previous research, indicating the most impoverished and limited neighborhoods cannot achieve without intervention (Masset et al, 2009).

This paper begins with the definition and development of cancer prevention guidelines by the WCRF/AICR. Then an analysis of the current research and results in adherence to those guidelines will be discussed. Which leads to the final section of this paper, gaps in the current research will be examined to identify the obstacles in adherence to cancer prevention

guidelines. This will conclude in support of the argument that further research is needed in poor, limited access areas to assess the unmet environmental needs, which prevent adherence to guidelines.

Literature Review

Development of Cancer Prevention Guidelines

In late 2007 the WCRF/AICR presented a report called: Food, Nutrition, Physical Activity and the Prevention of Cancer: a Global Perspective, based on the most comprehensive review of all studies since 1960 on diet, exercise, and cancer (Miles, 2008). What resulted are eight guidelines to implement for cancer prevention, they can be seen in Table 1.

The WCRF/AICR, who developed the guidelines above, took a new approach in 2014. The development of the Continuous Update Project (CUP), which is the largest, continuous review on food, physical activity, and cancer globally, brings focus to the need of

Table 1. Cancer Prevention Guidelines and Adherence Recommendations (Miles 2008).

Cancer Prevention Guideline	Adherence
1. Be as lean as possible within the normal range of body weight.	Maintain body mass index within normal range from childhood through adolescence and into adulthood
2. Be physically active as part of everyday life	Walk at least 30 minutes a day, as fitness improves aim for 60 minutes of moderate or 30 minutes vigorous exercise
3. Limit consumption of energy-dense foods and avoid drinks with high sugar content	Consume energy dense food sparingly, avoid sugar drinks, consumer fast foods sparingly, if at all
4. Eat mostly foods of plant origin.	Eat at least five portions of non-starchy vegetables and fruits each day, limit refined starches, relatively unprocessed grains or legumes with every meal
5. Limit intake of red meat and avoid meat that's been processed	If eating meat, consume less than 18oz a week and little to no processed meat
6. Limit alcoholic drinks	If consumed, limit to no more than two drinks per day for men and one drink per day for women
7. Limit consumption of salt, avoid moldy grains or legumes	Avoid salt preserved foods, limit processed foods with added salt to ensure intake of less than 6g/day, do not eat moldy cereal or beans
8. Aim to meet nutritional needs through diet alone	Dietary supplements aren't recommended in the prevention of cancer

public access to the guidelines and policy plan development, furthering the emphasis on public implementation methods is of utmost importance (Simmonds, Mitrou & Wiseman, 2014). By 2030 cancer prevalence is estimated to reach 22 million globally and an estimated 30% of cancers are preventable with guideline adherence—now is the time to direct focus on public needs for adherence. Furthermore, the strongest links to cancer risk are body composition, growth development, and maturation (Simmonds, Mitrou & Wiseman, 2014). With ever increasing obesity rates, youth and young adolescents are at a great risk. In the 1970's, childhood obesity among 12 - 19 year olds was 5%, but in the 2007-2008 school year prevalence of obesity reached 18.1% (Holman & White, 2011). Conversely, if guideline implementation can begin with youth, it could reduce future cancer rates and overall health (Holman & White, 2011).

Analysis of Adherence Studies

Understanding cancer prevention guidelines, the organizations involved, and how they were developed, as well as adherence studies should be analyzed as to mine knowledge regarding function in various communities and cultures. The University of Washington utilized the WCRF/AICR guidelines to develop diet optimization models (Masset et al, 2009). Two plans were created, the first meeting guidelines 3-5 and 7 (Table 1), which consisted of higher consumption of fruits and vegetables and a reduction in refined grains, against the current consumption patterns (Masset et al, 2009). The second plan met requirement 8 (Table 1), that all nutrient needs were met through diet alone, which required a large change in both volume consumed and patterns of consumption (Masset et al, 2009). The cohort consisted of 161 (n=161) adult men and women in the Pacific Northwest, the mean age for women was 42.2, and 38.0 years for men, 60% of women and 50% of men

had annual incomes greater than or equal to \$55,000.00/year, and largely Caucasian (84% men and 82% women) (Masset et al, 2009). Adherence results were largely successful with 93.5% of men and 94.0% of women meeting dietary optimization goals (Masset et al, 2009).

A contrasting adherence study was conducted among 18 African countries, which also assessed alcohol intake and smoking habits (Akinyemiju, McDonald, Tsui & Greenlee, 2014). An adoption of Western lifestyles has been increasing in African countries and with it an increase in chronic diseases, including cancer (Akinyemiju, McDonald, Tsui & Greenlee, 2014). The generalized results reveal populations were able to limit alcohol and tobacco consumption but largely failed at meeting the diet, physical activity, and BMI guidelines (Akinyemiju, McDonald, Tsui & Greenlee, 2014). For sake of comparison to the University of Washington study, it's worth noting that less than 5% of the population reported any college education (Akinyemiju, McDonald, Tsui & Greenlee, 2014). Adherence was highest in young women of high SES, who were in good overall health and residing in urban areas (Akinyemiju, McDonald, Tsui & Greenlee, 2014).

Obstacles in public knowledge

The Oncology Nursing Society conducted a national telephone survey of cancer survivors and those with no family history of cancer, to inquire on both adherence and knowledge of guidelines. Participants were selected from a sample taken from the Health Information National Trends Survey (HINTS) (Mayer et al, 2007). Only 21.6% of subjects without cancer and 29% of cancer survivors identified a better diet as a factor in risk reduction of cancer diagnosis (Mayer et al, 2007). Regarding physical activity, only 4% without cancer and 3% of cancer survivors identified regular physical activity as a method to prevent cancer (Mayer et al, 2007).

A physical activity levels (PALs) study is used to portray another obstacle in adherence, which

proposes a hypothesis that energy expenditure requires energy consumption to create a balance, opening up the opportunity to consume the suggested recommendations of dietary intake (Csizmadi et al, 2014). Conversely, those of healthy weight with lowest PALs would not meet the dietary intake needs as to keep an energy balance and prevent weight gain (Csizmadi et al, 2014). Those who eat less to avoid obesity risk in CPGs, do not allow opportunity to consume enough calories to meet nutrient requirements. (Csizmadi et al, 2014). Even in healthy looking individuals, risk is still prevalent

When focusing on intended populations, it is important to consider results of a survey on youth and adolescent behaviors. The Division of Cancer Prevention and Control at the Centers for Disease Control conducted a survey assessing National Health and Nutrition Examination Surveys (NHANES) and Youth Risk Behavior Surveys to measure cancer prevention guideline adherence in U.S. youth from ages 8-18 (Holman & White, 2011).

The results indicate that 6.2% of adolescents between 12-18 met fruit consumption recommendations and 2.2% met that of vegetables, while only 0.9% met recommendations for both (Holman & White, 2011). Whole grain results were also low, with 3.4% of adolescents meeting recommendations (Holman & White, 2011). So where are calories coming from? The results above suggest that they must be coming from energy dense foods (Holman & White, 2011). As for red meat, with the WCRF/AICR recommendations of a 18oz serving per week (Miles, 2008), the NHANES report of adolescents ages 12-16 consumed 1-2 servings of red meat per day and nearly one serving of processed meat per day, which was recommended to avoid altogether (Holman & White, 2011). Although dietary guidelines recommend sodium consumption of 2300 mg/day or less, the NHANES reported males consumed approximately 4266 mg/day and females consumed 2950 mg/day (Holman & White, 2011). This rationale is why I would like

to focus on adolescents aged 8-18 for further study.

Gaps between prevention guidelines and reality of adherence

According to the American Cancer Society's annual report, Cancer Facts & Figures 2014, the obstacles of adherence to cancer prevention guidelines surface with recommendations from large organizations for public policy change (American Cancer Society, 2014). Now more than ever, research has agreed that the environments in which people live, learn, work, and play have an increasingly large impact on their ability to eat healthy foods and practice adequate physical activity (American Cancer Society, 2014). Obesity rates in adults and young children have tripled over several decades, in 2010 children between 2- 19 years of age, 17% were obese, of that group African Americans represented 24%, Hispanics 21%, and non-Hispanic whites 14% (American Cancer Society, 2014). Adoption of the guidelines to a physically active lifestyle, the challenges reported were that 25% of adults had no leisure-time activity (American Cancer Society, 2014). Only 49% met the minimum recommendations for moderate activity, while youth represented 37% of the same measure (American Cancer Society, 2014).

According to Cancer Facts and Figures 2014, barriers that contribute to obesity are: limited access to affordable and healthy foods, large portion sizes notably in restaurant servings, marketing of food and beverages high in caloric, fat, and sugar content - especially aimed at children, schools, and worksites that do not offer healthy options or activities, poor community design that does not offer safe or accessible space for physical activity which in turn promotes sedentary activity, and lastly, economic and time constraints (American Cancer Society, 2014).

Overall, conclusions for cohort studies agree that adherence to guidelines in populations in poor, limited access areas of low SES have an increased and disproportionate disadvantage

in adhering to cancer prevention guidelines; and that development and implementation of targeted intervention programs are needed at all levels (Akinyemiju, McDonald, Tsui & Greenlee, 2014; American Cancer Society, 2014; Csizmadi et al, 2014; Holman & White, 2011; Masset et al, 2009; Mayer et al, 2007; Simmonds, Mitrou & Wiseman, 2014). With that I would like to steer toward a geographical perspective, honing in on "food deserts" in the United States. Food deserts are poor, urban areas that lack sources of healthy, affordable food (Caspi et al, 2012). Within food desert neighborhoods, the obstacle can be distance to a supermarket or a perceived lack of access to healthy foods (Caspi et al, 2012). Perceived notions of access have a great impact on fruit and vegetable consumption, with intake around 0.5 servings/day (Caspi et al, 2012).

Summary

Next is a method for observation, survey, and analysis; identifying the gaps in available nutrition, access to safe parks and areas for physical recreation, advertisement of fast foods and, public health campaigns. In the analysis of adherence studies, we learned that the higher the SES the greater adherence to guidelines. Another discovery is that children are the least likely to meet weight, nutrition, and physical activity guidelines, while being a population whose diets are largely controlled by parents and schools, and whose success in meeting guidelines has the most promise for reduction of lifetime cancer prevalence. What are the unmet needs of children living in low SES, food insecure neighborhoods, that prevent adherence to cancer prevention guidelines?

Proposed Methodology

Purpose of Research

While the adherence studies above demonstrate that populations of higher SES are more likely than those of low SES to adhere

to CPGs—with children showing the lowest consumption of healthy foods, research does not take explanatory measures. I propose qualitative research into groups of lowest adherence, to identify obstacles that present health risks. Once obstacles are identified, observed knowledge of communities can be further studied to develop effective public health policies.

Due to the exploratory search for greater depth into social problems facing the population in food deserts and the inductive search for obstacle clarity for theory development, ethnographical field research is the appropriate mode of observation. The variables require direct observation, data processing, and analysis, however in a cyclical process which other modes would not allow (Babbie, 2011). The gaps in knowledge are evidence that hypothesis testing is not singularly adequate for creation of social change. An understanding of the reality the population faces will provide a plethora of data for analysis. From that analysis a new theory for focused and effective public health policy can unfold, but with greater validity for these geographical populations. The variables will allow me to perform as an observer, in line with goals for positive social change, which allows for more transparency and development of rapport.

Population and Sampling

The population will be children and families in schools with greater than or equal to 40% of children receiving free meals via the National School Lunch Program within designated food desert neighborhoods. This will allow for a controlled group of analysis, where Income Eligibility Guidelines are controlling for participants at or below the 100% Federal poverty guideline (Food and Nutrition Service, USDA, 2014). Due to the ethnographical nature of the proposed research, I would like to observe various populations matching this description in school districts with highest rates of childhood obesity. The population will include students from ages 8 to 18, to account for a variety of

needs at different levels of interest. As for sample size, I would like to measure at least 50 students or families within each school district observed.

Units of Analysis and Observation

Units of analysis in this study are neighborhoods. The units of observation are individuals. The community-based nature of this inductive proposal requires gathering information from individual accounts for improved analysis and definition of needs facing specific neighborhoods. More directly, the neighborhoods are defined as those holding the food desert designation. Individuals for observation will be those students registered on the NSLP within their districts.

Sample Type and Strategies

I will be using purposive sampling in the initial stages of my research. As we are seeking detailed validation of personal experience for a specific disadvantaged group with intent for clarity of obstacles preventing equal opportunity in health advantages, it is best to study the population directly. Purposive sampling is the mode of selecting the population that will be studied. Once on location, the school district will have a list of students utilizing the NSLP, which will allow for a shift into systematic sampling.

Sampling from the National School Lunch Program as the strategy for observation will unfold as each school is approached. Being that the NSLP is a Federal program, every school district will have the information available, and have controlled for income inclusion. Based on the size of the NSLP list, a sampling interval will be implemented to select the specific units of observation. The initial selection will be done at random, with the systematic approach utilized thereafter.

Variables

The measurement of each variable will be conceptualized with the holistic intent to identify the naturally occurring social organization within each neighborhood by assessing the availability and quality of social programs, public spaces, and availability of healthy food choices.

Access to healthy foods, produce as an independent variable will measure a social-ecological approach of access to food stores based on distance from one’s home. Access to food stores, being supermarkets, grocery stores, or markets, has an effect on individual well being and the ability to adhere to diet recommendations (Sharkey, Horel & Dean, 2010). Indicators will be distance in miles to nearest food store with unprocessed produce available. Another indicator will be presence of a usable vehicle, which would compensate for distances greater than one mile. The level of measurement for this variable will be a scale of 1 to 5.

Advertising within community (of fast and processed foods) as an independent variable will

be measured indirectly via access to historical data and directly via in person observation. The presence of marketing materials within school grounds via vending machines, school lunch programs, and marketing in areas within the community via billboards and other visual simulations. The indirect measure will be historical data of dollars spent within these communities to advertise fast or processed foods via television and radio. The level of measurement will be decided during data analysis, as the results will have to be post coded.

Age as an independent variable will be measured indirectly through individual response via questionnaire. Age is a concept that will offer more conceptualization through interviewing and questionnaire response. Meaning, over responses to other variables, patterns of access, dietary habits, and other responses may prove to show more patterns with age correlation. Operationally, the variable will be measured as reported via questionnaire in Appendix I.

Physical activity in school as an independent variable will be measured from the availability and level of engagement in physical education

Table 2. Type and List of Variables.

Cancer Prevention Guideline	Adherence
1. Be as lean as possible within the normal range of body weight.	Maintain body mass index within normal range from childhood through adolescence and into adulthood
2. Be physically active as part of everyday life	Walk at least 30 minutes a day, as fitness improves aim for 60 minutes of moderate or 30 minutes vigorous exercise
3. Limit consumption of energy-dense foods and avoid drinks with high sugar content	Consume energy dense food sparingly, avoid sugar drinks, consumer fast foods sparingly, if at all
4. Eat mostly foods of plant origin.	Eat at least five portions of non-starchy vegetables and fruits each day, limit refined starches, relatively unprocessed grains or legumes with every meal
5. Limit intake of red meat and avoid meat that’s been processed	If eating meat, consume less than 18oz a week and little to no processed meat
6. Limit alcoholic drinks	If consumed, limit to no more than two drinks per day for men and one drink per day for women
7. Limit consumption of salt, avoid moldy grains or legumes	Avoid salt preserved foods, limit processed foods with added salt to ensure intake of less than 6g/day, do not eat moldy cereal or beans
8. Aim to meet nutritional needs through diet alone	Dietary supplements aren’t recommended in the prevention of cancer

programs, the requirement for student participation and the perceived importance of participation from the individual perspective. The availability of physical education programs will be operationalized via direct observation,

Table 3. Level of Measurement for Access to Food Stores, Produce.

Measure	Distance to Food Store
1	0 - 1 mile
2	>1-2 miles
3	>2-3 miles
4	>3-4 miles
5	>4 or more miles

noting the presence of the program, variety of activities offered, presence of gym recreation, and/or fields for outdoor play. A measurement of 1 will be given to schools showing all options (program, activities, gym and fields), 2 if the school displays three of four options, 3 if they have two of four options, 4 if they have one of four options and 0 if they have no options available.

Physical activity programs in the community as an independent variable will be measured by presence of recreation centers offering intramural sports to children and accessibility to parks via distance to one’s home. The presence of recreation centers offering intramural sports to children will be operationalized directly, by visiting each site and gathering data of sports offered and to what age groups. By interviewing program staff, a collection of enrollment participation for each sport will be measured, again, having more definition after cite site visit. Accessibility to parks will be measured in miles of distance from one’s home (Table 4).

Dietary habits as an independent variable will be measured directly within the school community and indirectly through the construct

of a questionnaire given to students (See Appendix 1). The direct in school observation will require multiple site visits during meal times to each school in the study, allowing for measurement of food choices available and choices made over time. If possible, collection of historical ordering and discard will be attained for the lunch program, indicating what the school district is ordering, what’s being sold, and what is discarded at the end of each meal period. A questionnaire will be developed for the sample student population with aim of their perception of their dietary habits, questions will be asked from a variety of angles to attempt increased reliability, while maintaining a maximum of 10 questions, to increase participation and completion of the questionnaire.

Family Size, Presence of a primary caregiver and Sex as independent variables will be measured indirectly. If allowed and accessible, the information will be gained through the school district NSLP database. There is a degree of assumption indicated after literature review that the presence and value of these control variables has a degree of correlation with adherence to dietary guidelines. With family size demanding increased quantities of food and therefore increased financial resources from the family, the quality of food in the home is likely affected. The presence of a primary caregiver would represent the likely preparer of the food. Their presence in the home, and the degree in which they spend time in the home is a likely indicator of quality of food available to

Table 4. Level of Measurement for Access to Parks.

Measure	Distance to Park Space
1	0 - 1 mile
2	>1-2 miles
3	>2-3 miles
4	>3-4 miles
5	>4 or more miles

children. Lastly, the sex of the individual may show correlation to food choices and, physical activity both within and outside of school.

National School Lunch Program will operate as a control variable, keeping the sample within this federal program ensures that all observed individuals come from families within the same poverty level income brackets, which is also based on family size (Food and Nutrition Service, USDA 2014). Using this control maintains consistency both within and outside the school district. Reliance on this system allows for each school observed fitting within the same social parameters.

Adherence to cancer prevention guidelines ultimately serves as the dependent variable. Adherence will be measured as a result

of collection and analysis of responses of independent variables. Once all data is cleaned and analyzed meaningful results will be produced. The guidelines available and low adherence by school aged children shows promise for compelling results. As Holman and White indicated in their 2011 study, 0.9% of U.S youth and adolescence meet adherence to both fruit and vegetable consumption per CPGs. This fact alone indicates we have selected an appropriate population to study. And with the accessibility issues facing food deserts and the clear impact on health advantages, the place of study is ultimately important (Sharkey, Horel & Dean, 2010). The results of this variable will give clarity to the degree at which this population faces adversity in terms of health inequality.

Appendix I: Proposed Project Timeline.

Task	June-August	Sept.-Oct.	Nov.-Jan.	March-May	June-August	Sept.-Oct.	Nov.-Jan.	March-May
Complete Approved Proposal								
Operationalize Variables								
Selection of School Districts								
Physical Integration								
Sampling for Units of Observation								
Direct Observation								
Data Processing								
Data Analysis								
Development of Results								

**Appendix II: Sample Student Questionnaire-
Obstacles of Adherence to CPGs**

1. Where do you normally shop for your groceries?
Please name the grocery store and location below
2. Who goes to the grocery store with you?
3. What transportation do you use to travel to the grocery store?
Select ONE that you use most often:
 Walk
 Bike
 Bus
 Drive
4. Do you participate in PE activities?
 Yes
 No
 Give a reason for your answer:
5. On the weekends and after school, do you go to the park?
 Yes
 No
6. If you do, what is your favorite park to play at?
7. What kind of lunch do you eat most days?
 Hot (from school cafeteria)
 Cold (brought from home)
8. What is your favorite food to eat at lunch?
9. What is your least favorite food to eat at lunch?
10. If you could pick one food to be added to the lunch menu, what would it be?
11. Sex
12. Family Size
How many people live at your house?
 Male
 Female
13. Age
14. Who cooks dinner at home?
 5 -7
 8-10
 11-13
15. Do you like to help?
 14-16
 Yes
 17-19
 No

Appendix III: Script for Qualitative Interviews

1. Where do you normally grocery shop? What's the name of the store? Where is that located?
2. Do you go to the grocery store? Who usually goes along?
3. How do you get to the grocery store? Do you walk, ride your bike, take a bus ride or ride in the car with your family?
4. Do you go to a PE class? Do you go every day? What do you do in PE? What is your favorite activity in PE?
5. On the weekends, do you go to the park with your friends or family? Who do you go with?
IF a negative response: Why don't you go to the park? What would make the park a better place to play?
6. Do you have a favorite park? What would your dream park look like?
7. Do you usually eat a hot lunch or do you bring your own from home?
8. What is your favorite food that you eat from the cafeteria? **OR** What is your favorite lunch that you pack from home?
9. What is your least favorite food to eat at lunch? Why?
10. If you could add one item to the lunch menu at school, what would that be? Why?
11. Direct observation of sex - no script
12. How many people live at home with you? Do you have brothers or sisters at home? Do you have a Grandma or Grandpa at home?
13. How old are you?
14. Who cooks dinner for you most nights?
15. Do you like to cook? Do you ever help cook dinner?

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