**CHS200 Fall 2018 Take Home Midterm Exam**

**A. Identify one important problem of global health you are interested in. Describe the global health problem briefly and one intervention/program approach that could be used to address the problem with the goal to reduce the related disease burden. Discuss i.e., not just listing but explain, each 3 important strengths and 3 important limitations of your approach.**

Obesity, abnormal or excessive fat accumulation that may impair health, is a growing global problem and has nearly tripled on a worldwide scale since 1975 ([WHO], 2018). According to data from 2016, both adults and children are afflicted, with more than 1.9 billion adults and over 340 million children and adolescents suffering from being overweight or obese ([WHO], 2018). Childhood obesity, in particular, has reached epidemic levels, in developed and developing countries. Childhood obesity increases the risk for cardiovascular disease, diabetes, high blood pressure, high cholesterol, cancers, and premature death and disability in adulthood ([WHO], 2018). Obesity is preventable, with many modifiable lifestyle risk factors ([WHO], 2018). The main contributors of obesity have been found to be the increased intake of calorie dense, but nutrient poor foods combined with the increase of physical inactivity due to the sedentary nature of most work, school, and transportation environments in a rapidly modernizing society ([WHO], 2018). Most interventions aim to prevent and treat obesity by having individuals limit their energy intake, especially those from fats and sugars, increase consumption of fruits, vegetables, and whole grains which are more nutrient rich, and engage in regular, moderately intense physical activity. One intervention approach to tackle the problem of obesity, when it comes to preventative and treatment measures, that has been particularly effective according to some research articles is the school-based interventions among children (Verrotti et al., 2014; Groziose et al., 2016; Blaine et al., 2017). It has been shown that lifestyle changes in adulthood are hard to implement, so interventions in childhood to educate the more malleable youth toward healthy eating habits and physical activity may be effective ways to combat obesity.

The strengths of a school-based intervention are that it may be more effective in the long run than interventions on adults. Food habits and the foods children are exposed to at an early age are predictive of a child’s future food habits and preferences (Groziose et al., 2016). Therefore, diet changes in childhood would be more likely to be sustainable into adulthood rather than trying to attempt a drastic change of diet in adulthood. Another advantage of school-based interventions is in the setting itself. Schools have been targeted in interventions due to the long hours the children already spend at school, a time period of which usually encompasses the normal meal times for both breakfast and lunch (Groziose et al., 2016). Since these meal times happen during school hours, it is more feasible than at other settings to implement a nutrition related intervention, such as the execution of a healthy substitute in the provided school meals. Schools are also chosen due to their accessibility- schools can reach a large number of children in a short period of time (Groziose et al., 2016). Additionally, school-based interventions are often very cost effective (Groziose et al., 2016). Minimal supplies would be required, of which most costs would be a one-time expenditure to purchase necessary materials such as educational pamphlets and portion model kits, and the staff required to educate the students, the classroom teachers, would already be available in the school setting. In terms of the medical costs and Quality Adjusted Life Years (QALYs) saved per student, the school-based interventions would be very cost-effective (Groziose et al., 2016).

One of the limitations of school-based interventions is that they may rely heavily on BMI as a measurement of body fat in order to determine the overweight and obese cutoffs for children. This may be due to the simple, fast, non-invasive nature, and low cost of the method. Body mass index (BMI) is commonly used to classify overweight and obesity in adults, defined as an individual's weight in kilograms divided by the square of his height in meters. However, there is no clear consensus on the cutoff point for excess fat in children and adolescents (Verrotti et al., 2014). BMI may not be a useful tool for children because children are still developing their body as they grow. BMI also fails to distinguish between fat, muscle, and bone, which may misclassify muscular children as overweight or obese. Additionally, BMI fails to acknowledge that growth rates and healthy body compositions differ between genders and ethnic groups (Verrotti et al., 2014). Another weakness could be due to the school-based intervention’s insufficient blinding and selection bias. Recruitment strategies, such as getting permission from the parents to get the children in the program or having the children participate in the program due to a passive consent process may introduce bias. This selection bias means that proper randomization is not achieved and the sample for the intervention would not be representative of the intended population. Also because of how the intervention is linked to behavior change, school-based interventions find it difficult to blind the participants and the researchers evaluating the intervention program. Lack of blinding would lead to overestimation of treatment effects. More limitations could be that the staff at the selected school are already burdened with the normal school load, and the lack of teacher time and administrative support may lead to a poor execution of the intervention. If the lack of support from teacher and staff persist, sustainability of the intervention would also become an issue (Blaine et al., 2017).

**References**

Blaine, R. E., Franckle, R. L., Ganter, C., Falbe, J., Giles, C., Criss, S., . . . Davison, K. K. (2017). Using School Staff Members to Implement a Childhood Obesity Prevention Intervention in Low-Income School Districts: The Massachusetts Childhood Obesity Research Demonstration (MA-CORD Project), 2012–2014. *Preventing Chronic Disease,14*. doi:10.5888/pcd14.160381

Graziose, M. M., Koch, P. A., Wang, Y. C., Gray, H. L., & Contento, I. R. (2017). Cost-effectiveness of a Nutrition Education Curriculum Intervention in Elementary Schools. *Journal of Nutrition Education and Behavior,49*(8). doi:10.1016/j.jneb.2016.10.006

World Health Organization. (2018). Obesity and overweight. Retrieved from http://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight

Verrotti, A., Penta, L., Zenzeri, L., Agostinelli, S., & Feo, P. D. (2014). Childhood obesity: Prevention and strategies of intervention. A systematic review of school-based interventions in primary schools. *Journal of Endocrinological Investigation,37*(12), 1155-1164. doi:10.1007/s40618-014-0153-y

**a) Information on cause specific mortality data remains difficult to obtain, even in many middle-income countries. One method has been used increasingly for judging the likely cause of death. Which method is meant? Please name and describe briefly with 3 key elements the underlying basic approach.**

Verbal autopsy has been increasingly used for judging the likely cause of death.

Verbal autopsy is a combination of

* a structured interview of family or caregivers
* the algorithms of trained professionals

in order to determine cause of death, especially in cases where deaths take place outside of a medical facility and medical certifications are difficult to procure.

Verbal autopsy is used in settings where

* the cause of death is not available
* where the cause of death is not routinely collected
* where people are not registered.

**b) Summary measure: a. What are the two major components of the disability adjusted life year (DALY) summary measure? b. Briefly describe the basic main concept underlying this summary measure that allows combining mortality and morbidity.**

DALY = YLL + YLD

Years of Lost Life (due to mortality) and Years Lost to Disability (due to injury & illness)

The Disability Adjusted Life Year summary measure is the sum of years of potential life lost due to premature mortality (YYL) and the years of life lost due to disability (YLD) and combines the measure of burden of disease in a population.

**c) A large proportion of global child deaths could be prevented by currently available basic methods and technologies. Give three examples of interventions (methods and technologies) and the related diseases that could be reduced if the intervention would be applied successfully.**

Malaria during pregnancy increases the risks for pregnancy complications and low birth weight. One of the most effective methods to prevent death from malaria are insecticide treated bed nets, where there was a 17% reduction of all cause child mortality in malaria endemic areas.

Pneumonia kills an estimated 1.4 million children under the age of five years every year. One preventative intervention is the use of vaccines.

Water and food borne bacteria and parasites cause infectious diarrhea, which cause more than 1 million deaths per year, largely due to fluid and electrolytes loss. With improved sanitation and access to safe and sufficient water, there can be up to a 88% reduction in diarrhea.

**d) Many LIC do not have functioning vital registries. Please briefly describe 2 main problems (discussed in lecture) that can result from this.**

A large proportion of births are not registered and mortality data are not recorded in low income countries.

1. The registration of a birth establishes one’s legal existence and provides the individual certain benefits and protections. Without it, a person may be left unprotected.
2. Without documentation, low income countries have difficulty gathering accurate statistical data for policy makers to enforce policies and deliver services for the public health. Vital registries are also a critical part of keeping track of the progression toward Sustainable Development Goals (SDGs). Without complete and accurate vital registries, the achievement and measurement of SDGs are compromised.

**e) This question (e) asks for a slightly longer response (in 150-350 max words) e) The epidemiological transition as discussed in class describes a transition/shift in disease occurrence observed globally. Pick 2 relevant aspects related to this and discuss briefly from a “global health” perspective**

The epidemiologic transition describes a shift from which the burden of mortality and disease gradually changes from infectious diseases to non-communicable chronic diseases. This epidemiologic shift happens due to several contributing factors.

One major underlying population trend has been urbanization. Urbanization is the increasing percentage of the population moving from rural to urban areas. The process is often linked to significant demographic, social, and economic changes such as rapid modernization, increased industrialization, and rising incomes. These changes have led to lifestyles characterized by malnutrition (with increasing consumption of calorie dense but nutrient deficient foods), reduced physical activity and tobacco consumption, associated with risk factors of chronic non-communicable diseases such as diabetes, hyperlipidemia, and obesity.

Another related aspect to the epidemiologic transition is the demographic shift in which mortality rates and birth rates drop. Mortality rates first drop sharply with improving health care. Infectious diseases become much more controlled or nearly obsolete, especially in the younger population, which contributes to both population growth and the drop in mortality rate. Birth rates continue to be high in developing countries as children are needed for the labor force and children are born due to lack of contraceptives and low educational attainment for women. Over time as country develops, further developed countries tend to have a lower fertility rate due to lifestyle choices associated with economic affluence where mortality rates are low, birth control is easily accessible and children often can become an economic drain due to the financial costs of raising children (education, housing).