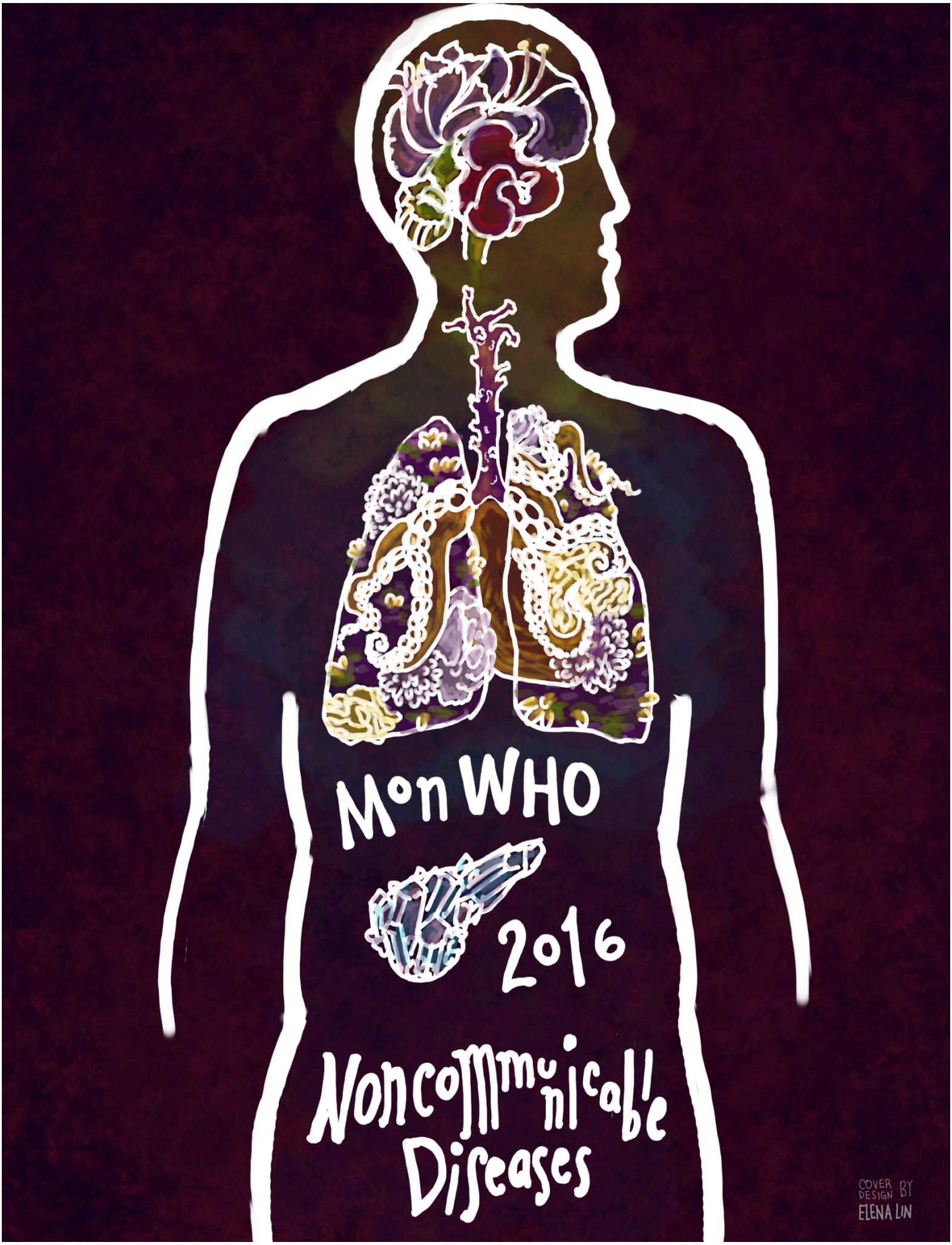
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WHAT IS MONWHO?

Healthcare is not limited to the interactions between patients and doctors within the walls of a hospital. Healthcare, especially in the context of global health, is a multifaceted, multidimensional discipline that incorporates both the intellect of science and the dynamics of the social community. The Montreal World Health Organization Simulation (MonWHO) is a conference that aims to promote a macroscopic perspective of global health, and to draw attention towards the social, cultural, ethnic, economic, and political factors of international relations that affect the global health care system. In 2007, MonWHO executives hoped to create a conference where students from any field of study could collaborate to broaden their perspectives of international health. MonWHO has grown substantially since its inaugural conference and is now supported by the McGill International Health Initiative (MIHI). In 2009 and 2010, MonWHO hosted the Global Health Advocates of the Canadian Federation of Medical Students (CFMS). In 2010, MonWHO was established alongside the European World Health Organization Simulation (EuWHO) as part of a transnational project of the International Federation of Medical Student's Association (IFMSA).

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OUTLINE

I) INTRODUCTORY REMARKS

Our theme this year is noncommunicable diseases (NCDs). NCDs comprise a wide spectrum of disorders, which include but are not limited to cardiovascular diseases, cancers, respiratory disorders, diabetes and mental health. About 38 million individuals succumb to NCDs every year, and this number is on the rise especially in low and middle-income countries. Often qualified as the "silent killer" because of its insidious nature, NCDs are an alarming problem in all regions of the world. Delay in diagnosis, low care seeking behavior, poor accessibility to health care and lack of effective and affordable treatments, are important contributing factors at the source of NCDs increasing prevalence.

Whether you joined the battle against NCDs through volunteering or perhaps pondered about the many individuals receiving a diagnosis of cancer every day, by joining us this year and raising awareness, you are being part of the effort needed to tackle this issue.

As delegates, you will explore the topic of NCDs through the lens of policy makers and leaders. It would be most useful to get acquainted with the main topics of this guide, and complement your knowledge with readings specific to the region you are representing.

The MonWHO Theme Team would like to thank you for joining us in this enriching journey and look forward to meeting you all!

Marieme Dembele

Theme Director, MonWHO 2016

II) DETERMINANTS OF NONCOMMUNICABLE DISEASES

There are a diverse range of risk factors that increase an individual's susceptibility to developing a noncommunicable disease (NCD). Different categories of risk factors can lead to increased probability of onset for different types of NCDs such as obesity, heart disease, cancer, and so forth. The four major risk factors for NCD are tobacco usage, an unhealthy diet, physical inactivity, and harmful use of alcohol.[1]

Table 1. The common risk factors shared amongst the four main NCDs.[2]

		Common modifiable risk behaviours for NCDs			
		Tobacco use	Harmful use of alcohol	Physical inactivity	Unhealthy diet
NCDs	Cardiovascular disease	√	√	√	√
	Diabetes	√	√	√	√
	Cancer	√	√	√	√
	Chronic respiratory disease	√			

a. Individual

At the individual level, risk factors manifest in terms of genetic or hereditary influences. There are genetic factors have been found to increase risk of onset for certain NCDs, creating a sort of genetic predisposition to these diseases.[3] *Genetic predisposition does not necessarily determine if a person will acquire the disease, but can significantly increase the likelihood. It can be caused by the presence of one gene, the complex interaction of multiple, genetic mutations, or the presence of abnormal alleles.*[4]

Cancers occur due to mutations in cells that cause uncontrollable cell growth, forming malignant tumors in the body. Genetic instability and loss of differentiation can be the consequence of mutations in important genes such as suppressor genes, oncogenes, and genes involved in DNA repair. Cells are no longer able to balance growth and death (apoptosis), causing undifferentiated,

[1] *WHPA Statement on Noncommunicable Diseases and Social Determinants of Health. (2010, December 1).*
[2] *Bell, R., Lutz, B., Webb, D., & Small, R. (2013, October 1). Addressing the Social Determinants of Noncommunicable Diseases.*
[3] *World Health Organization (n.d.) Genes and human disease.*
[4] *Ibid.*

rapid cell growth. These cells with invade neighbouring tissue and spread through the body via the blood stream or the lymphatic system.[5]

While many cancers are more primarily determined by lifestyle and environmental risk factors such as smoking and dietary habits, certain genetic mutations can significantly increase risk for development of cancer. The mutation of the BRCA 1 gene is inherited and albeit rare, accounting for only 5% of the causes for breast cancer, can increase the risk of developing breast or ovarian cancer to a 70% lifetime risk for affected family members.[6]

Cardiovascular diseases (CVD) are another subcategory of NCDs that may be linked to genetic risk factors such as single gene mutations and complex genetic interactions. Atherosclerosis, a disease in the arteries characterized by plaque build up, can lead to a breakdown of arterial wall resilience and leads to an increase risk of coronary heart disease and is being recognized as having developed in stages as early as childhood.[7] *Observations from epidemiological studies have shown a link between small birth size and later risk of CVD, leading to the conclusion that CVD and related diseases may be programmed into the uterus from the persistence of endocrine, physiological and metabolic adaptions of the fetus due to malnourishment.*[8]

Chronic obstructive pulmonary disease (COPD), a lung disease including bronchitis and emphysema, is influenced by genetic risk factors. A mutation in the alpha-1 antitrypsin protein has been shown to be a risk factor for development, and could lead to a more rapid decrease in function of adult lungs.[9] *Other NCDs such as asthma and diabetes are also believed to be caused by certain genetic factors, however the exact determinants from genetic factors and hereditary are not completely understood.*[10]

b. Environmental

Health inequities in structural frameworks can magnify the causes and risk factors for NCD distribution in the population. There are patterns of health inequities that emerge across racial, gender, and socioeconomic lines that contribute to disproportionate prevalence of NCDs for different social groups.

For example, there are four main behavioral risk factors that have been acknowledged as being the main contributors to onset of NCDs. However, these risk factors are found at different rates in different subsets of the populations, illuminating the inequity in distribution of health determinants. Tobacco usage and physical inactivity have been linked to increased onset of a noncommunicable

[5] *Ibid.*
[6] *World Health Organization (n.d.) Genes and human disease.*
[7] *Miranda, J., Kinra, S., Casas, J., Smith, G., & Ebrahim, S. (2008, October 13). Non-communicable diseases in low- and middle-income countries: Context, determinants and health policy.*
[8] *Ibid.*
[9] *Ibid.*
[10] *Ibid.*

disease, but cigarette smoking is far more common amongst the lower socioeconomic class globally.[11] *For individuals stratified across rural/urban communities, those living in areas of increased urbanization may be at a higher risk of developing an NCD due to a correlation with decreased physical activity. Lower rates of physical activity in urbanized areas, paired with changing diet trends towards foods that are high in trans-fats, saturated fats and are processed, can increase the risk of obesity specifically.*[12]

Researchers have begun to refer to NCDs as "diseases of urbanization", as many studies have indicated that there is a higher level of high blood pressure and other risk factors in urban areas versus rural areas.[13] *Many of these risk factors are also consequently tied to poverty, and a feature of increased urbanization is an increased proportion of those living in poverty. India serves as an interesting case study, with a growing urban population and a startling growth in proportion of the population living in poverty. Projections predict that while the population will double in the next 10 years, the population of the urban poor will double in only 5 years.*[14] *The urban poor are at a heightened risk for onset of NCDs given their increasingly urbanized lifestyle, as well as a lack of purchasing power denying them access to a healthy diet and proper healthcare.*[15]

In regions such as China and other Asian countries in the second stage of development, the burden of infectious disease decreases and nutrition generally has been improving.[16] *Diseases more common here include ones related to hypertension such as hemorrhagic strokes and hypertensive heart diseases.*[17] *When life expectancy grows, the risk of NCDs grows in tandem as high fat diets become more prevalent, smoking, and inactivity become more popular too. In developing and middle income countries, NCDs usually predominate the burden of disease, with the atherosclerotic CVD holding the highest mortality rate for those below 50 years of age. The increased incidence of CVD is a compounding burden on top of pre-existing infectious, nutritional and perinatal diseases.*[18]

Countries in situations of extreme social upheaval or war can had extremely damaged health infrastructures, leading to NCD prevalence similar to those in second stage countries. The barrier that social chaos serves can deter access to proper health treatment, such increasing the risk of addressing primary risk factors for NCDs. This is called a regressive stage, where there are increased deaths due to both CVDs and non-CVDs such as infectious diseases, or violence.[19] *Russia is an example of a country undergoing such a transition, where life expectancy has dropped in the last 10 years. In addition, deaths related to CVDs, infectious diseases, accidents and violence have increased.*[20]

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[11] *Bell, R., Lutz, B., Webb, D., & Small, R. (2013, October 1). Addressing the Social Determinants of Noncommunicable Diseases.*
[12] *Bell, R., Lutz, B., Webb, D., & Small, R. (2013, October 1). Addressing the Social Determinants of Noncommunicable Diseases.*
[13] *Anand, K. et al (2007). Are the urban poor vulnerable to non-communicable diseases? A survey of risk factors for non-communicable diseases in urban slums of Faridabad. The National Medical Journal of India, 20(3), 115-115.*
[14] *Ibid.*
[15] *Ibid.*
[16] *Yusef, S. et al (2001). Global Burden of Cardiovascular Diseases. American Heart Association, 104.*
[17] *Ibid.*
[18] *Ibid.*
[19] *Ibid.*
[20] *Yusef, S. et al (2001). Global Burden of Cardiovascular Diseases. American Heart Association, 104.*

Political changes have played an influence in lifestyle choices that are risk factors for noncommunicable diseases. In Mexico, trade liberalization and foreign direct investment has perpetuated the availability of unhealthy food and drink products.[21] The North American Fair Trade Agreement (NAFTA) has played a role in the transition of nutritional habits in Mexico. The increase in foreign direct investment fuelled the growth of the food processing industry, as well as the distribution, marketing, and retailing of these processed foods.[22]

Similarly, trade liberalization in the Asia-Pacific region has also increased the availability of high fat, sugary, processed foods available in the market. Transnational food corporations have only expanded their presence in the regional markets, and have strongly influenced the shift in dietary trends.[23] These companies have the power to determine what products to sell, what price to sell at, and how to effectively promote their products, driving a shift towards cheap, processed food.

In India, intellectual property laws have limited accessibility to newly developed and patented NCD medicines as patents prevent the development of generic brands to compete. They are expensive and those from lower-income backgrounds are not able to acquire medicinal technology that is vital for secondary and tertiary prevention.[24]

c. Social/Economic

Noncommunicable diseases such as CVD and diabetes have been shown to affect groups of lower socioeconomic status disproportionately in high-income countries. Low levels of education have also been associated with increased risk of CVD in high-income countries, but evidence is mixed for low-to-middle income countries. Education has been inversely associated with diabetes prevalence across the globe however.

Obesity is considered an intermediate social determinant for NCDs[25]. Nutrition trends have shown that as countries develop, there is a shift in dietary choices higher socioeconomic groups to turn to unhealthy eating habits coupled with very low levels of physical activity. Countries then continue to urbanize and develop, proliferating the trend of unhealthy diets and lack of physical activity amongst all social classes.[26] Obesity is a major biological risk factor for CVD and diabetes, and often affects those with higher incomes in lower-income countries. The affect is reversed in high-income countries, where it affects those with lower levels of income and education.[27]

The major behavior risk factors often seem to be more prevalent amongst disadvantaged or lower status social groups. The marginalization of the rural poor has had a major impact on their eating

[21] *Bell, R., Lutz, B., Webb, D., & Small, R. (2013, October 1). Addressing the Social Determinants of Noncommunicable Diseases.*
[22] *Ibid.*
[23] *Bell, R., Lutz, B., Webb, D., & Small, R. (2013, October 1). Addressing the Social Determinants of Noncommunicable Diseases.*
[24] *Ibid.*
[25] *Ibid.*
[26] *Bell, R., Lutz, B., Webb, D., & Small, R. (2013, October 1). Addressing the Social Determinants of Noncommunicable Diseases.*
[27] *Ibid.*

habits, such as that of the pastoral Maasai of Tanzania.[28] Rapid changes in their eating habits has lead to higher blood cholesterol levels in this social group. Inadequate dietary choices can increase sensitivity to lifestyle related risk factors, specially in low-to-middle income countries where malnourishment is more prevalent.[29] Low birth weight in the Democratic Republic of Congo has been correlated with later disease outcomes in individuals. Poverty in Nepal has also led to a lower consumption of fruits and vegetables.[30]

Cultural norms between social groups can influence dietary trends. Some cultures may be more accepting or even preferential towards obesity or being overweight, as a sign of god health and vitality[31]. Studies conducted in groups such as Arabs in Niger, groups in rural Jamaica, Puerto Ricans in Philadelphia, have found that big body size and fat reflected signs of wealth, prosperity, beauty, fertility and a "closeness to God".[32] On the other hand, in many developed, industrialized nations have come to associate fatness with ugliness, laziness, failure and a lack of self control. Many developed first world countries have cultures that idealize a slim physique, and correlate such with beauty, health, self-discipline, and general success. These differences in cultural preferences can promote different streams of lifestyle choices that serve as risk factors for NCDs.[33]

[28] *Miranda, J., Kinra, S., Casas, J., Smith, G., & Ebrahim, S. (2008, October 13). Non-communicable diseases in low- and middle-income countries: Context, determinants and health policy.*
[29] *Ibid.*
[30] *Ibid.*
[31] *Bell, R., Lutz, B., Webb, D., & Small, R. (2013, October 1). Addressing the Social Determinants of Noncommunicable Diseases.*
[32] *Ibid.*
[33] *Ibid.*

CASE STUDY 1:
SOCIAL STRATIFICATION OF DISEASE: CANCER

The existing disparity in cancer outcomes across socioeconomic status and race has been the subject of recent empirical investigation. The American Cancer Society (ACS) recently combined census data sources on socioeconomic status, race, and cancer experiences to create a cohesive understanding of the issue. Their findings show that socioeconomic characteristics (like poverty, poor education, and lack of health insurance) play a larger role when it comes to cancer burdens than biological characteristics (Ward et al. 78). Race is also identified as a significant determinant, with African Americans experiencing the highest death rate from every cancer site combined (Ward et al. 80). The report identifies four key elements that exacerbate the health gradient: prevention, early detection, treatment, and palliative care. Each of these areas could be targeted with effective policy and thus represent opportunities to reduce current disparities.

Prevention refers to behaviors that can lead to the onset of cancer, such as sun-tanning and physical inactivity. Cultural differences and varying access to resources lead to behavioral differences by both race and socioeconomic status. Smoking rates, for example, are shown to be much higher for those with an income less than twice the poverty level (Ward et al. 85). Consequently, the carcinogenic effects of cigarette smoking contribute to the correlation between cancer rates and socioeconomic status. Targeted advertising schemes are believed to be at least partly responsible for this observable difference in behavior (Ward et al. 85).

Early detection describes the timeline of cancer diagnoses. Earlier diagnoses allow for more effective treatment and can reduce the spread of cancer throughout the body. Disparities exist concerning the stage at which cancer is typically diagnosed. Comparing mammogram testing by race, the ACS found that while 72.1% of non-Hispanic white women had a mammogram in the past two years, this number drops to only 52.0% for American Indians/Alaskan natives (Ward et al. 85). This fact has serious implications concerning the likelihood of survival after a cancer diagnosis across racial groups. Steven J. Katz and Timothy P. Hofer also found that socioeconomic disparities exist in the use of beast and cervical cancer screenings. This relationship was similar in both the U.S. and Canada, despite Canada's universal health care coverage (530). Thus, universal coverage does not sufficiently overcome existing disparities.

The element of treatment concerns differences in how cancer patients receive care after their initial diagnosis. Using five-year survival rates for patients at the same stage at diagnosis, African Americans have lower survival rates than Whites for many studied cancers (Ward et al. 88). It is important to note that little evidence supports the idea that biological differences determine tumor characteristics or treatment outcomes between African Americans and Whites. Thus, disparities in access to care and quality of treatment are believed to be the most probable explanations for the

differing survival rates. The findings of Martin L. Brown and Vickie L. Shavers support this idea. Their evidence shows racial disparities in the receipt of multiple treatment types, which are associated with adverse health outcomes among minorities (334).

Palliative care is defined as the "active total care of patients whose disease is not responsive to curative treatment" (Ward et al. 89) This end-of-life care typically aims to make patients as comfortable as possible, rather than necessarily curing disease itself. The evidence shows racial minorities with cancer have lower hospice use, although research is limited (Ward et al. 90). It is not completely clear whether the lack of use stems from differences in resources or from cultural attitudes. If the difference reflects cultural norms, the disparity might not be targetable through policy. However, if this is not the case, policy could promote the idea that all people deserve equal access to palliative care, making patients' final days as comfortable as possible.

To summarize, the ACS identified prevention, early detection, treatment, and palliative care as key elements that exemplify and exacerbate cancer disparities. Many other researchers have supported the ACS findings: for this paper specifically, Katz and Hofer have been cited concerning early detection, and the work of Brown and Shavers are relevant to treatment. This case study analysis concludes with the findings of Harold P. Freeman, whose study aims to identify the dominant determinants of cancer. Freeman finds evidence that race itself is a factor of the level of care a patient receives. Further, the "complex interplay of low economic class, culture, and social injustice" cause socioeconomic cancer disparities, with the most dominant factor being poverty (76). This evidence, along with the ACS report, makes the role of socioeconomic status and race clear in the development of cancer. These particular disparities in the context of cancer progression represent a more generalized issue in which social determinants impact health outcomes for all non-communicable diseases.

III) NCDS IN AFRICA

a. Epidemiology

NCDs are a major cause of concern even in Africa. Although overshadowed by the significant and persistent burden of disease caused by infectious disorders, malnutrition and maternal and child health; NCDs are projected to be the major cause of mortality in sub-Saharan Africa by 2030 (1) (2). As of 2012, NCDs accounted for more than 75% of all causes of death in northern African countries including, Egypt, Libya, Tunisia, Morocco and Algeria but only accounted for a small portion of all death in countries such as Niger that are still battling high incidence of communicable disorders and maternal and child health related deaths. We are witnessing a heterogeneous repartition of NCDs throughout Africa with the looming threat of an epidemic. Indeed, it is estimated that about half of all individuals living in sub-Saharan Africa have hypertension, which is a predisposing condition to neurological and cardiovascular complications (2). Furthermore, in 2005, the mortality attributable to cardio- vascular disorders surpassed that of HIV/AIDS related death by 5 folds (1). In addition, diabetes presents a significant challenge as diabetes related death in the region is experiencing the fastest rate of increase amongst all chronic disorders.

FIGURE 1: Proportion of Deaths by Cause in SSA, 2010

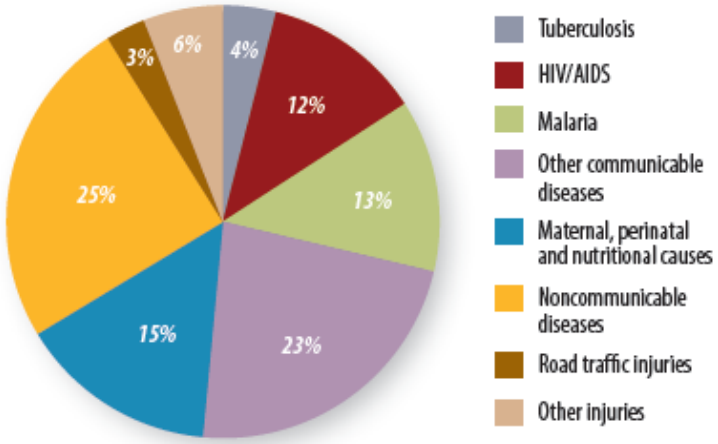


Figure 1: source (6). SSA: sub-Saharan Africa

b. Challenges

Economy

NCDs also affect the younger population and leads to premature deaths. Debilitating interventions and high health care costs also add a significant strain to the already fragile health care system and economy of low and middle income countries. Deaths due to NCDs affect twice as many individuals under age 60 in this area of the world compared to high-income countries (29% vs 13%), and the average age of NCDs onset is reported to start 10 years earlier in most low-income countries compared to high-income countries (3). These statistics mirror the significant impact NCDs engender in the workforce of most African countries.

Co-morbidities

The important burden of disease caused by infectious disorders such as tuberculosis (TB), Malaria, HIV/AIDS, maternal health and child health is unquestionable. These conditions are being tackled to various degrees in different parts of Africa and still necessitate interventions and attention. With the most recent outbreak of Ebola and now Zika virus for example, we also witnessed how communicable disorders can spread to diverse areas of the world. However, the misconception that NCDs is not prevalent in low and middle-income regions is wrong. Africa faces a gruesome challenge ahead since programs to combat both infectious diseases and NCDs are necessary. Furthermore, co-morbidities with infectious disorders facilitate increase of NCDs prevalence even though its worth noting that this situation can provide an arena to implement horizontal programs utilizing a more integrated health care approach. Most cancer cases in low-income regions have infectious origins and in Africa more than one third of cases belong to this category (more than double the global statistic)(3) (6). Cervical cancer is the most common cause of cancer related deaths in women from developing countries (90%); in particular, women in Africa have the highest incidence rate of cervical cancer worldwide. Cancer of the cervix is linked to infection with the human papilloma virus (HPV), a sexually transmitted virus. Therefore, women infected with the virus are at risk of developing cervical cancer. Early diagnosis is of paramount importance as early detection of changes in the cervix can facilitate mitigation of disease progression. Low-cost screening technologies are currently being implemented as effective preventive tools for cervical cancer. Visual inspection with acetic vinegar is a low cost screening system spearheaded by the NGO JHPIEGO, which allows for effective and low cost diagnosis and treatment (7). Liver cancer, which can be caused by infection with hepatitis C or B viruses, is also prevalent in Africa and COPD might increase risks for reactivation of TB (5).

Table 1: source (6).

TABLE 3: Common Cancers in SSA: Infectious and Other Risk Factors

Cancer sites, in rank order of incidence	Infectious agents	Other risk factors of high public health relevance
Breast		Hormonal/reproductive factors, obesity, physical inactivity, alcohol
Cervix	HPV	Tobacco
Liver	HBV, HCV	Aflatoxins (produced by *Aspergillus* moulds), alcohol
Prostate		
Lymphomas (non-Hodgkin and Burkitt)	EBV, malaria, HIV (indirect), HCV	
Colon and rectum		Diet, obesity, physical inactivity, alcohol, tobacco
Kaposi sarcoma	HIV (indirect), HHV8	
Oesophagus		Tobacco, alcohol
Lung		Tobacco
Stomach	Helicobacter pylori (bacterium)	Diets low in fruit and vegetables and high in salt, tobacco
Bladder	Schistosoma haematobium (fluke)	Tobacco, occupational exposure

Access to Health Care

NCDs embody their qualification as silent killers when they are not detected. Important challenges in tackling NCDs in Africa include diagnosis, lack of awareness and favorable policies, access and availability of proper health care as well as trained medical personal, and of quality infrastructures. Having to travel great distances to undergo important interventions can be an impediment to healthcare delivery as many cannot afford such trips. For example, Mali, the 24th largest country in the world observes one of the lowest hospital bed to per 10 000 inhabitants in the world which amounts to 1 in Mali compared to a world average of 30. In Tanzania, there are .16 pharmacists for each 10 000 inhabitants (6) (8). In addition to access, health related expenses are in general very high and consists mostly in out of pocket expenditures in most regions of Africa where health insurance coverage is often a luxury. For example, treatment for diabetes can cost up to half the yearly wage of a family (8).

c. Interventions

Data collection allows assessment of the prevalence and progression of diseases, increases awareness within policies makers and citizens, and facilitates planning and implementation of public health strategies. The Stepwise Approach to Surveillance (STEPS) is a standardized tool to collect data created by WHO which is used to allow uniform data collection worldwide. In 2012, twenty African countries used the survey to monitor trends in diabetes and hypertension; this initiative is an important step towards mitigating these disorders (6).

Africa's mobile phone industry is experiencing a height in expansion; surpassing even that of Europe and America. mHealth, which stands for mobile health, facilitates the practice of health through the use of mobile technologies. mHealth can be an effective tool to curbing the significant economic and burden of disease NCDs are expected to engender. Specifically, mHealth can support disease prevention strategies by texting health advices, help administer and collect surveys and sustain communication between health practioners and patients. mHealth is already widely and successfully used to tackle disorders such as HIV/AIDS in Africa (10). In context of telemedicine, networks such as The Réseau en Afrique Francophone pour la Télémédecine (RAFT) facilitates communications between experts and health professionals situated in "medical deserts". This type of network also allows for medical and public health training as well as long distance medical consultations (11).

Addressing both NCDs and infectious disorders through integrated programs is another important intervention. In South Africa, the PALSA PLUS (Practical Approach to Lung Health in South Africa) ensures that health professionals approach diagnosis by following specific guidelines to facilitate better detection, and accuracy in diagnosis of lung related disorders such as TB and/or asthma. In Zambia and Botswana integrate HIV care and cervical cancer using the "see and treat" strategy increased screening of HIV positive women followed by immediate treatment through cryotherapy when needed (6).

CASE STUDY 2:
STIGMA IN YOUNG ADULTS WITH SICKLE CELL DISEASE

Background

Sickle cell disease (SCD) describes a group of hereditary blood disorders that affect hemoglobin, the protein in red blood cells that carries oxygen throughout the body. Individuals with the disease have abnormal type of hemoglobin called hemoglobin S, which causes red blood cells to assume their sickled shape. The disease is not contagious; it can only be passed on from parent to offspring[1].

Signs usually appear during infancy and include but are not limited to acute pain, priapism (involuntary, persistent and painful erection), leg ulcers, fatigue, strokes, gallstones (small stones in the gallbladder), acute chest pain, and bacterial infections. The severity of the disease can vary from person to person, leading to some individuals exhibiting mild symptoms requiring limited attention while others exhibit severe symptoms requiring frequent hospitalization[1].

According to the World Health Organization, the disease is observed most commonly in people of African ancestry, but it is also found in individuals of Hispanic, Mediterranean, Indian and Arab descent. According to the World Health Organization's estimates of 2011, about 5% of the global population carries the genes causing the disease. 1 child out of 2500 is born with SCD in Canada.

A person that inherited two abnormal hemoglobin genes (hemoglobin SS), one from each parent, has sickle cell anemia, the most severe kind of SCD. If, a person inherits only one of the abnormal genes she is a carrier and does not have the disease, but will produce hemoglobin S. She can transmit the disease to her child if her spouse is also a carrier. Other common forms of sickle cell disease include, hemoglobin SC disease and hemoglobin S-beta thalassemia[1].

Stigmatization in Young Adults

Stigmatization is the practice of singling out a feature of an individual or a group and relating the feature with a cliché that negatively labels another in a way that is perceived as degrading by society.[2-4] In particular, health-related stigma is characterized by a form of devaluation, or social disqualification of individuals with specific health problems.[5] This can lead to unjust disadvantages for SCD individuals, including unfair treatment in schools, in the workplace, and within families, thus affecting individuals willingness to seek timely and quality health care.

In a study including about 1000 patients, it was found that most children with SCD survive childhood years, whereas young adults who switch to adult medical care are at high risk for premature death, especially shortly after transitioning.[6] As patients outgrow pediatric services, they are more prone to changes such as loss of an established primary medical home, access to ambulatory

care, and health insurance.[7] The absence of proper transitioning can lead to repeated hospital visits, distrust, and deleterious health outcomes for this susceptible population.[8] Therefore, the transition to adult care is critical for young adults to appropriately access the health care system.
As mentioned in the background, people with SCD often experience a slew of unpredictable pain crises, and often find themselves at the hospital to manage these painful crises.[12,13] The trustworthiness of young African American adults with SCD is often questioned by health care providers, who label patients as malingerers or connivers, or even drug seekers.[6,7,11,14,15] In fact, when individuals with SCD request specific pain medications, clinicians often interpret this as drug-seeking behavior,[16] although no empirical evidence suggests that individuals afflicted by SCD will become drug addicts if their pain is treated with narcotics.[17]

Additionally, in a study to discover whether disparate opioid prescription by race in emergency departments has diminished since 2000, it was found that Caucasian patients were significantly more likely to receive opioid prescription than black patients.[18] Thus, when young adults with SCD seek treatment for acute pain in an emergency department, there is probable racial stereotyping, skepticism, and difficult physician-patient interaction.[19] These elements contribute to a detrimental pain management experience.

Finally, scientific literature has linked health-related stigma behaviors with depression. A research study of 232 adults with SCD[20] found that 32 % of participants reported inflated levels of depressive symptoms versus 9.5% in the overall US population. Depression together with incidence of poorly managed pain crises may lead to feelings of inadequacy and even suicidal ideations in adults with SCD.[21] According to Anie KA, et al. (2002) found that adults with SCD commonly reported poor interpersonal skills such as self-esteem, and poor stress management capabilities such as feelings of hopelessness, as a result of frequent pain, hospitalizations, and subsequent loss of employment.[22] An adult with SCD said, "It's devastating for a person to be in pain but not to be believed. It makes you feel less than human. The trust is broken when the person you come to for help reacts negatively."[23] Dismissive pain management experiences may result in psychological disturbances, such as depression and anxiety, are often associated with a reduced ability to cope with pain and further perpetuate the cycle of pain intensity with significant effect on health outcomes.[24]

IV) NCDS IN THE AMERICAS

a. Epidemiology

As a whole, the region of the Americas reports a 77% mortality rate as a result of non-communicable diseases. Of these cases, 40% are due to cardiovascular diseases, 25% from cancer related complications, and 8% from respiratory disease. Diabetes and digestive related maladies tied for the fourth most prevalent, accounting for 6% of NCD respectively[1]. That said, the region, which includes North, Central and South America, as well as the Caribbean, overall accounts for the overall lowest death rates as a result of NCDs globally. With the lowest global ratio of 438 deaths for every 10,000 people, the Americas are a global leader in NCD health prevention strategies. This success can be demonstrated though, with the notable exception of that state of Guyana, the less than 20% mortality rate amongst persons from the ages of 30 to 70 from the four major NCDs. This success in health promotion has placed the region's populations at the overall lowest risk of succumbing to these 4 major diseases within the totality of their lifetimes[12].

However, despite these achievements, the Americas still struggle with specific preventable conditions that prove to be of great hindrance to their general wellbeing. Inherent in the varietal demographics present within the broad region of the Americas, the major diseases of High Blood Pressure, Obesity, Hypertension, Diabetes, and Cancer prove to be pervasive within certain areas that share similar characteristics, yet absent in others. These correlations are closely connected to proximity, cultural demographics, and state socioeconomic status[2].

For example, while scoring low overall, Latin America and parts of the Caribbean recorded a high comparable prevalence of diabetes. The islands of St. Kitts and Nevis, as well as St. Vincent reported that more than 17% of their female population and more than 10% of their male populations suffer from high blood glucose levels. While these states hold the greatest totals within the Americas, Mexico, as well as many South American countries such as Guyana and Surinam reported that greater than 10% of both their male and female populations were diabetic. North America reported similar female levels, however low levels among males[2].

While the Americas are leaders in curbing the incidences of most other NCD conditions, the region reports the highest rates of obesity in the world, with 27% of the population over 18 in the region ranking over 30 on the Body Mass Index. Females prove to be the most affected by the disease, with 30% of the region's population under the distinction. Only 21% of males in the region were determined to be obese, with only the countries of Canada and the United States reporting incidences of obesity in men higher than 25%. For females however, 24 nations in the region reported rates of female obesity higher than 25%. Furthermore, childhood obesity is a growing problem in the Americas. Within the region, 6% of all children under five are already overweight. This affliction is

heavily correlated with widespread low levels of physical activity and unhealthy diets within the region[2].

The relationship of a higher prevalence of NCDs among females in the region is paradoxical with respect to the case of High Blood Pressure, with 21% of males in the region afflicted with the condition as opposed to 16% of women. While the Americas report the lowest rates globally, the condition remains concentrated within South America and the Caribbean. The majority of states within this area including Brazil, Argentina, Uruguay, and Chile, reported over 25% of males suffering from High Blood Pressure. This relationship can be attributed to, in part, to higher incidences of tobacco use among men[2].

The second most deadly malady, cancer, greatly impacts all states in the Americas. While overall mortality rates remain much higher in the developed areas of the region such as the United States and Canada, the primary sites for the manifestation of the disease remain consistent throughout the region. For males, cancer of the prostate is reported at the most common among all countries in the region. In regards to females, breast cancer ranked first among all states, with the exception of Guatemala, Honduras, Nicaragua, Guyana, Peru, and Bolivia where cervical cancer reported highest. Diet and Genetics play a central role within these sites of manifestation[3].

Also worthy of noting, the countries of Canada and the United States are among global leaders in the treatment of more complex and often under researched NCDs such as Mental Health and Genetic diseases. In regards to mental illness, Canada devoted 7.2% of their total health budget towards treating and combatting mental illness[4], while the US allotted 6.2%[5]. This greater awareness and treatment of mental disorders can be illustrated by the fact that greater than 30% of each states' contribution towards the global burden of disease was attributed to neuropsychiatric disorders[45]. As well, due to the developed nature of the two states, they also prove to be global leaders in the identification and treatment or neurological and genetic disorders such as Parkinson's disease and Asthma.

b. Challenges and Cultural Impacts

Cultural tendencies within the Americas pose numerous problems that are associated with the manifestation of NCDs. Given the diverse cultural nature of the region, harmful use of alcohol, insufficient physical activity, excessive sodium intake, and tobacco use are all of great concern to the Americas. However, these damaging lifestyle choices present themselves in different magnitudes' within different areas of the region. Tailored strategies specific to regional needs are essential in tackling the variety of behavioural concerns present in the region[2].

The harmful consumption of alcohol continues to be a considerable risk factor within the Americas. Total average consumption ranks over a quarter above the global average, with a cumulative average of 8.4 litres pure alcohol consumed per person annually. Superseded only by Europe, the region ranks very high on global consumption rankings, with Canada, Chile, and Trinidad and

Tobago consuming an excess of ten litres per person annually. Additionally, the majority of the nations within the Americas report high instances of heavy episodic drinking. This majority documented greater than 10% of their respective populations' engaging in a bout of heavy episodic drinking within the last 30 days of being surveyed[2].

Insufficient physical activity is progressively becoming a great concern as the Americas develop further. The second highest in the world, 32% of those over 18 lack sufficient physical activity, which has shown to contribute to the growing obesity epidemic and a variety of cardiovascular ailments. Females remain overwhelmingly more greatly affected, with a regional average of 37% of those over 18 failing to achieve minimal exercise requirements. Under the same assessment, 25% of men failed to meet this standard[i]. The nation of Venezuela well exceeded both averages, with 50% of both sexes failing to meet requirements[2].

Consistent with the other regions, the Americas fail to meet the World Health Organization's global target of an average of two grams of sodium intake daily. Well over this benchmark, all areas within the regions, aside from Uruguay and certain states within the Caribbean, consumed over 2.75g of sodium on average per person. The nation of Paraguay reported daily consumption totals surpassing 4.25 grams of daily sodium intake[2].

Another paradoxical relationship, tobacco use is among the world's lowest in men, yet among the highest in women. Tied for the lowest smoking rates for men above the age of 15, the Americas reported a 22% tobacco consumption rate that included daily and occasional smokers. States with male smoking rates above 40% comprised of Chile and Suriname. Only exceeded by Europe, smoking levels for females within the Americas averaged at 13%. The countries of Chile, Argentina, and Uruguay reported national averages greater than 20%[ii] Tobacco use remains among the worst lifestyle choices globally in its impact upon an individual's health, concretely linked to fatal cardiovascular, respiratory, and cancer related conditions[2].

All of these lifestyle choices above adversely impact global health and by consequence contribute to medical expenses that burden and place constraints upon state economies' and healthcare systems'. For example, results from 2009 indicate that 2.8 million new individuals in the Americas were diagnosed with varying forms of cancer. Within the first year of this group's treatment, an estimated $153 billion was forgone in economic revenue. Furthermore, in 2010, 14% of all regional health expenditures was solely funnelled toward expenditures for the research and treatment of diabetes. These examples illustrate the severe burden, NCDs place upon governments within the America's[6]. However, combatting these costs proves difficult as preventative intervention measures prove difficult to implement, especially among low-income countries within the region. As well, an overall lack of structure and information within Latin America presents debilitating challenges in addressing NCDs needs in the region[2].

c. Interventions, Programs, and Prevention Strategies

The Americas as a whole prove to be unanimously successful in specific prevention strategies, while severely lacking in others. Older, more globally established strategies such as those to promote smoking cessation have roots in nearly all nations within the region. However, newer approaches, such as taxation upon unhealthy food items, have seen limited adoption. Initiatives in the prevention of Hypertension have seen overall low participation by the region. Nonetheless, the region has shown great progress in the numerous state-led prevention pilot projects across the region[2].

The Americas see limited implementation of fiscal intervention strategies towards the prevention of NCDs. Most successful, 90% of states within the region have instituted a form of excise tax on tobacco products in an effort to curve consumption. Similarly, 79% of stats in the Americas have implemented a government tax upon alcohol as a means to limit consumption. However, these two strategies remain the only widely adopted means of prevention. As a means to promote healthy lifestyles, 19% of states have subsidized healthy foods such as fruits and vegetables for consumers. Furthermore, 16% of states have provided taxation incentives to promote physical activity amongst their populations. Excise taxation upon unhealthy food products has not been adopted by any states in the Americas. Therefore, there is no taxation upon high sugar content food and beverages or high fat content food items[2].

Governmental initiatives to encourage and discourage lifestyle choices within the Americas remain limited. The incidence of strategies to discourage the use of tobacco products within the region sees to be the highest, with 63% state participation. These initiatives include the adoption of smoke-free workplaces and medical advisory requirements upon tobacco product packaging. Ranking second upon state adoption, 43% of the regions have government led initiatives for the promotion of physical activity. Only 30% of states instituted programs aimed at curving unhealthy diets among their populations. Both of these initiatives included media campaigns and the encouragement of proper lifestyle guidelines by medical professionals. In terms of the discouragement of the harmful use of alcohol, only 30% of the region reported state participation in prevention. Faring the worse, only 25% of the region participated in programs targeting the obese and overweight. Overall, the Americas ranked in the middle range when compared to the rest of the regions[2].

The United States of America has demonstrated positive results through its elevation of the legal drinking age to 21. A nation with alcohol deeply embedded into much of its history and culture, the United States now scores within the mid-range on global rankings in its total alcohol consumption. Interestingly however, the state continues to face high levels heavy episodic drinking. This case study illustrates the viability of this strategy in curving average alcohol consumption amongst populations[2].

In 2013, Latin America and the Caribbean joined with the Pan American Health Organization to tackle Cervical and Breast Cancer through the initiative The "Women's Cancer Initiative: A Joint Commitment to Save Lives". The program works to curb the projected 70% increase in both forms of cancer by 2030 through improved accessibility for detection and diagnosis, as well as better forms of

treatment. As well, the initiative is working to expand vaccination availability for HPV, which is linked with cervical cancer[7].

In the city of Curitiba, Brazil, a physical activity study found that environments that promoted high levels of walkability were highly correlated with greater amounts of exercise by residents. The findings revealed that areas within the city that promoted high levels of walkability increased rates of their respective residents achieving their daily requirements for exercise by more than 10%. This study demonstrates the positive relationship between urban planning that favours pedestrian traffic and higher levels of daily exercise among inhabitants[2].

The Americas have jointly organized a voluntary Pan-American Smart-Salt initiative, which works to educate populations and reduce daily sodium intake levels within the region. The organization sets regional targets and provides a collaborative effort that has shown significant results across the region. For example, efforts of collaboration have reduced sodium content levels in bread products by 25% in Argentina. This example illustrates the effectiveness of greater coordination that includes collaboration with private sector actors[2].

CASE STUDY 3:
BARRIERS TO PROVIDING EFFECTIVE MENTAL HEALTH CARE TO ASIAN-AMERICANS

Introduction

Asian-Americans are perceived to experience few social and psychological problems in adjusting to life in the United States. However, over the last decade, research indicates that Asian-Americans do in fact suffer from a wide range of mental health issues. Evidently, in the literature on the mental health of Asian-Americans, they, like other minority ethnic groups, tend to under-utilize mental health services and, when treatment is sought, they prematurely terminate it at a much higher rate than non-minority clients.[1] In the following case study, we will be investigating the under-utilization of mental health services by Asian-Americans, that is primarily confronted with two barriers: (1) a barrier to initiation of mental services and (2) a barrier to persistence in treatment once it is sought.

Barriers to Initiation of Mental Health Services

Cognitive Barriers

Cognitive barriers are one class of barriers that prevent Asian-Americans from seeking mental health services, involving a culturally informed conception of mental illness. Angel and Thoits argue that although we know that clinical help-seeking behavior is invariant, cultural influences may affect the experience and identification of the illness.[2] For example, South East Asians come from a cultural context in which people do not associate mental illness with negative connotations or emotional difficulties.[3] Instead, they seek help only if they exhibit destructive or dangerous behavior in a social group, [4] rather than from personal emotional distress. European Americans tend to consult a physician for medical health problems, whereas, Asian-Americans primarily relate psychological distress to a reliance on the medical sector instead of mental health professionals.[5] In addition, they will rely on alternative healers such as herbalists or acupuncturists.[6]

Affective Barriers

Among Asian-Americans, another barrier in seeking help is based on affective responses. Although there may be acknowledgement of distress, many Asian-Americans feel shame and stigma associated with psychological difficulties.[7] Although there already exists a pervasive stigma surrounding

mental illness in the U.S., the stigma in Asian-American communities is thought to be even greater.[8] *In a study of Chinese immigrants conducted by Webster and Fretz, social stigma was the primary reason for deferring professional consultation from fear that their family name and face would be viewed poorly by others.*[9] *As a result Asian-Americans are proven to show extended delays in seeking professional help.*[10]

Barriers for Asian-American Subpopulations

The Model Minority Stereotype: *smart ("naturally good at mathematics, science, and technology"), hard-working, self-reliant, docile, and obedient. The Model Minority Stereotype is often a cultural expectation placed on Asian-Americans as a group. Asian-Americans children are often associated with receiving higher overall scores in science, mathematics, and technology. In truth, many teachers or educators often associate this stereotype with Asian-Americans, and, in many cases, this becomes a self-fulfilling expectation. This Pygmalion effect in many cases makes Asian-Americans feel more capable – and so that is what they become. This seemingly positive stereotyping may be part of an explanation for the success of Asian-Americans in school. However, the "positive" stereotype creates its own burden, as Asian-American children and parents go through tremendous stress to earn A's, at the expense of mental health and well-being.*

Asian-American women are often associated with more vulnerability to psychological disorders than Asian-American men. Asian-American women are confronted by two inferior statuses in terms of both race and gender. In traditional Asian societies, the cultural expectation is to embody deference and the acceptance of suffering and personal sacrifice. Often, Asian-American Women are subjected to heightened role expectations favoring stoicism and sacrifice, which would point to avoiding help for mental illness. However, in studies there appears to be an equal, if not a greater number of women seeking mental health services.[11] *As a result, there is no greater reluctance for help among Asian-American females and the distribution among the subgroups varies, as shown in Figure 1.*

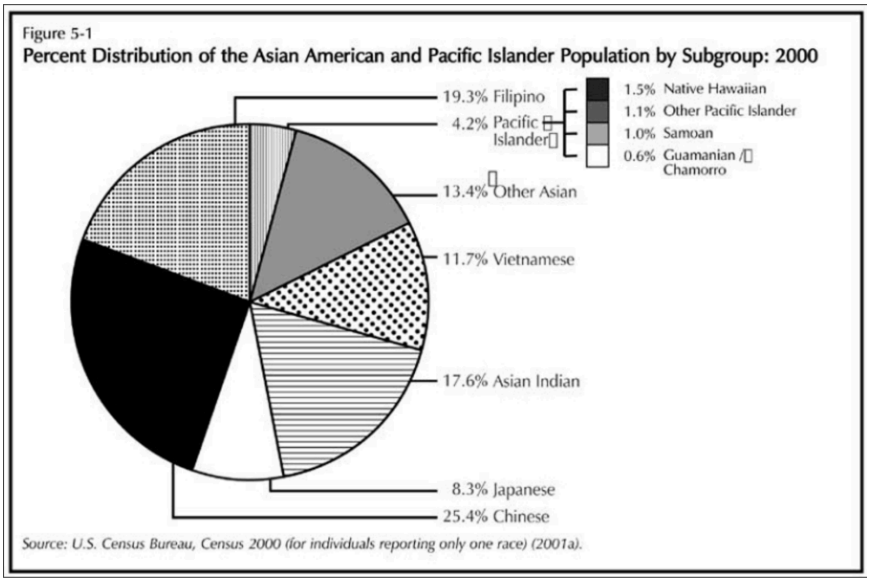


Figure 1: Percent Distribution of Asian-American and Pacific-Islander Population by Subgroup: 2000.[12]

Barriers to Persistence in Treatment Once Treatment is Sought

There is, in fact, a threshold of distress required for many Asian-Americans to seek help for mental illness; there are also difficulties in the evaluation process that are affected by culture.

Therapist Bias in Clinical Judgment and Cultural Factors Influencing Symptom Expression

According to a study done by Leong and Chou, there are several major factors that may contribute to the lack of cultural validity in clinical diagnosis.[13] One of the factors is therapist bias in clinical judgment, such that misdiagnosis due to cultural biases among mental health care professionals will lead to inappropriate treatment. This, in turn, will lead to the problem of premature termination of treatment among Asian-Americans seeking help. Because diagnostic assessment of any ethnic or cultural group uses the Western system, there may be misdiagnoses since Asian-Americans may express their problems differently because of their culture. According to a study done by Lopez, there are two types of errors that may result: over-pathologizing and under-pathologizing.[14] Over-pathologizing occurs when the clinician is unfamiliar with an individual's cultural background. For example, a clinician may misinterpret religious practices (seeing deceased relatives) and incorrectly diagnose a patient with having hallucinations or Psychotic Disorder. Under-pathologizing occurs when the clinician indiscriminately applies a cultural explanation to explain a patient's presentation; for example, attributing a person's reserved personality to a trait of their culture, rather than to depression.

CASE STUDY 4:
THE ROLE OF PRIMARY HEALTH-CARE PROFESSIONALS IN THE PROVISION OF MENTAL HEALTH CARE IN THE CARIBBEAN

Introduction

The history of psychiatry and mental health in the Caribbean follows a similar path as in other regions of the world.[1] During the Middle Ages, for instance, there were hospices (asylums) for the insane, where the main goal was to remove and confine, rather than actually to identify and treat, psychotic and demented individuals whose families were unable to take care of them. By the 19th century, a therapeutic system had developed, with asylums for the poor and private psychiatry for the wealthy. With the introduction of psycho-therapeutic treatments and the arrival of psychiatric pharmaco-therapy, several countries have advanced in their treatment of mental illness. Many countries have engaged in the deinstitutionalization and development of community-based mental health services. However, many others were slowed down or interrupted when developing community level services were initiated thirty years ago. In this case study, we will investigate the role that primary health care professionals play in the provision of mental health care to the Caribbean population as a whole and then, more specifically, the limitations of: (1) Undergraduate and Postgraduate Training, (2) Assessment and Treatment Protocols, (3) Referral System and lastly, (4) Prescription of Psychotropic Medicines.

Undergraduate and Postgraduate Training

Training of Primary Health Care in mental health in the Caribbean is poorly developed.[2] According the World Health Organization, only seven countries and territories provide information about the number of hours in undergraduate training devoted to psychiatry and mental health for medical doctors.[3] This suggests that a possible explanation for the limited information is simply that these countries do not have medical schools. In the case of nurses, all countries in the Caribbean have reported the known percentages of training hours dedicated to psychiatry and mental health. The proportion varies between 1% and 6% of the total training hours.[4] In the case of other professional health-care workers, the provided information is not as concrete, as only three countries have been reported: Guyana, 4%; Jamaica, 37%; St. Lucia, 11%, as summarized in Figure 1.

	Primary Health Care Doctors	Primary Health Care Nurses	Non- Doctor /Non-Nurse Primary Health care Workers
Anguilla	0%	15%	NA
Antigua & Barbuda	0%	0%	0%
Barbados	0%	46%	UN
Belize	0%	6%	0%
British Virgin Islands	0%	0%	0%
Dominica	0%	0%	NA
Grenada	0%	0%	0%
Guyana	43%	57%	3%
Jamaica	8%	50%	20%
Montserrat	0%	86%	NA
St Kitts & Nevis	0%	39%	0%
St Lucia	0%	0%	0%
St Vincent & the Grenadines	0%	0%	0%
Suriname	0%	0%	0%
Trinidad & Tobago	UN	0%	0%
Turks & Caicos	0%	NA	NA

Figure 1: Proportion of Mental Health Professionals with at Least Two Days of Refresher Training in Psychiatry/Mental Health in the Year Previous to the Assessment.[5]

Assessment and Treatment Protocols

Assessment and treatment protocols are a key issue. Thirteen of the countries and territories do not have assessment and protocols for key mental health conditions in primary care clinics.

According to the WHO, between 21% and 50% were available in clinics in Belize and Trinidad and Tobago, while in the Turks and Caicos, these protocols were present in 81% to 100% of clinics.[5]

Referral System

Another way of moderating the primary health-care doctors was to look at full-time primary health-care doctors who give at least one referral per month to a mental health professional. Four countries - Anguilla, Antigua and Barbuda, Montserrat, and St Kitts and Nevis - have zero referrals made by primary health care doctors. Grenada, Guyana, Jamaica, Suriname and Trinidad and Tobago, have between 1% and 20% doctors who have made referrals. British Virgin Islands, St Lucia and St Vincent and the Grenadines, have between 21% and 50% doctors making referrals. Only one country, Belize, has a high percentage of doctors (between 51% and 80%) who made at least one referral per month to a mental health professional.[5]

Prescription of Psychotropic Medicines

In all countries and territories of the Caribbean, health regulations authorize primary care doctors to prescribe psychotropic medicines. All countries in the Caribbean affirm that psychotropic medicines are available in all or almost all physician based primary care facilities, with the exception of St. Lucia, Antigua and Barbuda.[6] Countries such as Guyana, Jamaica, Suriname, Trinidad and Tobago and Turks and Caicos, have psychotropic medicines available in all or nearly all clinics. In eight countries and territories (Anguilla, Antigua and Barbuda, Barbados, Belize, British Virgin Islands, Dominica, Grenada, St Kitts and Nevis and St. Lucia) non-physician based clinics do not have psychotropic medicines. An interesting point is that in Dominica, Jamaica, Montserrat, Suriname and Turks and Caicos, nurses are allowed to prescribe these drugs, but with restrictions. All Caribbean countries and territories but three have declared non-interaction with complementary/traditional/alternative practitioners. In Jamaica, there is limited interaction, while in St Kitts and Nevis and Turks and Caicos, all or almost all practitioners interact with primary care or mental health professionals.[7]

V) NCDS IN EUROPE

a. Epidemiology

Most prevalent conditions

The non communicable diseases (NCD) most common internationally include, cardiovascular diseases, cancer, respiratory diseases, diabetes, and the abuse of alcohol and tobacco (World Health Organization Regional Office for Europe, 2014). Europe hosts one of the highest rates of NCDs in the world with cancer, cardiovascular diseases, alcoholism and diabetes among the most prevalent (World Health Organization Regional Office for Europe, 2014). Cardiovascular disease, cancer, respiratory diseases and diabetes account for a stunning 77% of the burden of disease and almost 86% of premature mortality in Europe (World Health Organization Regional Office for, 2011). Harmful use of alcohol and tobacco are the top modifiable risk factors in the European region (World Health Organization Regional Office for Europe, 2014). Overall, these prevalent NCDs comprise a majority of disease and premature death in Europe deeming them deserving of immediate action.

Most prone groups

There is a sharp relationship between socioeconomic, gender and age differences and incidence of NCD. Age is an important consideration in diagnosis and prevention because as people age NDCs become more common, eventually becoming the leading cause of morbidity and disability (World Health Organization Regional Office for, 2011). There is also a gender divide between men and women, with women living longer, around 8 years longer, with a greater portion of their lives in poor health (World Health Organization Regional Office for, 2011). Socioeconomic status is of great concern when considering prevention strategies since age and gender are not as compliant to change as is socioeconomic status. Socioeconomic status is both a malleable and power determinant of heath, an example would be that people who are considered to be in low socioeconomic status groups have twice the risk of serious illness and premature death when compared to those in high socioeconomic groups (World Health Organization Regional Office for Europe, 2014).

Differences within continent

A vast and varying continent such as Europe is anything but uniform when considering the plague of disease. Some of the key variables to consider when analyzing non-communicable diseases in Europe are fat availability, weight, alcohol, and tobacco use. Fat availability, which can be a

contributing factor to a variety of NCDs, tends to increase with country income level while the availability of saturated fat is more uniform (World Health Organization Regional Office for Europe, 2014). Saturated fat levels settle around 8% in lower income countries and 10% in high income countries (McKee, et al., 2014). Weight is another predictor of non-communicable diseases and is often a risk factor when significantly increased or decreased from healthy levels. Weight problems in Europe affect more than two thirds of adults, with a quarter of them falling into the obese category (World Health Organization Regional Office for Europe, 2008). Alcohol consumption and tobacco use are, as mentioned above, considered the most modifiable risk factors. They are both greatly influenced by socioeconomic status. Alcohol consumption is increasing in countries with low and middle socioeconomic statuses (World Health Organization Regional Office for Europe, 2014). Tobacco use is also most prevalent among the lower and middle income countries of Europe (World Health Organization Regional Office for Europe, 2014).

Differences between continents

A few of the most prominent components of NDCs internationally are cancer, diabetes, and alcohol. Europe, in accordance with the Americas, holds the highest incidence of all types of cancer combined for both sexes (World Health Organization Regional Office for Europe, 2014). The prevalence of diabetes is the lowest in the WHO European region at 20% (World Health Organization Regional Office for Europe, 2014). Europe, when compared to the rest of the world, has the highest per capita consumption of alcohol (World Health Organization Regional Office for Europe, 2014). Overall, with the exception of diabetes, Europe hosts a prominent proportion of the burden of NDCs when compared to the rest of the world.

b. Cultural Impact

Community impact

As a community, the health care burden of non-communicable diseases is large considering most of them are long term and/or deteriorative diseases. Burden on the health care system can propagate other problems such as deteriorating health care services and health inequity. The corrosion of overburdened health care services can manifest in many forms; overcrowded hospitals, lack of health care officials, long wait times for services. Health inequity, which is the systemic difference in the health statuses of different groups, is perpetuated by socioeconomic conditions (World Health Organization , 2011). The health inequity helps feed the socioeconomic status gap that burdens government systems such as health care, welfare and other social services. The community impact of non-communicable diseases works in a cyclic manner, perpetuating the burdens of these diseases.

Individual impact

The individual impact of non-communicable diseases contains both economic and legal aspects. Individuals and families that suffer from NDCs may be deprived of access to education or the ability to work (World Health Organization Regional Office for Europe, 2014). They may be deemed less desirable for employment or may be less productive than others due to their disease. The negative impact of NDCs on education and employment may impact their economic well being and their earning potential (World Health Organization Regional Office for Europe, 2014). Legally, they have the right to be free from discrimination and marginalization yet their conditions may provide a barrier to these essential rights.

c. Challenges

Lifestyle

Aspects of environment and lifestyle that negatively affect NCDs such as fat consumption, lack of exercise (sedentary lifestyle) and tobacco use are prominent problems in Europe. Sedentary lifestyles have been further promoted by modern means of transportation and technology. Governments and other organizations have gone to great lengths to fight against these barriers and encourage active and healthy lifestyles. It will be a challenge for the preceding governments and leaders to combat the stagnancy and popularity still associated with smoking, fast food and sedentary lifestyles.

SES gap

Low socioeconomic status negatively effects health outcomes. This is evident in countries currently in the midst of an economic crisis (World Health Organization Regional Office for, 2011). These countries often have an increased proportion of malnutrition, mental health problems, suicide and general health problems due to lack of early intervention. Spain is an example of socioeconomic status effecting health outcomes. The number of people in Spain who have displayed mental health disorders has increased significantly and researchers have inferred the increase in mental health disorders to be attributed to the current economic situation in which unemployment is increasing (World Health Organization Regional Office for Europe, 2014). Another example is in Greece where between January and May of 2011, there was a 40% rise in suicide in accordance with economic instability. This was compared to the same period in 2010 in which there was not the same economic hardship in the country (World Health Organization Regional Office for Europe, 2014).

Economic issues

Economic issues derived from NCDs are at both the government level and the individual level. At the government level NCDs cause surging health care costs and comprises a significant proportion of a countries GDP (World Health Organization Regional Office for Europe, 2008). An example is

increased demand for social care and welfare support as a large proportion of these diseases require palliative care. Economic burdens also include the impact of absenteeism from work and school as well as the decreased productivity of a growing number of employees, and increasing employee turnover (World Health Organization Regional Office for Europe, 2008). At the individual level reduced income and early retirement caused by the burden of NCDs can lead individuals and families into poverty (World Health Organization Regional Office for Europe, 2014). Treatment costs and reduced income are both burdens that can lower the socioeconomic status of the individual and family effected by NCDs.

Health gap

As mentioned above, NCDs and the health gap comprise a cyclic relationship. NCDs contribute to the widening of the heath gap between countries in the European regions. Mortality rates for people with high SES will decline more rapidly than those less well off. The disability brought on by NCDs compromises economic resources and strains the health care system, making both less accessible. This leaves the population with a low socioeconomic status with higher mortality rates, creating conditions that make the poor even poorer. This effect of NCDs on socioeconomic status further increases the health gap between those of high and low socioeconomic status.

d. Interventions, programs and prevention strategies

Context

Non-communicable diseases are chiefly effected by lifestyle and preventative care. This makes them prime real-estate for governments and organizations to utilize policy changes to combat them. At least 80% of all heart disease, stroke and type 2 diabetes and at least one third of all cancer cases are avoidable (World Health Organization Regional Office for Europe, 2014). This gives us increased incentive to make policy changes and continue to tread on in the fight for improved access to preventative medicine. Early death can be avoided by dealing with the four key behavioural risk factors: unhealthy diet, physical inactivity, tobacco use and the harmful use of alcohol (World Health Organization Regional Office for Europe, 2014). These four factors are often the basis for intervention in NGO's, governmental organizations and others fighting against non-communicable diseases.

Local

Its part of the European WHO action plan to make schools and workplaces more supportive of health. WHO, international institutions, and federal governmental organizations often work with small NGOs and local government offices to decrease NCDs at a community level by implementing action plans at the doctor-patient level, community initiatives, and through in school programs. An example is Shape up, a project that focuses on determinants of health such as diet and physical exercise and is implemented in 78 schools across Europe (World Health Organization Regional Office for Europe, 2008).

Regional

There are a number of existing groups that work towards advancing public and preventative health care. EUPHA, the European Public Health Association, works to improve public health and is comprised of 14,000 public health experts in 41 countries (EUPHA, 2015). ASPHER, the Association of Schools of Public Health in the European Region, works to improve the training of public health professionals (ASPHER). WHO healthy cities work to address health inequality, address the social, economic and environmental aspects of health and improve the needs of vulnerable groups (World Health Organization Regional Office for Europe, 2016). The WHO CINDI, the Countrywide, Integrated Noncommunicable Diseases Intervention, works to prevent noncommunicable diseases through intersectoral collaboration (National Institute for Health and Welfare, 2015). All of these programs operate regionally to combat NCDs, sometimes through government and NGO assistance to provide regional assistance to communities.

Country

From action plans, to legislature and conventions, countries in Europe are involved in many forms of intervention and prevention strategies. Fourty-seven member states in the European region are parties to the WHO framework convention on Tobacco Control (FCTC) which aims to regulate tobacco in order to reduce the incidence of tobacco related health problems (World Health Organization Regional Office for, 2011). The European action plan (EAP) aims to reduce the harmful use of alcohol (2023-2020) (World Health Organization Regional Office for, 2011). The European union, through their health strategy, is taking significant action into controlling and better understanding health determinants, in disease prevention, on healthy ageing, against poverty and social exclusion (European Commission). Countries are also utilizing improved statistical tracking on the national level to monitor and evaluate NCDs. National legislation and fiscal policies are being put in place by many countries to regulate the sale of alcohol, tobacco, industrial trans fats, and more (World Health Organization Regional Office for Europe, 2014). All of these movements are working to improve the state of public health through lifestyle and prevention at the national level. The WHO Europe Ministerial Conference on the Prevention and Control of Non-Communicable diseases in the context of health 2020 highlighted the importance of prioritizing and investing in NCDs at the national level, communicating that the trickle effect of these movements initiating from the national level will allow more to be affected than if solely tackled from the regional or local level (World Health Organization Regional Office for Europe, 2014).

International

Internationally, there are several platforms for the international community to interact about public health. The World Health Assembly endorsed the Action plan for the implementation of the Global Strategy for the Prevention and Control of Non-Communicable Diseases (2008-2012) (World Health Organization Regional Office for Europe, 2014). They created an international plan for mapping emerging epidemics, reducing exposure to risk factors, and strengthening health care for people with NCDs. The united nations general assembly on the prevention and control of NCDs is a central international platform for regulating, creating and implementing strategies and prevention programs to combat noncommunicable diseases.

CASE STUDY 5:
THE FRENCH PARADOX

Non-communicable diseases (NCDs) are currently the number one cause of death and disability in the world, and primarily affect the European region. These diseases can be broadly classified into 5 categories – diabetes, cardiovascular disease, cancer, chronic respiratory disease and mental illness. These five disease alone account for 86% of all deaths in Europe. ***[5]*** *Cardiovascular diseases (CVDs) in particular cause the death of approximately 17 million people globally* ***[2]*** *and four million in Europe alone. In fact, 47% of all deaths in Europe are caused by CVDs* ***[1]****. However, these diseases disproportionately affect low and middle income countries due to less access to preventative efforts and greater exposure to CVD risk factors* ***[2]****.*

Despite mortality from stroke having decreased greatly over the last five to ten years, there are still large differences in both current rates of death and the rate at which mortality is decreasing between European countries. ***[1]****. Interestingly, in France mortality from all causes in men is similar to statistics from England and Wales. However, mortality from coronary heart disease (CHD) in Frenchmen is less that 1/3 of that in England, and ¼ that in Scotland. Similarly, mortality from coronary heart disease in Frenchwomen is 1/5 of English women and 1/6 of women in Wales* ***[9]****. According to the MONICA project, a worldwide monitoring system for cardiovascular diseases organized by the WHO, the mortality rate from CHD is much lower in France than other industrialized countries such as the USA and the UK, and mimics rates found in Japan and China* ***[7]****. It is known that mortality caused by ischaemic heart disease is closely related to the average serum concentration of cholesterol and to the intake of saturated fat in the population. However fat intake in France is not considered low, unlike in other Mediterranean countries in which CHD rates are expectedly low* ***[9]****. Furthermore, other risk factors for coronary heart disease, including blood pressure, body mass index, serum total cholesterol levels and cigarette smoking are no lower in France than they are in other industrialized countries* ***[7]****. This contradictory situation in which there is a high intake of saturated fat but low mortality from CHD amongst the French is termed the French paradox* ***[8]****.*

A study conducted in the late 1990s and published in The Lancet explored the paradox by assessing alcohol consumption, diet and overall mortality rate from 21 developed countries over a 23 year period (from 1965 to 1988). It was found that France had the highest wine intake and the highest total alcohol intake from all the countries included in the study. Interestingly, France also had the second lowest mortality rate from CHD after Japan, a country historically known to have very low intake of animal fat. The study also completed univariate analysis in which several variables were individually analyzed for their effect on CHD. The strongest and most consistent correlation found was the inverse relationship between consumption of wine ethanol and CHD. There was also an inverse correlation between beer and spirit consumption with CHD, although this relationship was

found to be much weaker. As expected, there was a positive correlation between animal fat consumption and CHD. In other words, ethanol – particularly wine ethanol – was found to be inversely related to CHD ***[3]****. The 'French paradox' has thus been attributed to the increased wine consumption in France compared to other European countries.*

Later studies have confirmed that consumption of alcohol at the intake levels which occur in France (20 to 30 grams per day) can reduce risk of CHD by at least 40 percent. Initially, it was believed that alcohol protected from CHD by raising serum concentrations of HDL cholesterol, a factor which is thought to prevent atherosclerosis. However, serum concentrations of HDL are no higher in France as they are in other countries. It is now believed that moderate alcohol intake does not prevent CHD through an effect on atherosclerosis, but rather through haemostatic mechanisms. Alcohol intake (at the level which is associated with reduced risk of CHD) has been shown to decrease platelet aggregation, an event which leads to increased risk of CHD. In addition, studies have shown that platelet reactivity is lower in France than in Scotland providing one possible explanation for protection from CHD in France ***[7]****. Indeed, a study conducted over a four week period in which participants either had 30g of alcohol per day or abstained from alcohol intake showed that consumption of alcohol resulted in a decrease of collagen-induced platelet aggregation and fibrinogen levels. Platelet function and haemostatic variables however were not affected* ***[6]****.*

Recently, a new hypothesis for the explanation of the French paradox – called the timelag hypothesis – has emerged. This is based on evidence that mortality from heart disease relates to past levels of dietary fat and serum cholesterol better than to present levels. In other words, adding present data of animal fat consumption did not predict mortality from heart disease better that using past data alone. Animal fat consumption and serum cholesterol concentrations have only been the same between France and Britain for approximately 15 to 20 years. Prior to 1970, France had lower animal fat consumption (21% of total energy consumption compared to 31% from Britain) and also lower serum cholesterol (5.7mmol/L versus 6.3mmol/L). According to the time lag hypothesis, this older data explains the lower mortality from heart disease in France, indicating that there must be a time lag between increase in serum cholesterol and the resulting increase in coronary artery atheroma and risk of death from ischaemic heart disease. A similar time lag has been observed for smoking and lung cancer ***[4]****.*

In further support of the time lag hypothesis, it has been shown that despite there being an inverse relationship between wine ethanol levels and CHD mortality, there is no inverse correlation between ethanol levels and longevity in the population. This is because there is a positive correlation between wine consumption and other causes of mortality aside from CHD. Cohort studies have consistently shown that CHD protective efficacy plateaus at one to two drinks per day ***[3]****. However, while alcohol consumption is certainly higher in France than other countries, this only reflects higher average consumption per drinker and not necessarily a greater number of drinks. Because the reduction in CHD risk only depends on the first or second drink, some argue that the French paradox cannot be entirely explained by greater alcohol consumption in France. These researchers postulate that the reason the wine hypothesis became popular is because high levels of wine consumption are associated with countries that underwent a significant change in animal fat consumption from 1965*

to 1988. These include France, Italy and Spain, countries which used to have low saturated fat consumption, a fact which is no longer true. Finally, it is thought that the the time lag between the increase in fat consumption and serum cholesterol concentration and their effect on heart disease risk is at least 25 years [4].

Despite still being unresolved, the French paradox could be of great interest if it confirms that there are certain foods and drinks which protect against coronary heart disease. This is especially important since cardiovascular disease represents a major cause of death in Europe. As is often the case, however, less research is usually done on countries lacking disease compared to countries in which the disease is highly prevalent – this remains a great barrier to the resolution of the paradox.

CASE STUDY 6:
MENTAL ILLNESS IN GREECE

*The World Health Organization (WHO) is guided by the motto "no health without mental health." **[7]** This is because of the enormous number of people – approximately 83 million worldwide – affected by mental illness **[6]**. Mental disorders represent a significant toll on human health, impacting not only the afflicted person, but also their career and the productivity of society as a whole **[7]**. Mental illness affects one in four people at some point in their lives, and represents 20% of the burden of disease in the WHO European region. Furthermore, of the top 20 countries with the highest rates of suicide, six of the countries are in the European region **[8]**. Although much is known about mental health prevention, care and treatment, many countries still have limited community based mental health services. In addition, stigma is still highly prevalent.*

*In high income countries, 90% of suicides are attributed to mental illness. According to the 2012 report, an estimated 804 000 suicides occurred in the year alone, with an age standardized rate of 11.4 people per 100 000 population. Suicide accounts for 17.6% of all deaths amongst young adults aged 15 to 29 in high income countries and is ranked the second leading cause of death in Europe within this age group, after road traffic incidents. Despite this, only 13 European countries have developed a national suicide strategy **[6]**. Furthermore, depressive disorder is quite common in Europe, with an overall prevalence of 8.56%. Of the countries characterized, study sites fell into one of three categories: high prevalence (such as in urban Ireland and urban UK), low prevalence (urban Spain) and medium prevalence (multiple other sites in Europe). Importantly, this showed that there is a wide difference in the prevalence of depressive disorders across study sites **[1]**.*

*Unemployment, debt and social inequality are all risk factors for depression and associated suicide. Mental health is directly related to a person' socioeconomic circumstances, and poverty, unemployment as well as poor working conditions are known to significantly increase the risk of mental disorder **[5]**. Certainly a country which has felt the burden of debt and a flailing economy is Greece, and mental illness is a side effect of the Greek financial crisis which too often goes unnoticed. The economic recession of a few years ago deeply affected the international community, bringing with it adverse ramifications such as reduction in income, debt, eviction, job loss, insecurity and poor quality of life. Just a year before the 2009 recession, Greece was in a period of growth and was seen as the 27th largest economy in the world. However with the international economic downturn in 2009, Greek citizens faced socioeconomic turmoil and unemployment skyrocketed from 6.6% in May of 2008 to 16.6% in May of 2011 **[4]**. Not surprisingly, Greece is thought to have been more affected by the economic downturn than any other European country. Thus, over the years of the economic crisis, numerous austerity measures were implemented in Greece in response to the inconsistencies in the finances of the Greek nation. This not only impacted the nation's own economy, but the European and world economy as well **[2]**.*

In 2008, a year before the recession crippled the Greek economy, the second nationwide cross sectional study was conducted to assess rates of depressive disorders in the nation and compare findings with the first cross sectional study conducted 30 years prior. Due to the beginning of the economic downturn and the rise in social unrest, a replication study was then conducted in 2009. It was found that the prevalence of major depression rose from 3.3% in 2008 to 6.8% in 2009, just after one year of economic unrest. In 2011, Greece was in the midst of economic collapse and thus, another replication study was completed to understand the impact on the mental health of the population. It was found that the prevalence rate had again risen to 8.2%, an increase which was observed for the majority of population subgroups. However, young people, married people, and individuals with financial distress all displayed increased odds of suffering from depression, showing a strong association between major depression and economic hardship ***[4]****.*

In terms of risk estimates, the odds of suffering from major depression in Greece was found to be 2.6 times greater in 2011 than in 2008. Expectedly, the average number of depressive symptoms was higher for people who had experienced high economic distress compared to those who experienced lower distress. Furthermore, the increased prevalence of major depression led to a simultaneous and sharp rise in the country's suicide rates ***[4]****, with a 36% increase in the number of people reported to have attempted suicide from 2009 to 2011* ***[3]****.*

To analyze these trends, another study completed a 30 year interrupted time-series analysis of the impact of prosperity related events on the occurrence of suicide in Greece. This 30 year analysis used data from 1983 to 2012, over which a total of 11 505 suicides had occurred. It was found that over the 30 year period, the months during which the highest rates of suicide occurred in Greece were in 2012. Notably, there was an abrupt and sustained increase in suicide rates by 35.7% after the passage of the new austerity measures in June 2011. This is not surprising, considering the national debt reduction strategies and austerity measures were often abruptly announced and met with rioting and criticism, furthering the already bleak crisis faced by the Greek. Overall, austerity related events in the multidecade analysis corresponded to statistically significant increases in suicides in both men and women. On the other hand, it was found that one prosperity related event – this being the January 2002 launch of the Euro in Greece – marked an abrupt but temporary decrease in male suicides -27.1%. From this data, it is clear that the economic status of a nation deeply affects the mental health of its citizens. This means that greater thought should be given to the unintended health consequences that may follow changes in the economy and implementation of economic austerity measures ***[2]****.*

VI) NCDS IN ASIA

The prevalence and rise of non-communicable diseases in the Asian region are a major source of concern. Every year, the South East Asian region reports a mortality rate of 55% due to non-communicable diseases (Low, Lee and Samy 20). Additionally, an estimation provided by the World Health Organization for the South East Asian region between the years 2005-2012 projects a 21% increase of mortality (Low, Lee and Samy 20). In the global context, "nearly 80% of NCD deaths (29 million) occur in low- and middle-income countries" (World Health Organization, Regional Office for South-East Asia 5). The propagation of non-communicable diseases will be a significant challenge to overcome as it hinders "global development, specifically to the achievement of the Millennium Development Goals in low-and-middle income countries" (Low, Lee and Samy 20). The alarming rate of increase for non-communicable diseases presents a global problem in which sustainable and efficient solutions must be found.

a. Epidemiology

The World Health Organization has identified four major non-communicable diseases as "cardiovascular diseases (including heart disease and stroke), diabetes, cancer and chronic respiratory diseases (including chronic obstructive pulmonary disease and asthma)" (World Health Organization, Regional Office for South-East Asia 1).

Diabetes

The definition of diabetes as defined by the WHO is a "fasting plasma glucose value ≥ 7 mmol/l (126 mg/dl) or being on medication for raised blood glucose" (World Health Organization, Regional Office for South-East Asia 17). In the Asia Pacific region, there was a "57% increase in the absolute number people with diabetes, from 84.5 to 132.3 million" from 2000 to 2010 (Low, Lee and Samy 21). The rise in diabetes can be possibly attributed to the growing "globalization and urbanization" experienced by the South East Asian Region which has led to a transition of a healthy diet consisting of "whole grains as well as fruits and vegetables" to an unhealthy diet of processed foods "high in saturated fats, transfats, free sugars or salt" (World Health Organization, Regional Office for South-East Asia 30). Examples of an unhealthy diet include countries such as Bangladesh and Thailand, where the amount of salt consumed on average per day is 16 g and 10.8 g respectively (World Health Organization, Regional Office for South-East Asia 30). Furthermore, in India, many foods present for purchase contains "5-12 times higher trans fatty acid (TFA) levels than the 2% limit set by some developed countries" (World Health Organization, Regional Office for South-East Asia 31).

Cardiovascular Disease

The rise of cardiovascular disease is evident due to hypertension which can be seen throughout all countries regardless of income class (Low, Lee and Samy 23). In the Asia Pacific region, the mortality of a third of the population in middle income countries is traceable to hypertension caused cardiovascular disease (Low, Lee and Samy 23). However, not only is hypertension a major cause, but prehypertension is another cause (Low, Lee and Samy 23). Another problem is the maintenance of DALYs. According to the World Health Organization, one DALY "can be thought of as one lost year of 'healthy' life" (Who.int) and "the total number of DALYs lost to CVDs in this region constituted more than 50% of the worldwide sum of DALYs lost to CVDs in 2005" (Low, Lee and Samy 21). The highest mortality rate for females with "ischemic heart disease (218 per 100000)" is present in Maldives and highest mortality rate "(304 out of 100000)" for males with ischemic heart disease is present in Fiji (Low, Lee and Samy 21). For urban and rural regions of India, cardiovascular diseases has the highest mortality rates for both sexes (World Health Organization, Regional Office for South-East Asia 14).

Cancer

For the Asia Pacific region, "13% of all deaths" are due to cancer and 70% of mortality due to cancer "occurred in low- and middle-income countries where access to healthcare resources is poor" (Low, Lee and Samy 21). For the year of 2000 in the Asia Pacific region, there was a mortality rate of 2.9 million out of 4.3 million people who were affected by cancer (Low, Lee and Samy 21). Lung cancer in this region has the highest number of cases (Low, Lee and Samy 21). In the Asia Pacific region, "tobacco use remains the major avoidable risk factor for cancer. This includes tobacco chewing, which is the leading cause of oral cancer" (Low, Lee and Samy 21). There is also a high prevalence for "nasopharyngeal cancer... reported for some parts of China and Southeast Asia, with the main risk factor being smoking and alcohol intake" (Low, Lee and Samy 22). Another suggested cause for cancer is the "consumption of traditional Asian foods, such as pickles, sa-um or smoke dried meat and dried fish have been implicated with stomach cancer which is quite high in...Iran, Central Asian Republic, China, Korea, Japan" (Low, Lee and Samy 23).

Chronic Respiratory Diseases

Some examples of chronic respiratory diseases include "COPD, asthma and occupational lung disease" (World Health Organization, Regional Office for South-East Asia 18). These diseases are present in all age groups and most people affected are not of old age (World Health Organization, Regional Office for South-East Asia 18). In South Asia, "chronic obstructive airway diseases (emphysema and chronic bronchitis) and asthma, resulting from indoor and outdoor air pollution, account for a large proportion of the burden of chronic respiratory diseases" (Ghaffar, Reddy and

Singhi 809). In areas of poverty, wood fuel is burned inside houses and this action is a "major contributor to the disease in regions such as Nepal and rural India and Pakistan" (Ghaffar, Reddy and Singhi 809-810).

b. Challenges

Social Class

The difference in social standing plays a major role shaping the circumstances for people (Ghaffar, Reddy and Singhi 810). For the wealthy class, they have the tendency to exercise less and for the poorer class, they might not eat a healthy level of vegetables and fruits (Ghaffar, Reddy and Singhi 810). Additionally, the wealthy class have the resources for medical care and are able to "recognize their risk earlier and seek medical attention, they will develop chronic but manageable disease" (Ghaffar, Reddy and Singhi 810). Contrarily, the poorer class might not have the resources for medical care and might be less educated about diseases (Ghaffar, Reddy and Singhi 810). As a result, the poorer class "will develop rapidly progressive disease with early and sudden fatal outcomes" (Ghaffar, Reddy and Singhi 810).

Expenses

In addition to social standing, the amount of money needed to acquire adequate medical health care is also a major obstacle for many people of the poorer class. The World Health Organization lists some challenges not only as "high out of pocket expenditure for health," but also "low government budget for health" (Singh). Statistics provided by the World Health Organization show that among countries such as Myanmar, Bangladesh, India, and Nepal, they have a very high percentage of "out-of pocket expenditure on health," ranging from 66% to 88% (Singh). Additionally, statistics from the World Health Organization show that comparing "per capita government expenditure on health" to "per capita total expenditure on health," there is not much of a difference (Singh). Two problems have been identified here with one on the population level and the other on the governmental level.

c. Strategies, Programs, and Interventions

Strategies

Generally, "high levels of evidence-based planning, commitment, community mobilization and profound focus on a small range of critical actions" builds a solid foundation for countries to tackle NCDs (Low, Lee and Samy 23). On a population level, there can be a significant reduction in salt in the diet of the people (Low, Lee and Samy 23). Governmental legislation has been present in two member countries of WHO in the South East Asia region which aims to increase the nutrition of the diet of the people (World Health Organization, Regional Office for South-East Asia 61). The WHO defines three important aspects needed for a NCD surveillance system which consist of "(1)

surveillance for exposure to behavioral and metabolic risk factors; (2) surveillance for disease outcomes and (3) surveillance/monitoring of health system response" (World Health Organization, Regional Office for South-East Asia 62).

Programs

A gradual implementation of "education on blood pressure, cholesterol and weight should be emphasized at school level as it serves as an appropriate place for health promotion and education so as to reduce the risks of CVDs" (Low, Lee and Samy 23). An example is of an intervention program which took place in India called "MARG (medical education for children / Adolescents for Realistic prevention of obesity and diabetes and for healthy aGeing)" (Low, Lee and Samy 23). This program produced excellent results as it "resulted in children (aged 8-11 years old) with 15% improvement in knowledge regarding trans-fatty acid, obesity, diabetes, physical activity and blood pressure" (Low, Lee and Samy 23). Furthermore, there was an increase of students who shifted their preference to steaming food and going outside to play games (Low, Lee and Samy 23). In the South East Asia region, "all Member countries have blood pressure measurement facility available at the primary health-care level" (World Health Organization, Regional Office for South-East Asia 66). Additionally, "blood glucose and weight measurement facilities [are] available in nine countries" (World Health Organization, Regional Office for South-East Asia 66).

Interventions

A major target for the prevention of NCDs is youth. The young have been using tobacco due to influence from "tobacco advertising, promotion and sponsorship (TAPS)" (Low, Lee and Samy 24). Therefore, banning TAPS is very important to reduce the usage of tobacco (Low, Lee and Samy 24). Other actions taken were the implementation of smoke free zones which has been successful (Low, Lee and Samy 24). Moreover, in Malaysia, a Smoke Free Legislation (SFL) has been passed and smoking cannot be done in air conditioned places (Low, Lee and Samy 24). In Thailand, there exists a Thai Health Promotion which has helped with the prevention of NCDs (World Health Organization, Regional Office for South-East Asia 61). This foundation has done work in "increasing tobacco taxation. The consistent increase in taxes over the past several years has led to steady decrease in smoking prevalence among adults" (World Health Organization, Regional Office for South-East Asia 61). A crucial first step would be to target tobacco as "population based measures for reducing tobacco and harmful use of alcohol, as well as unhealthy diet and physical inactivity, are estimated to cost US $2 billion per year for all low and middle income countries, which translates to less than US $0.40 per person" (World Health Organization, Regional Office for South-East Asia 6).

CASE STUDY 7:
TOBACCO USE IN BANGLADESH

Bangladesh is in the midst of an epidemiological transition where the burden of disease is shifting from infectious diseases, under-nutrition and conditions of childbirth to that of NCDs (Bleich et al. 1). In 1986, NCDs represented just 8% of total deaths compared to 52% of deaths due to communicable diseases; estimates from 2006 indicate that NCDs represented 68% of total mortality, while communicable diseases only accounted for 11% of total deaths in the country (Bleigh et al. 2). Three NCDs are responsible for a large part of the mortality, morbidity and health services utilization in Bangladesh: cardiovascular disease, diabetes, and tobacco-related illness (Bleich et al. 2). In particular, a recent household survey in Bangladesh estimated that tobacco-related illnesses were responsible for 16% of all deaths in the population (Bleich et al. 2). Evidence suggest high rates of tobacco use, particularly among men (men: rural – 52%, urban – 41%; women: rural – 29%, urban – 17%), amounting to 41.3 million tobacco users (Bleich et al. 2). Furthermore, the recent trends in NCD-related risk factors in Bangladesh point to future increases in NCD prevalence and deaths (Bleich et al. 2). As the burden of disease shifts, so too must the focus of the country's health system to continue to meet the needs of the population.

There are significant challenges to effectively confronting the growing burden of NCDs in Bangladesh. The country's limited fiscal resources, weak public health systems, highly unregulated private health sector, and aging population are all significant barriers (Bleich et al. 2). However, there are two major national programs directed at lowering the adverse effects of tobacco on the population. The first is the Bangladesh Anti-Tobacco Alliance (since 1999), an NGO which seeks to educate the public and policymakers about the dangers of tobacco, and strengthen the nation's tobacco control policies. The second is the Smoking and Tobacco Product Usage Act (2005), a policy implemented by the government to restrict smoking in public places, restrict tobacco advertising, and create fiscal incentive to encourage tobacco farmers to switch to other crops (El-Saharty 11).

The NCD efforts in Bangladesh have partially met five of the six criteria outlined by the World Health Organization Action Plan for the Global Strategy for the Prevention and Control of Noncommunicable Diseases (Bleich et al. 4). However, most programs are in their infancy, and focus more on development and implementation than on evaluation and research (Bleich et al. 4). The government is also fairly constrained by lack of resources; they are unable to implement rigourous development and evaluation of programs (Bleich et al. 4). Bleich et al. recommend that additional resources be devoted to primary and secondary prevention of tobacco use, and that the focus be on interventions proven to be cost-effective, such as cigarette taxes and advertising bans on tobacco products (Bleich et al. 5). Studies by the World Bank and other international organizations have shown that there are many low-cost preventative activities for NCDs – the key is to find ways to adopt and implement them in Bangladesh (Bleich et al. 5).

VII) GLOBAL INTERVENTION

a. Programs and interventions at the global level

Non-communicable diseases (NCD) are the major health burden in the industrialized countries, and are increasing rapidly in the developing countries owing to demographic transitions and changing lifestyles among the people. Since the early 1970s, a number of community-based health intervention projects have aimed at promoting risk-reducing lifestyle changes in different populations. These projects were usually started in the field of cardiovascular disease prevention and emphasized the fact that merely providing risk-reduction measures for clinically high-risk people in health service settings would have only a limited impact in the whole country. [1]

Seeing that regional intervention has little success in only a few number of countries, the UN decided to summon in a collaborative effort from around the world to tackle the NCDs through the endorsement of the WHO Global Action Plan for the Prevention and Control of NCDs 2013-2020 on the 66th World Health Assembly. The scope of the Action Plan lies in the context of coordinated and coherent actions taken by all Member States and stakeholders in order to attain the nine voluntary global targets, including a 25% relative reduction in risk of premature mortality from cardiovascular diseases, cancer, diabetes, or chronic respiratory diseases[2]. However, since there is no single formulation of an action plan that fits all countries as they are at different phases of their socioeconomic development and in the prevention and control of NCDs, it is therefore crucial to adapt the framework provided in the action plan at regional and national levels, where applicable.

It is fairly well-understood now that NCDs—mainly cardiovascular diseases, cancers, chronic respiratory diseases and diabetes, do not self-produce and do not beget out of no reason. While in some regions, the prevalence of NCDs is fairly high, the prevalence of such diseases is fairly low in other regions. This can not only be attributed to the racial susceptibility to such diseases, lack of basic health care, limited access to clean water and food sources, pollution, as well as some of the major risk factors (such as tobacco use, physical inactivity, poor diet, harmful alcohol use, etc.) that contribute to such diseases, but more importantly, an inequitable distribution of social determinants of health, and that action on these determinants, both for vulnerable groups and the entire population[3].

To prevent and control non-communicable diseases occur at multiple stages of life, intervention should start as early as with the newborn to offer the best chance of primary prevention. Such a life-course approach requires policies, plans and services for the prevention and control of NCDs to take account of health and social needs at all stages of the life course, starting with maternal health, including preconception, antenatal and postnatal care, maternal nutrition and reducing environmental exposure to risk factors, and continuing through proper infant feeding practices and

health promotion for children, adolescents and youth, followed by promotion of a healthy working life, healthy ageing and care for people with non-communicable diseases in later life[2].

b. Research and advancements in sciences

As the epidemic rates of non-communicable diseases still persist at a high point in developed countries and are seen to be increasing at a faster rate in developing countries, an emerging field that seeks to combine that seeks to combine the knowledge and expertise of diverse disciplines towards the aim of healing impaired function in the body, regenerative medicine, seems to be the new ray of hope in curing the NCDs[3,4]. The goal of regenerative medicine is not just to replace what is malfunctioning, but to provide the elements required for in vivo repair, to devise replacements that seamlessly interact with the living body, and to stimulate the body's intrinsic capacities for regeneration[5].

Diabetes, being one of the four types of NCDs identified by WHO as the attributor for the largest health burden, has long been known to be treated with insulin, whose role in our body is to regulate sugar in the bloodstream and stores excess glucose for energy. A research published in 2006 that featured an International panel of experts working in the field of regenerative medicine has offered the counterargument, stating that repeated insulin treatments are costly and inaccessible to many patients in developing countries, and suggested that there might be a better way to control diabetes and the incidence of its complications by resorting to regenerative medicine therapies, such as bone marrow stem cell transplantation or microencapsulated islet cells using novel biomaterials, which not only could increase accessibility by providing a permanent solution, but also reduce the financial burden caused by the purchase of insulin[6].

To tackle another main type of NCD—cardiovascular diseases, especially in developing countries where the prevalence is increasing, the panelists suggested to use the application of autologous cells for the regeneration of heart muscle after myocardial infarction and cardiomyopathies. Such therapy has shown promising early results, as noted in the study, and is being tested in clinical trials in a number of countries. The principal advantage of using autologous cells and injects them directly into damaged regions of the heart or used in regenerative myocardial patches, is to avoid the costly immunosuppressive regimens[6], induced by immune refection upon the cell implantation. In addition to saving lives, such therapy is believed to also bring down the cost of treating heart failure. Similarly, an outrageously groundbreaking idea to use 3-D printers to create internal blood vessels for kidneys, livers, and other large organs lies in the same vein as other regenerative-repair approaches. The process, known as 3-D printing, uses a solution of living cells as "ink", to produce a layer-by-layer, life-size kidney[7] that is available to be transplanted. Without a doubt, this will certainly be a promiseful venture, leading into the future of regenerative medicine.

The third implementation recommended by the panelists is targeted at infectious diseases, by using engineered immune cells and novel vaccination strategies to enhance an individual's immune system,

it is believed that such therapy is capable of fighting infectious and to combat new strains of common diseases, namely, HIV/AIDS, tuberculosis, hepatitis, and malaria[6].

Just like a salamander can regrow its tail, the time for human to possess the capacity of self-regeneration should approach soon.

CASE STUDY 8:
ENHANCING NURSING AND MIDWIFERY CAPACITY TO CONTRIBUTE TO THE PREVENTION, TREATMENT AND MANAGEMENT OF NON-COMMUNICABLE DISEASES

Roles of nurses and midwives in the prevention, treatment and management of NCDs

Nurses and midwives can make important contributions as professionals and as part of multidisciplinary teams to address NCDs and reduce risk factors. Nursing's holistic approach to the health of individuals and communities will not only prevent diseases, but promote health, building on the strengths and resources of individuals and communities.

Nurses and midwives are well placed to reduce risk factors associated with NCDs by implementing WHO's recommended "best buys" (that is, cost effective, feasible and with a low implementation cost[8], such as implementing policies on smoke-free environments and smoking cessation interventions, promoting physical activity, providing dietary education and guidance, and preventing and treating the harmful use of alcohol. Addressing NCDs through existing health-care programmes can also maximize reach. For example, including smoking cessation interventions as part of Directly Observed Treatment Short- course (DOTS) programmes for tuberculosis patients, integrating treatment for NCDs with HIV/AIDS care, and including diet and physical activity education in mother-and- child health and immunization clinics are ways to build synergies and maximize reach.

Recognizing the important contributions of nursing and midwifery practice for preventing, treating and managing NCDs, the 2012 WHO Global Forum for Government Chief Nursing and Midwifery Officers (Global Forum) focused on evidence-based practice and NCDs[9]. The Global Forum issued a commitment to enhance nursing and midwifery practice, "working collectively and in our own countries to address NCDs evidence-based nursing and midwifery practices"[9] through policy and advocacy, research and education. The Global Forum participants support a strong commitment to evidence-based nursing and midwifery practice to "address NCDs and risk factors impact on individuals, families, communities, and society"[10] in support of WHO's global strategy on NCDs. The Global Forum emphasized that nursing and midwifery contributions would ensure that discussions on best-practices to address NCDs would maintain a "people centered primary care is crucial [approach], that prevention must be the cornerstone and that NCDs and risk factors need to be addressed throughout the lifespan"[10]. The Global Forum concluded that the need to emphasize NCDs and risk factors would require a "transformed curricula, standards of education and practice, in revised competency statements and in updated job descriptions and role definitions"[10].

Scientific evidence supporting the role of nurses and midwives in addressing noncommunicable diseases and risk factors

For several decades, nurses and midwives have contributed significantly to the understanding of health, including predictors and correlates of health- seeking behaviour and the cultural, social and emotional factors that impact on the effectiveness of interventions throughout the health-care continuum. Nursing and midwifery researchers have been involved in building evidence-based practice for preventing, screening/early detection and treating cancer, diabetes, and cardiovascular and chronic respiratory diseases. Nurses and midwives have developed evidence-based practice to reduce the four key identified risk factors for NCDs: tobacco use, harmful use of alcohol, physical inactivity and unhealthy diets. Nurse and midwife scientists have been active collaborators in multidisciplinary and multiprofessional research, developing the best strategies to improve evidence-based practice, from prevention to health systems changes that improve access to and quality of care provided throughout the life continuum.

Midwives are well-positioned in their daily practice to provide health education, encourage healthy behaviours and ease access to primary and secondary prevention of NCDs. This could include regular cervical cancer screening and screening for early detection of breast cancer. Such activities fit within the essential competencies identified by the International Confederation of Midwives[11] and the call in the report The State of the World's Midwifery, 2011. Delivering Health, Saving Lives[12] for midwifery services to be integrated with the community and health system as part of the continuum of care.

Research led by nursing and midwifery to assess interventions that tackle NCD risk factors

Nurses and midwives worldwide have addressed NCD risk factors as part of their daily practice while engaging in health education in a variety of settings.

<u>Diabetes</u>

Evidence-based nursing interventions in diabetes, help to achieve WHO's recommended cost-effective interventions for preventing and managing diabetes, including blood pressure and glycaemic control, and foot care[13]. In addition to intervention research, nursing organizations developed and implemented best- practice, evidence-based guidelines on caring for diabetics, from prevention to treatment. For example, the Registered Nurses' Association of Ontario in Canada developed and implemented the Reducing Foot Complications for People with Diabetes Best Practice Guideline[14]. An evaluation study of the guideline's implementation found there was a statistically significant improvement in nine out of 12 nurse indicators related to diabetes foot care[15].

Cancer

In the area of cancer care, nurse-led research has guided interventions related to screening and early detection, treatment, survivorship/rehabilitation, and palliation/ end-of-life care. Screening for cervical cancer has been recommended by WHO as one of the "best buys" to tackle the global burden of cancer and is one of the competencies recommended by the International Confederation of Midwives[16]. Findings from nursing research have resulted in identifying the factors that help or hinder the spread of knowledge about, and access to, screening among women in countries such as Zimbabwe[17] Turkey[18], Hong Kong SARS[19] and the Philippines[20] as well as ethnic minorities in Australia[21] and the United States[22] to cite a few recent examples. Health promotion, including testing interventions to enhance cancer screening in underserved populations, is one of the strategic research priorities of the Oncology Nursing Society[23]. Co-occurring NCDs and risk factors complicate nursing intervention. For example, a study of cancer screening for women with diabetes in 12 states of the United States[24] found no difference in mammography rates, but the findings revealed that women with diabetes were less likely to have cervical cancer screenings, highlighting the importance of a holistic approach to addressing NCDs rather than a disease-focused approach.

Cardiovascular disease

For decades, nurses have been developing and implementing interventions to improve treatment outcomes and reduce death from cardiovascular diseases. Related studies examined the promotion of smoking cessation[25], physical activity[26] and a proper diet among patients with an array of cardiovascular diseases[27-29]. The findings confirm that nurses can be valuable members of multidisciplinary teams working towards implementing WHO's recommended "best buys" for interventions to tackle cardiovascular diseases, including strategies to promote aspirin therapy to reduce the risk of acute myocardial infarction.

Respiratory diseases

Nurse-led research on individuals with chronic respiratory diseases has helped to identify strategies to manage symptoms and improve the quality of life among patients with chronic respiratory obstructive disease and asthma. This includes offering cost-effective interventions that minimize disability caused by respiratory diseases. Nurse-led research has also helped improve understanding of the factors associated with health-seeking behaviours, medication adherence and access to care for patients. These research efforts highlight a variety of complex approaches to promote symptom management and enhance quality of life[30]. Tobacco use is among the priorities for research into risk reduction even after a diagnosis of respiratory disease. Research is also needed on how to reduce complications in the critical-care setting and end-of-life models of care.

VIII) PHARMACEUTICAL INDUSTRIES, GLOBAL HEALTH AND NCDS

a) Pharmaceutical companies and NCDs

Pharmaceutical companies play an important role in global health issues such as non-communicative diseases (NCDs). According to the World Health Organisation's (WHO) global health report (2014), over 50% of deaths worldwide, 38 million out of 56 million, were due to non-communicable diseases (NDCs), mainly cardiovascular diseases and cancer, in 2012 (Figure 1)[34]. The World Health Bank roughly estimates that NDCs will steadily increase, particularly in developing countries in Sub-Saharan Africa and South Asia (Figure 2)[35]. Since a significant amount of the population worldwide is affected by NDCs, pharmaceutical industries play an important role in the issue of NDCs as part of the medical treatment provider.

Fig. 1.1 Total NCD deaths, by WHO region, comparable estimates, 2012

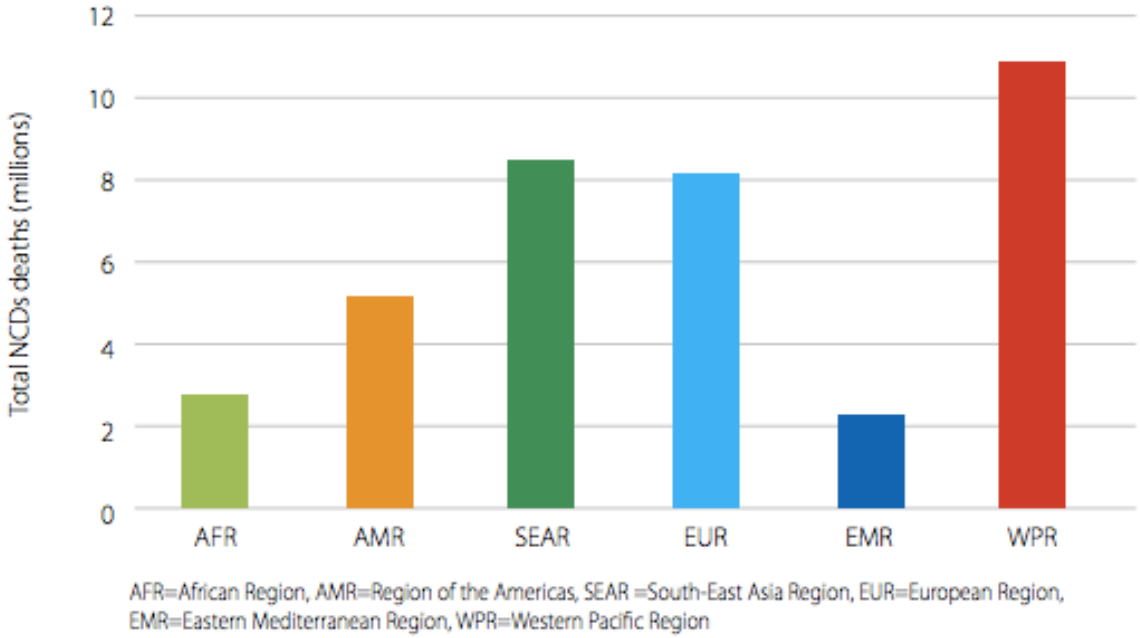


Figure 1.

[34] *http://www.who.int/nmh/publications/ncd-status-report-2014/en/*
[35] *Irina A. Nikolic, Anderson E. Stanciole, and Mikhail Zaydman, "Chronic Emergency: Why NCDs Matter," World Bank Health, Nutrition and Population Discussion Paper (2011).*

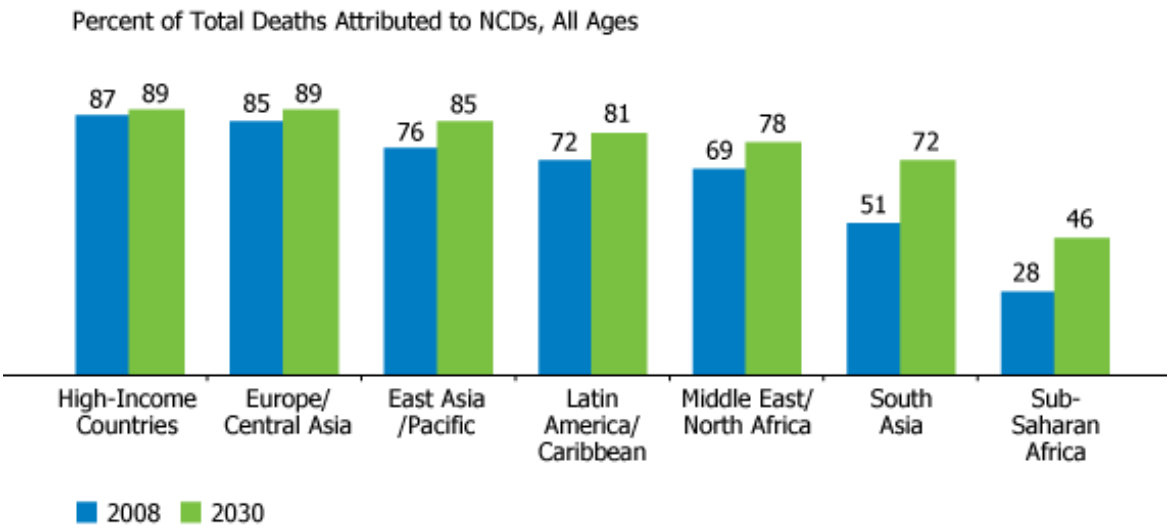


Figure 2. Irina A. Nikolic, Anderson E. Stanciole, and Mikhail Zaydman, "Chronic Emergency: Why NCDs Matter," World Bank Health, Nutrition and Population Discussion Paper (2011).

Pharmaceutical companies are responsible to produce safe and effective drugs to alleviate patients' symptoms or to treat NDCs. Pharmaceutical drugs such as Synthroid and Crestor, which treat thyroid disorders and cardiovascular diseases respectively, with 21 millions sales topped as the first and second most prescribed branded drugs in 2015.[36] Any involvement in clinical and translational research of pharmaceutical corporations can shape the trend of people suffering from NDCs. An active participation or financial encouragement of drug trials and development could possible put a halt on the increasing trend of certain NDC patients. One promising example is the development of immunotherapy drug as a type of cancer treatment.[37] Pfizer, an American international pharmaceutical firm, and Cellectis, a French biotechnological company, made a $2.9 billion deal collaboration to conduct research and develop oncological drugs that exploit our immune system to fight cancer.[38]

Although there may be price control from governments, policies normally merely ensure that the cost for characteristically similar pharmaceutical products consistent rather than keeping the price minimal.[39] Nevertheless, Canada has exert significant effort in restraining profit incentives pharmaceutical industry to drug innovation.

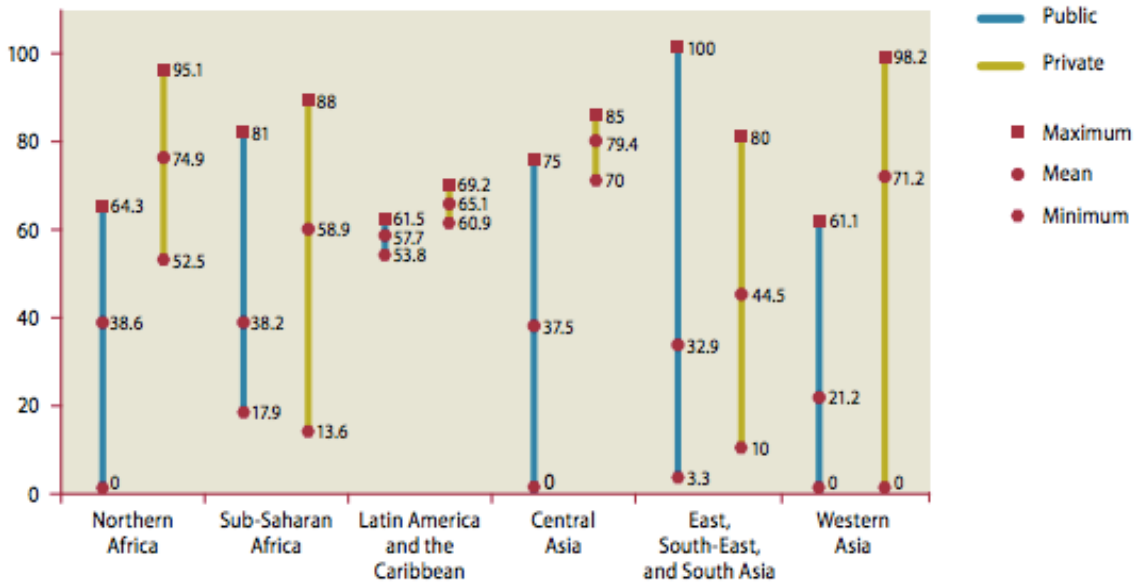
b. Accessibility to pharmaceutical products in developing countries

[36] *http://www.medscape.com/viewarticle/844317*
[37] *http://www.theguardian.com/business/2015/jun/01/cancer-breakthroughs-trigger-big-pharma-interest-drugs-deals*
[38] *http://www.pfizer.com/news/press-release/press-release-detail/pfizer_and_cellectis_enter_into_global_strategic_cancer_immunotherapy_collaboration*
[39] *http://www.theguardian.com/commentisfree/2013/feb/22/hiv-aids-deaths-pharmaceutical-industry*

Pharmaceutical companies can be potentially prosperous when it comes to doing business with cancer patients. Big pharmaceuticals can buy the rights to provide certain drugs, resulting in monopoly in the pharmaceutical industry, thus affecting the public's access to pharmaceutical products[40]. Depending on the quality of public healthcare, the accessibility to pharmaceutical drugs varies from countries to countries. There have been reports of patients in developing countries being denied access to pharmaceutical products according to the World Health Organisation (WHO).[41] Although public medical care in less developed countries is usually free of charge or at low cost, access to public medicine is low in developing countries, and an even lower availability in private medicine (figure 17). Without high availability to medicine in these countries, it is challenging to access to NCD pharmaceutical products with ease and at a low cost.

Figure 17

Availability of selected medicines in public and private health facilities between 2001 and 2007 (*percentage*)



Source: Surveys of medicine prices and availability using WHO/HAI standard methodology (available from http://www.haiweb.org/medicineprices/).

Notes: (1) Where multiple state or provincial surveys have been conducted (China, India, the Sudan), results from individual surveys have been averaged without weighting.
(2) Number of countries in the sample: among developing countries, there were 27 and 30 countries for the public and private sectors, respectively; Northern Africa, 3 countries; sub-Saharan Africa, 9; Latin America and the Caribbean, 2; Central Asia, 2 for the public sector and 4 for the private sector; East and South Asia, 7 for the public sector and 6 for the private sector; Western Asia, 5 for the public sector and 6 for the private sector.

c. Sustainability of pharmaceutical treatment for NCDs

[40] *http://apps.who.int/medicinedocs/documents/s19108en/s19108en.pdf*
[41] *http://www.who.int/medicines/mdg/MDG08ChapterEMedsEn.pdf*

Pharmaceutical products typically do not treat the root of NCDs; rather, drugs alleviate symptoms that NCDs manifested. Sustainability of pharmaceutical products for treating NCDs is a real issue since NCDs are often chronic that requires a long period of time using certain medications.

One prominent example is diabetics, especially patients suffering form Type I diabetes. Patient begins to suffer from type I diabetes from a young age. They are required inject insulin dosage three times per day to maintain their internal glucose level stable after consuming food. Given that type I diabetic patients require this large amount of insulin medications for their whole lives form their early onset, it has significant influence on their family and themselves financially. Insulin injection solutions can be costly when patients insulin and monitor their body glucose level. Pain management in cancer patients is another example of the problem with NCDs pharmaceutical products. Pain relieving agents typically require long term prescription, which will encounter similar problems.

d. Non-pharmaceutical interventions

Although pharmaceutical interventions are effective in alleviating symptoms of NCDs, it is an approach that is to solve problems when people are diagnosed with any kind of NCD. Treating NCDs medically is not the best solution since it does not prevent the increasing trend of people suffering NCD. The best attitude to tackle this problem is prevention.

<u>Public health education</u>

One popular non-pharmaceutical intervention is to increase awareness of non-communicative diseases in the society. Unlike pharmaceutical drugs that treat patients after they are diagnosed, educating the society is part of preventive medicine. The goal is to decrease the chance people from getting NCDs that will decrease their quality of life. NCDs, such as vascular diseases and diabetes (type II), depend heavily on personal lifestyle. For instance, numerous scientific papers show a correlation in obtaining excess cholesterol from diet and cardiovascular diseases. Therefore, governments and health professionals are taking a proactive role to promote information on how to keep our body healthy to reduce the number of NCDs cases from increasing. Most noticeable ones are anti-tobacco advertisement campaigns. In 2014, the European Union (EU) implement tougher policies in tobacco packaging that serve to remind tobacco users of varies medical consequences of smoking when they intend to buy cigarette packs.[42] It may seem very intuitive about public health education from the government or schools, but it can be difficult for developing countries. Developing countries may have limited resources in which only certain communities have access to education, making it difficult to reach the whole population.

Yet, preventative medicine has limitations despite its value in creating a society that individuals have sufficient knowledge to live healthy lives in their liberty. Nevertheless, etiology can be multifactorial, meaning diseases can be induced by multiple causes. The effectiveness of preventative intervention

[42] *Eurpeon Commission. (2014, April 3). Tobacco products. Retrieved October 21, 2014, from European Commission: http://ec.europa.eu/health/tobacco/products/index_en.htm*

for NCDs is heavily challenged in NCDs that are hereditary, born defects, and mental disorders. These diseases, for instances congenital hypothyroidism, are usually not caused by the external environment or lifestyle.

"Expert patient" management

NCD patients are also encouraged to keep educating themselves to reduce their symptoms. This is a rhetoric approach in western medicine - the "expert patient" management. This type of management promotes the idea that patients have the ability to self-care and manage their diseases. According to Tattersall (2002), this concept is based on the premise that "many patients are expert in managing their disease" and that can be helpful in making decisions in the treatment process.[43] Perhaps this approach to NCDs is to encourage more patient involvement in their disease, which in turn increase self-efficacy and potentially reduce non-compliance to NCD medicine. Nevertheless, this "self-management" approach can meet challenge when introduced to the reality. In low-income setting or less developed countries, NCD patients do not have enough education or resources to qualify as "expert".

[43] http://www.ncbi.nlm.nih.gov/pubmed/12108472

CASE STUDY 9:
NON-PHYSICAL NCD: PHARMACEUTICAL INDUSTRIES IN MENTAL HEALTH

The public has become increasingly aware of mental well-being and stigmas in recent years. There are two main popular treatments of mental disorders once diagnosed: pharmacotherapy and psychotherapy. Pharmacotherapy uses medications to counter abnormal physiology caused by mental disorders; psychotherapy uses "talk" sessions with a certified professional to address abnormal behaviours or thoughts raised from mental disorders. Studies have shown that patients suffering from mental disorders response positively to medications; however, it raises questions about sustainability. With the economically interested pharmaceutical industry, it can cause heavy financial burdens for patients who have to take long-term medications, sometimes multiple drugs. (Statistics? Or interview?) Moreover, the healthcare insurance in different countries, which means that for some patients, it is even more of a burden if the government does not help to cover pharmaceutical costs.

Furthermore, some argue that psychiatric drug research and developments are not very well studied. Pharmaceutical companies tend to overrate the positive effects of the drug treatment, which can be problematic when only a handful of clinical trials are published based on the selected ones that show promising results.[44] Without studies that counter the positive results, this is potentially misguiding to patients about the success rate of the developing drug. In a study conducted in 2008, Turner and his colleagues found out that "[a]mong 74 FDA-registered studies, 31%, accounting for 1449 study participants, were not published"(Perlis et al., 2005)[45]. The findings also show that half of the studies that were perceived positively by the FDA are published, while 11 of them "conveyed a positive outcome" even when the FDA questioned their results or viewed them as having negative outcome. Adding to that, 94% of the published literature has successful trials while FDA has only concluded 51% of the publications as having successful trials. There is a striking difference in presenting trials between the published literature and FDA's analysis, which suggests an inclination of the pharmaceutical companies to selectively publish their results.[46] This selective bias imposes a risk to the industry and particularly to patients. Disclosing drug developments that only have good results inevitably misguide medical professionals and the patient; lack of research behind potential backlashes of a drug could easily cause medical professionals to overestimate drug's success and oversee the negative impacts the drug may bring to the patient. We, as human, learn through mistakes. Without publications that point out bad outcomes of the drug of interest, this can hinder the rate of improving and developing drug in the pharmaceutical industry.

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[44] *http://www.ncbi.nlm.nih.gov/pubmed/18199864*
[45] *Perlis, R. H., Perlis, C. S., Wu, Y., Hwang, C., Joseph, M., & Nierenberg, A. A. (2005). Industry sponsorship and financial conflict of interest in the reporting of clinical trials in psychiatry. The American journal of psychiatry, 162(10), 1957-1960*
[46] *http://www.medscape.com/viewarticle/813912_4*

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[i] *Note that World Health Organization data lacks data within several South American Countries*
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