Original Research Article

Specific Chronic Diseases and Their Burdens: More Efforts Needed

Abstract
Chronic infections (diseases that take long period of time to heal or do not heal at all) are taking a good toll on human life on top of destroying the quality of life. The number of these diseases is increasing with time and their effects and complexities are becoming not only unbearable but also unfathomable. The drugs, knowledge, technologies and procedures adopted so far in combating the diseases are like a drop of water in an ocean. This work aims to bring together into one paper the scattered information on chronic infections in terms of general information on the diseases, specific diseases in details, their burdens on humans in terms of prevalences, costs, deaths and general sufferings, and the literature on what other researchers have done. It also gives the discussions and emphasis on the need to have more efforts and resources directed towards the same for a better future and life. Other researchers' and organizations published works were searched from the internet, summaries made and conclusions derived from the findings. It was found that the diseases are everywhere and increasing in number as time goes by, attacking all persons irrespective of their ages, invading both developed and developing countries, burdens are unbearable and persons bearing even two or more of the diseases at the same time. Also, their complexities are increasing, some are sharing symptoms and factors causing them, they are overloading the healthcare systems, some are untreatable with modern technologies and all research points out that the burdens will continue to be heavier as well as the situation getting worse. All these show that more is required if the situation is to be arrested on time.
Key words: Chronic infections, burdens.

1 Introduction

1.1 Definition and examples

Chronic diseases/infections are diseases that take a significant time to heal once contracted or do not heal at all (Muntaner *et al.*, 2014; AIHW,2014; AIHW, 2010 - about three months and longer (Meetoo, 2008, O'Halloran *et al.*, 2004). The diseases have long-lasting effects on the infected individual(s) in terms of welfare and health services. They have been classified as the leading causes disabilities among humans. Both effects and causes of these maladies can be extremely complicated to understand. While some have life-threatening effects and others have just mild effects that do not require a lot of efforts to deal with, most are unmanageable especially when at critical stages. Chronic infections have been increasing over time together with their complications. Some share symptoms and causes and it becomes hard to tackle them without the right medical equipment. Examples of chronic diseases include: hypertension (high blood pressure), congestive heart failure, coronary artery disease (CAD), cardiac arrhythmias, hyperlipidemia, stroke, arthritis, asthma, autism spectrum disorder (ASD), cancers, chronic kidney disorder (CDK), chronic obstructive pulmonary disease (COPD), dementia including Alzheimer's, depression, diabetes, hepatitis, human immunodeficiency virus (HIV), osteoporosis, schizophrenia and substance abuse disorders (Goodman *et al.*, 2013). The diseases can be caused by a wide range of factors such as stress, drugs, viruses, bacteria, lifestyles, foods, environment, genes among others.

1.2 General information

The increasing number of chronic infections is also emphasized by the fact that in developing counties such as USA, the Centres for Disease Control (CDC) records about 10% of individuals leading difficult lives due to chronic infections (Redden, 2007). The tragedy has not left children out of this trap since it is reported that statistics on chronic diseases among teenagers and children are shocking since prevalence of these conditions are increasing and was at 7% in 2004 in America (Redden, 2007; Perrin *et al.*, 2007; Santos, 2014). By the year 2011, the leading cause of deaths, illnesses and disabilities in Australia were the chronic diseases that accounted for about 90 percent of deaths in totality (AIHW,2014; AIHW, 2011b). The increasing chronic diseases are associated with changes in age of population and lifestyles, leading to the largest burden of poor health. The biggest health

problem that nations such as Australia face today is due to chronic diseases' burdens in tackling both the diseases themselves and their causes. This is due to their astonishing impacts at personal, economic and social levels.

Apart from developed countries, developing nations are now facing an increasing widespread of the chronic diseases (AIHW,2012d; AIHW,2014; WHO,2011) and their effects. This is attributed to the facts that the increasing urbanization, growing revenue/incomes in these nations and dropping food prices have facilitated changes in diets, obesity and physical inactivity globally. Research shows that many people actually suffer from more than one chronic disease simultaneously (AIHW,2014). Globalization has been associated with negative health effects (Meetoo, 2008; Hawkes, 2002). This is supported by the fact that, unfit and addicting food and non-food products (such as alcohol, tobacco and fatty, salty and sugary foods, soft drinks etc.) are traded internationally and reach many countries, including the poor ones, as well as creation of markets that target children who force parents to spend on unbudgeted amounts.

According to AIHW (2014), chronic diseases can be classified into four main groups namely: diabetes, cancers, cardiovascular diseases and chronic obstructive pulmonary disease (COPD). The four groups account for about 75% of all deaths caused by chronic diseases. On top of deaths, the diseases cause mental health issues that lead to disabilities and significant poor health among people. According to AIHW (2011b), some of the chronic diseases include diabetes, mental disorders like depression, cardiovascular diseases like stroke and coronary heart disease, cancers like colorectal and lung cancer, respiratory diseases like COPD and asthma, oral diseases, chronic kidney diseases and musculoskeletal disease like osteoporosis and arthritis. To some extent, these diseases are preventable. Tackling chronic diseases is not an easy task but preventing can be easier than treating. Some nations like Republic of Korea have been relying on diets that are overloaded with vegetables and have low fats (Lee *et al.*, 2002; Meetoo, 2008). This has reduced chronic infections among people significantly compared to those nations not following the same soot. Malyshkin (2014) notes that the case of infectious chronic diseases is different from that of non-communicable chronic diseases because the mechanisms for the infectious ones remain poorly understood. Furthermore, their treatment procedures and methods that are optimal are yet to be discovered. If the micro-organisms from chronic foci exhibited high resistance to antibiotic, or if their immune deficiencies were found in chronically affected patients invariably, then it would be easier to understand the challenges of controlling the diseases.

1.3 Specific Chronic Diseases

Chronic obstructive pulmonary disease (COPD) refers to a collection of progressive diseases that attack the lungs of human beings including the chronic bronchitis and emphysema (Prasad, 2020), mostly caused by prolonged exposure to irritants from chemicals as well as due to smoking. While chronic bronchitis leads to the inflammation in the lungs and eventually narrowing of the tubes and building up of mucus in the tubes, the emphysema destroys the lungs' air-sacs slowly and this causes interference with airflow. The disease causes breathing to be a problem and destroys the respiratory system. Globally, approximately 4% to 20% of individuals suffer from the disease among the grown-ups aged above 40 years while USA has possibly 30 million patients. It is ranked fourth in the list of the diseases that is causing most hospitalizations and burdens among the old-aged individuals.

Arthritis refers to the disease that causes one or more of the joints (such as knee, shoulder and spine joints) in human beings to inflame, leading to swelling around the joints, stiffness and pain in the joints. Examples are rheumatoid and osteoarthritis (wear and tear arthritis) among others that are more than one hundred types (American Academy of Orthopaedic Surgeons, 2019). The disease affects adults but its related infections are found among children too. The terms rheumatism and musculoskeletal are also used to refer to arthritis of the whole range of pains in joints (www.arthritisresearchuk.org). There are approximately 200 types of these conditions and can be classified into 5 main categories or groups namely: inflammatory arthritis, mechanical/degenerative arthritis, soft tissues musculoskeletal pains, connective tissue disease (CTD) and back pains. The symptoms of the disease include swelling in the joints, stiffness of joints in the mornings, weight loss, night sweats or mild fevers, tiredness, skin rashes among others. The causes are a combination of factor s working together including genetics and family risks, previous injuries, smoking, infections, physical-demanding jobs among others.

The chronic kidney disease (CKD) is abnormal urine persistence (can be excretory renal function that is impaired) and this suggests that the functional nephrons are lost (Romagnani *et al.*, 2017). It is disease characterized by changes in the structures (like tumors, cysts, malformations etc.) or functions of the kidney or both structure and functions. The disease increases the risk of developing cardiovascular disease as well as death. The disease may be caused by increasing age of individuals that leads to loss of nephrons, chronic injuries in the kidney due to diseases like diabetes and obesity or toxic exposures, and low number of nephrons at birth. The prevalence of the disease is estimated to be between 7 and 12 percent globally. In developed nations, the prevalences in China, USA, German, and England are 1.7, 6.7, 2.3 and 5.2 percent respectively by the year 2017.

Human immunodeficiency virus (HIV), that is spread through unprotected sexual intercourse, blood transfusion, breast-feeding, sharing of needles among other ways, is an acquired virus that leads to infection and AIDS- a human condition that leads to devastated and weak immune system that is prone to many more opportunistic deadly and undeadly diseases like cancers (Kapila *et al.*, 2016). It renders the body to a state of being unable to protect itself. Many infected persons do not have serious and obvious observable symptoms. The HIV prevalence nationally in Kenya was about 5% overall by the year 2017, with about 5.2 and 4.5 percent among women and men respectively (Kenya HIV Estimates Report, 2018). In terms of regions in Kenya, the prevalence ranges from 0.1 percent up to about 21%. In the same year, those aged between 15 and 24 years (university students' age for majority) had overall prevalence of approximately 2%, with females and males having about 2.6 and 1.3 percent respectively.

High blood pressure (hypertension) is a disease that involves the blood pressure of the arteries in which the level doubles the long-lasting risk for cardiovascular (WHO, 2005). The pre-hypertensions are signified by systolic and diastolic blood pressures of between 120 and 139, and between 80 and 89 mmHg respectively. Any systolic and diastolic blood pressure above 140 or 90 mmHg respectively is called hypertension. The disease has two stages namely: stage one (systolic and diastolic blood pressures are between 140 and 159, and 90 to 99 mmHg respectively) and stage two (systolic and diastolic blood pressures are above 160 and above 100 mmHg respectively). Any systolic or diastolic blood pressure above 140 and below 90 mmHg respectively is called isolated systolic hypertension. Generally, the disease is caused by chronic nephritis, diabetes nephropathy, hydronephrosis, hypothyroidism, hypercalcaemia, brain tumours, lead poisonings, burns, alcohol withdrawal and abuse, pancreatitis, rigidity of aorta among others.

Stroke, also called apoplexy/cerebrovascular accident (CVA), is sudden onset of focal neurological deficiency that can take more than a day- 24 hours, or it a disease that results when arteries to the brain burst or gets blocked resulting in failure of the brain to receive enough blood needed for its operations (Wittenauer & Smith, 2012; American Stroke Association, 2020). It is a disturbance of the functions of the cerebral part of the body of an individual and it is caused by vascular origin (Coupland *et al.*, 2017). The challenge can lead to problems in sleeping, seeing, pain, bladder control, having seizures, body parts moving, thinking, fatigue, memory and depression. The first period of 24 hours of this disease is called acute stroke while transient ischaemic attack (TIA) is stroke that takes less than a day- can be 5 to 20 hours. The spontaneous rupture of vessels of blood (or aneurysms/secondary to trauma) causes haemorrhagic stroke. The factors associated with the disease are high blood pressure, smoking tobacco, diabetes and heavy alcohol consumption. The disease is ranked 2nd in causing deaths not only in European regions but also globally- taking approximately 11% of death tolls. Among all age-sets, developing nations bear the worst burden of the disease, accounting for about 85% of deaths due to stroke. Women are more susceptible to developing the disease compared to men with prevalences up to 21% and 17% respectively. The disease is life demanding due to the fact that about 12% and 38% of ischaemic and haemorrhagic strokes respectively kill within a one-month-period. Economically, the USA records that an ischaemic stroke patient can spend up to approximately 140000 US dollars by the year 1999 and about 65.5 billion dollars for all indirect costs in treating strokes by the year 2008, UK spends about 9 billion pounds yearly and the entire European Union budgets for approximately 27 billion Euros per year for strokes.

Diabetes as a chronic disease can be defined as the result of failure of the pancreas in human beings to produce insulin in enough quantities or may be as a result of the body failing to utilize effectively all the insulin that is produced from the pancreas (WHO, 2010). Insulin refers to the hormones in human bodies that are capable of regulating/controlling sugar in blood. According to Lal (2016),

diabetes/diabetes mellitus refers to a collection of metabolic maladies whereby an individual has sugar/glucose in blood in high quantities as a result of poor production of the insulin or poor utilization of the already produced insulin. It can also be both in which there is poor production and what is produced is poorly utilized. The disease doubles the risk of dying among the infected people compared to the healthy ones. There are two types of diabetes namely: type 1 diabetes (as a result of the body not producing insulin- this is rapidly fatal if daily insulin is not administered to the patients) and type 2 diabetes (as a result of the failure of the body to utilize fully all the insulin produced leading to excess of the insulin in the blood system- usually brought about by physical inactivity and body weight that is in excess like obesity). Most of the diabetes patients (about 90 percent) suffer from type 2 diabetes while the rest have type 1. From what the world was experiencing by the year 2010, WHO had projected that the deaths due to diabetes would double by the year 2030. Almost 50% of the deaths occur among the people aged below 70 years while about 80% of these deaths are among the poor nations that are underdeveloped (in middle-and low-income nations). If the disease goes unchecked, the eventual consequences are problems with eyes, kidneys, heart damage, nerves and the blood vessels, with health complications such as diabetic retinopathy (blindness), diabetic neuropathy (damaged nerves), kidney failure, increased risk of stroke, heart disease and foot ulcers. High blood sugar patients experience frequent urination (polyuria) leading to increased thirst (polydipsia) as well as increased hunger (polyphagia). A simple test on urine can help detect the presence of excess glucose in the urine and this can be accompanied by a blood test as a confirmatory test.

Congestive heart failure is a disease that results from the failure of the heart to pump blood in enough quantities/volumes for the needs of the body (Malik *et al*., 2021). Any problem that maims the ventricular filling or that interferes with the blood ejection to the blood circulation system results in the congestive heart failure. Maladies like myocardium, those affecting heart valves, endocardium and metabolic/vessels disorders cause the disease. By the year 2013, the disease was costing approximately 30 billion dollars in USA only with yearly mortality rate at 22%. By the year 1996, the disease was invading more than 1 percent of the entire population (Taylor, 1996). In most industrialized nations, the disease was afflicting about 10% of the elderly people by the same year. The burden of the disease is heavy due to the fact that about 5 percent of the hospital admissions are due to congestive heart failure while about 30 percent of the disease patients are readmitted. The disease can be diastolic or systolic predominantly (Singh *et al*., 2005). Singh *et al*. notes that the disease is mainly caused by other diseases like high blood pressure, cor pulmonale and coronary heart disease with more than 70% of patients having hypertension. Some of the symptoms of the disease include the pulmonary rales, edema, gallop rhythm, orthopnea, paroxysmal nocturnal dyspnea and others.

Hepatitis is a disease of the liver inflammation that can progress to liver cirrhosis, liver cancer or fibrosis though it can also heal by itself (WHO, 2019). Viruses (the most cause of the disease-infectious causes) A, B, C, D and E cause the disease but B and C are the most common eventual causes of the cancers and cirrhosis, affecting hundreds of millions worldwide. Some of the symptoms linked with the disease in patients include the jaundice, nausea, abdominal pains, dark urine vomiting and fatigue that is extreme. In USA, about 4.4 million people are currently suffering from hepatitis B and C. The types of hepatitis are named after the type of viruses causing the disease. E.g., hepatitis A, hepatitis B and so on. The hepatitis B, C and D are mostly chronic, hepatitis A is always acute and short-term while E is often acute. The non-infectious causes of the disease are alcohol in excess, overuse and overdosage of medical drugs, exposure to poisons, and auto-immune system response. Hygiene and vaccines are possible ways of preventing the disease.

Dementia is a chronic or progressive disease or disorder in which the memory, thinking, capabilities of attending to daily activities and behaviour of an individual deteriorate (WHO, 2020) mostly among the elderly people. The ability of an individual who is sick from the disease to process thoughts gets worse than what a normally aged person experiences, leading to effects on calculations, language, thinking, comprehension, judgement, memory and learning capacity. Yearly, about 10 million individuals develop the disease while there are approximately 50 million already infected individuals. Some of the diseases like Alzheimer's and stroke as well as injuries that affect the brain are the causes of the disease. The disease comes with economic, physical, social and psychological impacts on patients, families and carers on top of the stigmatization and discrimination among the sick, and the

infected persons face barriers to care and diagnosis. Some of the signs and symptoms of the disease are loss of track of time, forgetting, getting lost at home, repeating questions, forgetting places and names of people one knows, losing of place and time awareness, facing challenges in walking, challenges in recognizing friends and family members as well as changing behaviour to aggression. Risk factors that are associated with the disease include ageing, lack of regular physical exercises, depression, excessive smoking, social isolation, cognitive inactivity and excessive consumption of alcohol, low educational attainment, lack of healthy diets, obesity/overweight, excess cholesterol, blood sugars and pressure.

Autism spectrum disorder (ASD) is a disease involving neuro-developmental problems that is linked with existence of the social-communication shortages as well as limited and monotonous/repetitive behaviours of individuals (Ousley & Cermak, 2014). In other terms, the ASD is a complicated developmental/growth condition in which there are persistent/lasting/continuous problems in speech and non-verbal communications, interactions socially, and repetitive and restricted behaviours. The infected individuals face social, communication and emotional problems. It is related to the development of the brain whose impact is evidenced on how the patients carry themselves socially, in interaction and in communication. Some of the symptoms include loss of language skills, lack of response to one's own names, lack of eye contact, difficulties in learning, intelligence that is very low and lack of communication skills among others. Genes and environmental factors such as infections from viruses, complications during pregnancies, complications from medications, air pollution among others are thought to be the causes of the disease.

Hyperlipidemia is a disease that involves lipids/fats in the blood at high levels that are abnormal. The high levels of lipids in blood lead to increased chances of developing CHD (Verma, 2017). There is a relationship between hyperlipidemia and blood lipids as well as the complications of the disease like CHD. When the triglyceride that carry lipoproteins or the cholesterol concentrates in blood plasma beyond the normal levels, the hyperlipidemia develops in an individual. The deposits of lipoproteins or cholesterol in walls of arteries block the flow of blood to the heart. Common type of the disease are hypercholesterolemia and hypertriglyceridemia that are based on type of lipids, and familial/primary hyperlipidemia (with type I up to type V) and acquired/secondary hyperlipidemia (usually caused by diabetes mellitus, alcohol use, hypothyroidism, renal failure and nephrotic syndrome) that are based on the causing factors. Some of the causes of the hyperlipidemia disease include saturated fats and cholesterol in foods, diabetes, obesity/overweight, hypothyroidism, lack of physical exercise, smoking tobacco, excess alcohol, heredity, mutation of lipoprotein lipase and drugs like steroids. Symptoms may include chest pains, swelling of liver, pancreas or spleen, blocked vessels of blood in heart and brain and high rate of glucose intolerance.

Arrhythmia is a term used for the collection of all the conditions whereby the electrical activity within the heart of an individual is not normal (Humphreys & Warlow, 2013). This type of disease refers to irregular/abnormal heartbeats in which the rhythm is not regular (Resnekov, 1964). It's also known as dysrhythmia. Some of these conditions are not that serious and may just cause minor symptoms that are only irritating like beats of the heart that are very fast while some cause life-endangering symptoms including cardiac arrest and stroke. Abnormal electrical activity in heart may lead to the heart beating faster or slower beyond the normal and acceptable intervals and this can cause pumping of blood that is insufficient to the body organs. In normal rhythm of the heart, the beats are between 60 and 100 in a minute. If things are abnormal, the results are either tachycardia or bradycardia. In tachycardia (fast rhythm), the heartbeats are more than 100 in a minute while in bradycardia (slow rhythm), the beats are less than 60 in a minute. The causes of the disease include but not limited to hypertension, surgery and the healing process, heart attack's injuries, coronary artery disease, disorders in valves, imbalance that may be caused by electrolyte in blood among others. Substances such as cocaine, caffeine, alcohol, aerosols when inhaled, nicotine, emotional shock, stress and frights among others can also cause the disease. The five types of arrhythmias are tachycardia, bradycardia, supraventricular arrhythmias, ventricular arrhythmias and brady arrhythmias.

Asthma is a disease defined as a chronic inflammation of the air-ways that is linked with the hyper-responsiveness of the air-ways to physical exercises, tobacco smoking, allergens, environmental factors (like dust, feathers, molds, fumes, pollen), viruses, emotional stresses, obesity, pregnancies, among others and this hyper-responsiveness leads to conditions/problems such as chest-tightness, wheezing, coughing, dyspnea- shortness of the breath of an individual- and increased production of

mucus (Kim & Mazza, 2011; Brazier, 2020). The air-ways' walls become inflamed, swollen and tight, and this makes it difficult to breath. In some countries such as Canada, it is the most common disease among the chronic respiratory diseases with about 10 percent of the population suffering from the disease. In USA, approximately 8% of the population was suffering from the disease by the year 2017. Research shows that this disease is not just affecting the lungs but it's a disease affecting the whole respiratory tract. The disease, if unchecked, can lead to poor quality of life, deaths, and impairing the of the daily activities and individuals' performance. Some types of asthma are child-hood asthma, adult-onset asthma, occupational asthma, severe and difficult-to-control asthma and seasonal asthma.

Coronary artery disease (CAD) or coronary heart disease (CHD) is the chronic disease that affects the coronary arteries that supply blood rich in oxygen to the body's cardiac muscles (Themistocleous *et al*., 2017). It involves the atherosclerotic fatty deposits (plaques or fatty deposits are composed of cholesterols, cellular waste products, fibrin or clotting materials in blood, fatty substances and calcium) in the body's coronary arteries leading to stenosis of the arteries or thickening of the blood vessels, usually the arteries. Such a condition may cause heart attack (myocardial infarction). The process of deposits building up in the main arteries to the heart may take many years. The disease is turning out to be the leading cause of cardiac surgery globally. The risk factors include the family history of the diseases, age and gender (these three are non-modifiable), obesity or overweight, lack of exercise and physical activities, high blood pressure, smoking tobacco and hypercholesterolemia-increased low-density-lipoprotein (these are modifiable factors as lifestyle interventions and medical activities can help reshape the outcome). Even though the patients may have no symptoms, they experience increased risks of some problems such as chest pains, heart failure, heart attack, cardiac arrhythmias among others.

Cancers can be defined as malignant forms of abnormal growth in cells as a result of changes in these cells and can spread from one part of the body to another through lymph and blood systems. The cells lose control in regulating their own growth and end up growing and multiplying out of control and without limit to form tumors. Cancer is a term that describes a group of more than 100 disease that affect any organ in the body and develop at any life-stage. The biological diversity of cancers is reflected in the wide range of treatments and services associated with cancers (Kaplan, 2013; http://www.nih.gov, http://www/dietandcancerreport.org, http://www.cancercouncil.com.au; Shehata *et al*., 2016). Genetic together with non-genetic changes in genes are responsible for cancers. Some of these changes are induced by factors from the environment and lead to abnormal growth of the infected cells. However, it's not yet clear about the specific factors in the environment and internal cues that bring about these changes. Therefore, there is need to fully understand these changes and see how they are related to the environment and hence develop survival strategies that can lead to prevention of cancers. About 80% of cancers are associated with lifestyle or environment with the risk factors for some cancers having been identified clearly (Kaplan, 2013). By the year 2013, cancers were the main causes of deaths and they accounted for approximately 20% of all deaths in the world (Passos, 2013). Despite the so many types of cancer existing today, one thing they share in common is that all begin from abnormal cells growing out of control. Some of the differences between normal and cancer cells are that cancer cells don't know when to stop growing and they move from one organ to develop in another organ while normal cells are aware of their growth limits, their location and they don't move and grow elsewhere (http://www.twicethetrust.org). Tumors from the same tissues have proved to be comprised of several sub-types and it is thought that, as new and advanced technology is being unveiled with time, the grouping of the sub-types may expand. The malignant cells in the body contain abnormal DNA methylation patterns. In cancers, so many genes could be having increased levels of DNA methylation (hypermethylation) while even hypomethylation (low levels of DNA methylation in totality) facilitates development of cancers. (http://www/dietandcancerreport.org). The cancer cells have several traits including: they have self-sufficiency in growth signals, they aren't sensitive to the antigrowth regulators, they evade apoptosis, their capability in replicating is not limited, capability to evade other tissues, etc. The possession of adaptive traits by cancer stem cells enables survival in all environments (Idikio, 2011). Generally, cancer refers to the end results of a number of alterations or modifications in the genes of a cell. The modifications change the balancing that exist cell proliferation and cell death (apoptosis) leading to a transformed cell (Carrillo-Infante *et al*., 2007; Passos, 2013).

Depression as a disease encompasses loss of interest as well as persistent/long-lasting feeling of sadness (Goldman, 2019). It is a mental disorder that comes with anxiety (WHO, 2012). Some of the life events that may lead to depression include loss of a job, bereavement and so on. It mostly affects females compared to males and some of the symptoms are changes in appetite, depressed mood, loss of pleasure in hobbies, under- or over-sleeping, fatigue, feeling worthless, loss of concentration, persistent thoughts and attempts of suicide, unintended weight gain or loss among others. College students find it hard to cope with new lifestyles, changes, experiences and cultures at first and this can lead to the disease and anxiety. This disease is classified as the leading root of disability among people. The disease affects persons of all ages, including teens and children. Types of this disease include major depression, persistent depression disorder (dysthymia), bipolar disorder, psychotic depression and postpartum depression. The disease impairs a person's ability to deal with everyday activities. On daily basis, about 3000 persons commit suicide globally due to the disease.

Alzheimer's disease (AD) can be defined as a long-term neuro-degenerative malady that has clearly defined pathophysiological mechanisms (Alzheimer's Association, 2021; De-Paula *et al*., 2012), which means it's a disease of the brain that worsens as time elapses. It's classified as the commonest cause of the disease dementia because up to 80 percent of dementia cases are Alzheimer's disease while it is the 6^{th} leading death's cause in USA and 5^{th} leading death's cause among those age 65 years and above. Its symptoms are not noticeable until after quite a long time, leading to loss of memory and problems associated with language. The neurons or nerve-cells become damaged over time and eventually the memory, thinking and learning become affected. The disease is also fatal. Brain changes such as reduced brain volume (atrophy) that is due to loss of cells, reduced brains' capability to process the main fuel called glucose, inflammation in the brain, clumps of fragments of proteins called beta-amyloid that accumulate outside the neurons/nerve-cells and protein tau's abnormal form that accumulates inside the nerve-cells are linked with Alzheimer's disease due to blocking and damaging of the neurons. Pathways for nutrients' transportation are blocked and communication from one neuron to another is interfered with or hindered. Risk factors could be genes, family history of the disease, age of an individual, risk factors associated with the cardiovascular disease, unlimited use of alcohol, diets, lack of quality and adequate sleep, physical inactivity and depression. By the year 2020, more than 11% of people in USA aged 65 years and above were suffering from the disease while it is projected to increase from 58 million in year 2021 up to 88 million people by the year 2050. About 33% of elderly people in USA have succumbed to the disease.

Osteoporosis disease (also called 'silent disease') can be defined as a systemic disorder/condition that is characterised by reduced mass of the bones and this results in increased risk of fractures of wrists, hips and spines (IASP, 2009), with hip fracture as the most dangerous and serious one. The bones become 'spongy' or 'porous' due to the holes they develop (AAOS, 2019) and this makes bones to be fragile. This is a disease in which bones weaken as one ages and become susceptible to breaking even when one is involved in simple tasks. The disease has no symptoms and is realized when fractures take place. Pains from the disease are experienced only when there is a fracture. Globally, there are more than 200 million individuals suffering from the disease, more than 30% of females suffer the same fate while more than 12% males have the disease. In USA an approximately 14 billion dollars are spent yearly in treating the disease with about 54 million patients suffering from the disease and related issues. Mostly, females are the most affected individuals when they get older. The risk factors for the disease include age (as one gets older, the more the risk), body size (small and thin bodies are at higher risk), ethnicity (some ethnic groups like Caucasian and Asians are at higher risk than others), family history of the disease, nutrition/diet (diets poor in vitamin D and calcium, and low body weight can increase the likelihood of developing the disease), lifestyles adopted (smoking, alcohol in excess and inadequate physical exercise can lead to the development of the disease) and some medicines like steroids.

Schizophrenia disease can be defined a dangerous psychiatric disorder, a heterogenous behavioural as well as a cognitive/mental syndrome in which the brain gets disrupted in its development (Farah, 2018; MIRECC, 2013). The individuals' emotions, thinking and behaviours are impaired or affected and offers them hard times in understanding the reality that surrounds them. The characteristics of the disease are disorganized speeches, delusions, disorderly, reduced emotional expression, hallucinations and others. The patients have suspicious thoughts about those surrounding them, they may hear voices

and sounds that those around them are not aware, among others. Paying attention and making decisions become an issue to such people. It can be caused by factors related to the environment (such as infectious agents, perinatal as well as prenatal complications), stress, drugs such as bhang, amphetamines, tobacco and alcohol or genes (changes in genetic materials). Generally, symptoms are hallucinations, delusions, disorder in thoughts, bizarre behaviours, blunted effect, anhedonia, avolition, logia, asociality and cognitive impairments such as different types of memories, learning and attention. The disease affects males than females although the prevalence is generally low [usually from 0.3% to 0.66%] (Farah, 2018). But according to MIRECC (2013), 1 percent of population develops the disease in life time.

2 Methods

A literature search was done on many papers that were gotten from the internet. The papers were involving chronic diseases.

2.1 Procedures

Papers on chronic diseases worldwide were downloaded from the internet, read and a summary made from each. Discussions and conclusions were made.

2.2 Materials

The resources needed to accomplish the task were computer and internet.

3 Results

3.1 Chronic Diseases' Burdens

The extremely destroying effects of the diseases have forced the United Nations to prioritize and direct their efforts towards lowering the fatalities from them by about 25% among those aged between 30 and 70 years by the year 2025 (AIHW,2014; Hunter & Reddy, 2013; Beaglehole *et al.*, 2011). Failure to check and contain the issue as early as possible would lead to increasing infected persons that may overweigh not only the health-care systems in place but also the economy and the technology. This is due to the fact that the number of risk factors is increasing over time as the population grows and ages. The efforts towards combating the situation have been slow and not matching with the rate of deterioration of the situation (Meetoo, 2008). Malyshkin (2014) highlights on the fact the main worry for public health and communities is the chronic diseases.

The under-developed and developing nations experience about 80% of all deaths that are due to chronic infections like stroke, cancers and heart diseases globally (Jha *et al.*, 2012), while the high-income nations bear the biggest burdens economically. The leading diseases in causing deaths are cancers, COPD, diabetes, hypertensive heart disease and stroke. These diseases pose a significant burden on the nations', families' and individuals' economy and this can become unbearable as time elapses. The developing nations are at high risk of getting their economies hurt severely due to increasing chronic infections as time goes by because of their growing populations. The situation in developing nations can worsen with time due to the chronic diseases as there are no enough resources for sustainable investments in new drugs, no control in tobacco uses and the existence of gaps in implementing programs and strategies for controlling chronic diseases.

The non-communicable diseases (NCDs) caused approximately 58 million deaths in the year 2005 globally (Meetoo, 2008; WHO, 2005), and the value was estimated to rise up to 64 million in the year 2015, despite the efforts towards eliminating the diseases. Globally, in the year 2002, the deaths were mainly from stroke and ischaemic heart disease (17 million deaths), 7 million from cancers, 4 million from chronic lung disease and 1 million from diabetes mellitus. It's also noted that, the diseases share principal risk factors such as use of tobacco, diets that are not healthy, lack of physical exercises or activities and consumption of alcohol in excess. Although the diseases develop slowly, they eventually become disasters through their devastating complications, premature deaths, quality of life that is extremely poor and overwhelming burdens on the health care systems, as well as posing a threat to the public health.

In Africa, the chronic kidney disease (CKD) has a prevalence of approximately 16% and approximately 18% in sub-Saharan Africa (Ngendahayo *et al.*, 2019; Kaze *et al.*, 2018). Among the groups suffering from other chronic diseases like HIV/AIDs, diabetes and hypertension, the prevalence is much higher (about 32%). The sexually transmitted infections/diseases (STIs/STDs)

including cervical cancers and HIV/AIDs, which are chronic infections, pose a threat to public health in men and women as a growing menace in both developing and developed nations (Waure *et al*., 2015). WHO (2001) lists chronic infections as among those diseases that pose the greatest burdens on individuals, communities/societies, nations and international communities in both developed and under-developed countries, and these burdens can only be lessened through a combination of strategies like patient treatments, promoting health and preventing the diseases. According to CDC (2003), thousands of ladies succumb to death yearly due to chronic diseases (including genital cancers) that affect the uterus and fallopian tubes, and these ladies are not restricted to those of a specific age.

As is noted by Waure *et al.* (2015), breast and cervical cancers are the most common types of cancers among the women in Europe who are aged between 15 and 44 years, the age bracket that includes university students. In most cases, the elderly people are the ones likely to succumb to death from chronic infections because the diseases 'eat into' one's life more and more as time elapses (Girma & Ayalew, 2020). The chronic infections make one to be more prone to other forms of diseases and their health is more susceptible to their effects like the Covid-19 disease. The stress comes as a worry about one's health in the presence of the Covid-19 pandemic and this stress worsens the chronic health issues of the suffering individuals. The ageing individuals and those with chronic illnesses like cancers, diabetes, cardiovascular disease and chronic respiratory disease suffer the most, even to death (WHO, 2020; Girma & Ayalew, 2020).

The severity of the new disease, Covid-19, has been found to be correlated with chronic diseases like COPD, high-blood pressure, obesity and diabetes and age of individuals above 70 years (Gennaro *et al.*, 2020). Individuals who have chronic diseases are always at risk of contracting other infections (Thronson *et al.*, 2014) while some chronic diseases are responsible for causing other illnesses like conjunctivitis (pink eye). The diseases are common among school children. Fallet *et al.* (2020) have noted that the chronic infections that are due to virus like HIV, HBV and HCV indeed interfere with the adaptive immunity by subverting crucial elements in the system, leading to manipulated defence system. This makes it easier for the virus to establish itself and advance in invading the host.

UNAIDS (2005) has highlighted the stigma and discrimination that comes with chronic diseases like AIDs. The stigmatization and discrimination have negative impacts towards the efforts of combating the diseases. It becomes hard to prevent further spreading of the diseases because denial of the existence of a problem is fuelled and this ends up delaying the actions needful for stopping the spread. The infected persons are seen as a 'problem' by the society. The infected persons choose to remain silent for fear of being discriminated when their personal health information gets to reach the surrounding people. The stigmatization is as a result of some factors like the misunderstanding of the diseases among people, poor reports from media, lack of treatments and incurability of the diseases among other factors. The discrimination globally denies the victims their basic rights to education, good health-care, free movement and work.

3.2 Research on chronic diseases

Jha *et al*. (2012) carried out research on costs of the chronic diseases globally. The results show that in the year 2010, cancers cost approximately 290 billion dollars by the year 2010 and estimates that the costs may be up to 458 billion dollars in the year 2030; cardio-vascular diseases cost about 863 billion dollars and estimated to be up to 1044 billion dollars in the year 2030; COPD cost about 1.2 trillion dollars and the projected cost in the year 2030 is up to 4.8 trillion dollars; diabetes cost about 500 billion dollars and the estimate for the year 2030 is up to 745 billion dollars and the mental health conditions cost up to 2.5 trillion dollars, and this is estimated to rise up to 6 trillion dollars in the year 2030. From the 5 main non-communicable diseases (NCDs)-chronic diseases- (diabetes, cardiovascular disease, chronic respiratory diseases, mental health conditions and cancers), the value of lost output for the period from year 2011 to year 2030 is estimated to be 47 trillion dollars, with mental health conditions and cardiovascular disease contributing the largest share. It is the illness-related loss of income and the expenses on health care that pose financial risks on individuals and families.

Liu *et al*. (2013) researched on the relationships between chronic diseases (arthritis, diabetes mellitus, hypertension, coronary heart disease, asthma and stroke), obesity and frequent mental distress on one hand, and inadequate sleep on the other hand among grown-ups in the United States. The research employed a questionnaire in data collection with a sample of 375653 respondents. Slightly more than

50% were aged 45 years and above, 50.3% were male participants, about 62% had studied beyond secondary school, about 66% had no problem with mental distress, approximately 11% had frequent mental distress, about 28 percent had obesity, about 9% were suffering from diabetes, 6.1 percent had heart disease in the past, approximately 3% were having stroke, those who had hypertension were about 29%, those who had asthma in the past were 13.4 percent while arthritis infected individuals were about 26%. Approximately 52% had contracted at least one chronic disease among the six mentioned and about 69% had not gotten enough sleep for one month under investigation. The graduates were less likely to fail to have enough sleep compared to those with less education. The relationship between frequent mental distress and obesity on one hand, and each of the six chronic diseases listed on the other hand, was statistically significant. There was also relationship that was significant between insufficient sleep and chronic diseases arthritis, hypertension and asthma. The chances of having coronary heart disease, diabetes and stroke were higher for those having insufficient sleep compared with those enjoying enough sleep.

Sinnige *et al.* (2013) carried out a literature search on prevalences of simultaneous occurrence of more than one chronic disease in a single patient (co-morbidity) or more than two chronic diseases (multi-morbidity) from those publications between year 2000 to year 2012 in Cochrane, Medline and Embase libraries. The focus was on researches involving co-morbidity and multi-morbidity that have mentioned rates of more than one disease combined. Out of the 23 publications of interest found, the widely mentioned chronic diseases were diabetes, high-blood pressure, depression, stroke and cancers, the disease pairs combinations were found to be 165 while triplet disease combinations were found to be 50. Depression was found to be combined with eight other chronic maladies while diabetes and hypertension were clustered with six other different diseases, the pairs that involved hypertension in their combination had the highest rate of prevalence and those patients who had been diagnosed with having major depression combined high blood pressure were about 57%. The study also shows that highest rates of prevalences were reported in studies that involved data collection through surveys or interviews and nearly all involved general population.

The inclusion of chronically diseased students in regular schools has been studied by Muntaner *et al.* (2014) with the aim of identifying the infected students' needs that can help enable the implementation of proposals towards improving learning institutions. The study employed interviews and discussion groups in which students, teachers, health practitioners and families were involved. The findings show that teachers are not familiar with their students' conditions and parents are forced to inform the schools about their children's conditions and the necessary special requirements they need in place while studying. From secondary schools onwards, students become responsible for their own health and this makes them to be totally detached from the teachers and other surrounding people. The students have a feeling that by disclosing their conditions and receiving special care in schools, they might become discriminated, hence they opt not to disclose their status. All the participants in the study agreed that the affected students really need special attention and the chronic diseases pose some challenges for the teachers in the way they handle their subjects/courses/units in class. It's realized that, the relationship between the students and teachers fades as the student advances in school levels and the teachers' roles in taking care of the infected students waxes cold as the student moves from primary to secondary and from secondary to university. The most problematic relationship was found to be that between students/their families and the school administration (both educational and medical administrators), with the consequences that the administration lacks the awareness about the infected students' realities and special treatments they need. Most of the learning institutions lack the necessary infrastructure in place for students with special needs due to chronic infections and this makes the students feel left out and miss the much-needed support from the administrative personnel.

Grover and Joshi (2015) performed a literature search on publications with models for chronic diseases management from CINHAL and PubMed databases between year 2003 and 2011. The chronic diseases of interest were cardio-vascular, diabetes and chronic obstructive pulmonary disease (COPD). Most of the studies were found to be from USA. The models for chronic diseases' management that were found in the publications included improving chronic illness care (ICIC), Stanford Model (SM), chronic care model (CCM), innovative care for chronic conditions (ICCC) and community-based transition model (CBTM). While the most investigated model was CCM, the most studied elements were: self-management support and delivery system design (87%), 57% was

decision support and clinical information system, and health system organization with 52%. The elements like support paradigm shift, patient safety, manage political environment, health literacy between treatments and visits, remote patient monitoring, support patients in their communities, community policies, emphasize prevention center care on families and patients, use health-care personnel effectively and built integrated health care were found to have been poorly studied.

On the illness experiences among those patients suffering from communicable chronic infections, Oliveira *et al*. (2017) conducted a literature search from the databases PubMed, Scopus and the resources in Latin-America's and the Caribbean's Health Sciences. Most of the studies were found to have been conducted in Brazil, then China and USA. The worst experience that impacted the patients' lives most and pioneered negative feelings in them was the stigmatization that comes with these diseases. The patients were also found to have adopted lifestyle habits that are very health for them and lived in harmony and comfortably with the infections due to the support they got from religions, families and health services. The negative sensations and feelings among the patients after diagnostic are fuelled by the body's fragileness that is caused by the disease and the maintenance of the infections' conditions because this exposes the patients to prejudice, discrimination and stigmatization. The most vulnerable groups of patients to negative sensations and feelings after diagnosis are those suffering from hepatitis, HIV/AIDS and tuberculosis. One of the best ways forward is to ensure that the support network is strengthened around the patients to help them achieve life of quality and ensure their situations improve with time.

Literature search on measuring the chronic diseases' treatment burdens was done by Sav *et al*. (2017) from PsychInfo, Scopus, Medline and CINAHL databases for the publications done between year 2000 and 2016. About 63% of the publications were based on measuring the treatment burdens quantitatively, about 9% were based on both qualitative and quantitative methods of measuring the burdens while the rest dealt with qualitative criteria only. Approximately 49% of the studies had been done in North America, about 34% in Europe while 10% came from Asia-Pacific. About 60% of the studies had been done on people aged between 18 and 60 years and the chronic diseases encountered included cancers, diabetes, chronic kidney disease, cardio-vascular disease, coeliac disease among others. Majority of the studies were on respiratory issues, diabetes, cancers and multi-morbidities. In first category that was based on direct measures, the researchers focussed on information about how the patients understand the treatment burdens. The second category that was based on inferred measures focussed on time and financial aspects of burdens. Indirect measures were documented by third category that focussed on travel/time, medication and treatment costs based on treatment experiences. In general, there is a variation in the methods used by researchers to determine the treatment of chronic diseases burdens but all reveal the complex nature of the burdens on those suffering from the maladies.

Chapel *et al*. (2017) investigated the literature among the publications made from year 2000 to year 2016 on prevalence and costs of chronic diseases that are non-communicable among the adult beneficiaries aged between 18 and 64 years in Medicaid program from CINHAL and Medline databases. The prevalences for the various main non-communicable chronic maladies were found to be up to approximately 12% for heart disease, 27% for high blood pressure, 23% for hyper-lipidaemia, diabetes had about 13%, cancer was at 10%, 19% for asthma, depression had approximately 22% while for chronic diseases in general, the prevalence was about 62%. Medical costs (in US dollars) for these diseases per patient were found to be approximately 4700 for diabetes, COPD has about 6500, asthma has approximately 3100 and about 700 for hypertension. The yearly costs for heart-failure patients were about 52000 dollars per patient, about 21000 dollars per schizophrenia patient and the half-year costs per cancer patient was approximately 46200 dollars. There rates and costs are termed as high for the non-communicable diseases among the suffering patients.

A literature search from publications between year 2006 and 2014 from CINAHL, Medline, PsycINFO and Embase databases was performed by Reynolds *et al*. (2018) on primary/basic care interventions when it comes to managing chronic diseases. Controlled randomized trials had the largest proportion (93%) of the publications that dealt with patient-levels' intervention based on primary care, 49% of the studies had been done in USA, average age of the patients studied was found to be about 61 years and the average study-duration was approximately 14 months. Most of the publications showed that the most practiced primary care strategy was the Self-Management Support-

with elements Chronic Care Model having 46%, Decision support having 23%, Delivery system design having 21% and Clinical information systems having 9%. The research notes that education on self-management support should be provided to general population since it provides the best and high-quality primary care for the chronic diseases' patients.

Emmert-Streib and Dehmer (2019) conducted a review on survival analysis for multi-variate data, considering the commonly used functions (survival, hazard and density functions). The aim was to make a comprehensive, extensive and detailed presentation on survival analysis. Both parametric and semiparametric models have been well covered as well as substantial definitions that are needed to acquaint the reader with a good background in the field. The work has derived all the important functions in survival analysis including specifying the hazard, survival and density functions for several types of distributions that survival time can assume. The researchers have noted that, many publications that have researched on survival analysis have discussions that easily lead one into confusion due to the complexity of the procedures/methods used on multivariate data. On top of this, many rely on software that are widely used in biostatistics or epidemiology such as SAS and STATA, but the two researchers have majored on use of R programming language in statistics in demonstrating their examples to the reader. However, the examples used in demonstrating the use of R software are not for data from research they have conducted but on lung cancer patients from the survival package.

Girma and Ayalew (2020) have studied the stress from Covid-19 on the health of the adults with chronic diseases and their coping mechanisms in Ethiopia, Southwest parts, in which only the adults with chronic diseases were investigated. About 14% of the participants were found to be severely stressed (significant proportion) while about 68% were moderately stressed. Out of the many types of coping mechanisms developed by the participants, three of them were most preferable, namely: active coping strategies, religious and instrumental one. The results also show that 2.4% of the participants had 3 chronic diseases simultaneously, with HIV/AIDs (about 23%) and diabetes (17%) as the most common chronic infections.

3.3 Discussion

The day-to-day escalating health complexities including cancers, viral diseases (like HIV/AIDS, Ebola, Corona Virus Disease and Dengue Fever), mental challenges, tuberculosis, asthma among others, are becoming unbearable burdens among humans. On top of this, the resistance of these infections to already discovered drugs and treatments (like malaria) due to mutations have dealt humans a heavy blow and led to additional costs as well as demanding for additional lives for graves. Another bottleneck on the way to healthy humans has been forced in place by the fact that some of the infections cannot be cured such as HIV/AIDS, in which, health practitioners are just treating symptoms and not targeting the disease or the root-cause itself. The long-term/chronic infections that do exist such as asthma and HIV/AIDS, among others, are like a hurricane in life; causing mental instability due to excessive stress, long-lasting pains, long-term cost burdens, lowering individual's productivity, disorienting one's socio-economic life and general shaping of individual's living styles and standards for the worse. They become a real havoc in life! Experience shows that there are many people with chronic infections but do not let the hospitals know because they do not seek medication. One of the invisible dangers is the fact that, since the advent of the ARVs, the visible signs of infected persons have been covered and people seem to deem HIV/AIDs as a gone disease, making it possible for one to spread it easily among colleagues due to lack of suspicion among people. The greatest worry is that these infections do not discriminate any age group but attack all categories of humans including the most productive groups, none have not been left out.

Going by the researchers' findings, the whole picture is becoming darker with time, cases increasing, diseases escalating and burdens that come with all these are becoming weightier. The concerned stakeholders need to wake up and deal with the situation in terms of more and intensive research, more funding, more concern and creating general awareness among the people. There is necessity to deal with the mustard seeds before they become fig trees to be cut with razor blades. There is no need to wait for the healthcare systems to collapse so that all can know there is a hidden danger.

4 Conclusions and recommendations

4.1 Conclusions

By definition, chronic diseases are illnesses that take long time to heal or do not heal at all with persistent effects including HIV/AIDS, asthma, hypertension, cancers and so on. The diseases

previously thought to be 'for the elderly' are now invading every age leading to overburdened health-care system and increased sufferings. More resources are required to mitigate the situation. Stakeholders need to concerted efforts in dealing with the condition. The rising concerns worldwide about the looming danger is a waking call to all because the drama is not getting more interesting with time.

4.2 Recommendations

The governments and other stakeholders to increase funding towards research in this area. The researchers to intensify their activities in coming up with lasting solutions to the problems. All the media to direct their efforts towards disseminating the right and timely information to the general public with the aim of educating them fully concerning the impending calamity.

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