

Original Research Article

Comment [D1]: Review article

Specific Chronic Diseases and Their Burdens: More Efforts Needed

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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.

Comment [D3]: Sounds too fancy. Any synonym

Comment [D4]: ??

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 (Meeto, 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 of 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 (CKD), 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.

Comment [D5]: Or right medical treatment?

Comment [D6]: CKD

1.2 General information

The increasing number of chronic infections is also emphasized by the fact that in developing countries 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

Comment [D7]: Chronic infection or chronic diseases? Kindly re-check

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

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

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

86 1.3 Specific Chronic Diseases

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

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

Comment [D8]: Reference

Comment [D9]: Can you reframe this sentence?

Comment [D10]: Chronic infection of chronic disease?

Comment [D11]: Because the infectious diseases are caused by microorganism invasion, therefore the long term mechanism remains unclear.

Comment [D12]: This sentence has to be reframed. Briefly write long term use of antibiotic can become resistance

Comment [D13]: Causes breathing problem

Comment [D14]: affects

Comment [D15]: Give few examples and remove this sentence (more than one hundred types)

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

Comment [D16]: Reference

118 Human immunodeficiency virus (HIV), that is spread through unprotected sexual intercourse, blood
119 transfusion, breast-feeding, sharing of needles among other ways, is an acquired virus that leads to
120 infection and AIDS- a human condition that leads to devastated and weak immune system that is
121 prone to many more opportunistic deadly and undeadly diseases like cancers (Kapila *et al.*, 2016). It
122 renders the body to a state of being unable to protect itself. Many infected persons do not have serious
123 and obvious observable symptoms. The HIV prevalence nationally in Kenya was about 5% overall by
124 the year 2017, with about 5.2 and 4.5 percent among women and men respectively (Kenya HIV
125 Estimates Report, 2018). In terms of regions in Kenya, the prevalence ranges from 0.1 percent up to
126 about 21%. In the same year, those aged between 15 and 24 years (university students' age for
127 majority) had overall prevalence of approximately 2%, with females and males having about 2.6 and
128 1.3 percent respectively.

Comment [D17]: Leads to weak and compromised immune system

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

Comment [D18]: Statement is not clear

140 Stroke, also called apoplexy/cerebrovascular accident (CVA), is sudden onset of focal neurological
141 deficiency that can take more than a day- 24 hours, or it a disease that results when arteries to the
142 brain burst or gets blocked resulting in failure of the brain to receive enough blood needed for its
143 operations (Wittenauer & Smith, 2012; American Stroke Association, 2020). It is a disturbance of the
144 functions of the cerebral part of the body of an individual and it is caused by vascular origin
145 (Coupland *et al.*, 2017). The challenge can lead to problems in sleeping, seeing, pain, bladder control,
146 having seizures, body parts moving, thinking, fatigue, memory and depression. The first period of 24
147 hours of this disease is called acute stroke while transient ischaemic attack (TIA) is stroke that takes
148 less than a day- can be 5 to 20 hours. The spontaneous rupture of vessels of blood (or
149 aneurysms/secondary to trauma) causes haemorrhagic stroke. The factors associated with the disease
150 are high blood pressure, smoking tobacco, diabetes and heavy alcohol consumption. The disease is
151 ranked 2nd in causing deaths not only in European regions but also globally- taking approximately
152 11% of death tolls. Among all age-sets, developing nations bear the worst burden of the disease,
153 accounting for about 85% of deaths due to stroke. [Women are more susceptible to developing the
154 disease compared to men with prevalences up to 21% and 17% respectively]. The disease is life
155 demanding due to the fact that about 12% and 38% of ischaemic and haemorrhagic strokes
156 respectively kill within a one-month-period. Economically, the USA records that an ischaemic stroke
157 patient can spend up to approximately 140000 US dollars by the year 1999 and about 65.5 billion
158 dollars for all indirect costs in treating strokes by the year 2008, UK spends about 9 billion pounds
159 yearly and the entire European Union budgets for approximately 27 billion Euros per year for strokes.

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

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164 diabetes/diabetes mellitus refers to a collection of metabolic maladies whereby an individual has
165 sugar/glucose in blood in high quantities as a result of poor production of the insulin or poor
166 utilization of the already produced insulin. It can also be both in which there is poor production and
167 what is produced is poorly utilized. The disease doubles the risk of dying among the infected people
168 compared to the healthy ones. There are two types of diabetes namely: type 1 diabetes (as a result of
169 the body not producing insulin- this is rapidly fatal if daily insulin is not administered to the patients)
170 and type 2 diabetes (as a result of the failure of the body to utilize fully all the insulin produced
171 leading to excess of the insulin in the blood system- usually brought about by physical inactivity and
172 body weight that is in excess like obesity). Most of the diabetes patients (about 90 percent) suffer
173 from type 2 diabetes while the rest have type 1. From what the world was experiencing by the year
174 2010, WHO had projected that the deaths due to diabetes would double by the year 2030. Almost 50%
175 of the deaths occur among the people aged below 70 years while about 80% of these deaths are
176 among the poor nations that are underdeveloped (in middle-and low-income nations). If the disease
177 goes unchecked, the eventual consequences are problems with eyes, kidneys, heart damage, nerves
178 and the blood vessels, with health complications such as diabetic retinopathy (blindness), diabetic
179 neuropathy (damaged nerves), kidney failure, increased risk of stroke, heart disease and foot ulcers.
180 High blood sugar patients experience frequent urination (polyuria) leading to increased thirst
181 (polydipsia) as well as increased hunger (polyphagia). A simple test on urine can help detect the
182 presence of excess glucose in the urine and this can be accompanied by a blood test as a confirmatory
183 test.

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

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

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

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

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

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

253 Arrhythmia is a term used for the collection of all the conditions whereby the electrical activity within
254 the heart of an individual is not normal (Humphreys & Warlow, 2013). This type of disease refers to
255 irregular/abnormal heartbeats in which the rhythm is not regular (Resnekov, 1964). It's also known as
256 dysrhythmia. Some of these conditions are not that serious and may just cause minor symptoms that
257 are only irritating like beats of the heart that are very fast while some cause life-endangering
258 symptoms including cardiac arrest and stroke. Abnormal electrical activity in heart may lead to the
259 heart beating faster or slower beyond the normal and acceptable intervals and this can cause pumping
260 of blood that is insufficient to the body organs. In normal rhythm of the heart, the beats are between
261 60 and 100 in a minute. If things are abnormal, the results are either tachycardia or bradycardia. In
262 tachycardia (fast rhythm), the heartbeats are more than 100 in a minute while in bradycardia (slow
263 rhythm), the beats are less than 60 in a minute. The causes of the disease include but not limited to
264 hypertension, surgery and the healing process, heart attack's injuries, coronary artery disease,
265 disorders in valves, imbalance that may be caused by electrolyte in blood among others. Substances
266 such as cocaine, caffeine, alcohol, aerosols when inhaled, nicotine, emotional shock, stress and frights
267 among others can also cause the disease. The five types of arrhythmias are tachycardia, bradycardia,
268 supraventricular arrhythmias, ventricular arrhythmias and brady arrhythmias.

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

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274 mucus (Kim & Mazza, 2011; Brazier, 2020). The air-ways' walls become inflamed, swollen and tight,
275 and this makes it difficult to breath. In some countries such as Canada, it is the most common disease
276 among the chronic respiratory diseases with about 10 percent of the population suffering from the
277 disease. In USA, approximately 8% of the population was suffering from the disease by the year
278 2017. Research shows that this disease is not just affecting the lungs but it's a disease affecting the
279 whole respiratory tract. The disease, if unchecked, can lead to poor quality of life, deaths, and
280 impairing the of the daily activities and individuals' performance. Some types of asthma are child-
281 hood asthma, adult-onset asthma, occupational asthma, severe and difficult-to-control asthma and
282 seasonal asthma.

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

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

Comment [D24]: Smoking tobacco, consumption of trans fatty acid and

Comment [D25]: Why so many links are given? You can delete all and add reference.

329 Depression as a disease encompasses loss of interest as well as persistent/long-lasting feeling of
330 sadness (Goldman, 2019). It is a mental disorder that comes with anxiety (WHO, 2012). Some of the
331 life events that may lead to depression include loss of a job, bereavement and so on. It mostly affects
332 females compared to males and some of the symptoms are changes in appetite, depressed mood, loss
333 of pleasure in hobbies, under- or over-sleeping, fatigue, feeling worthless, loss of concentration,
334 persistent thoughts and attempts of suicide, unintended weight gain or loss among others. College
335 students find it hard to cope with new lifestyles, changes, experiences and cultures at first and this can
336 lead to the disease and anxiety. This disease is classified as the leading root of disability among
337 people. The disease affects persons of all ages, including teens and children. Types of this disease
338 include major depression, persistent depression disorder (dysthymia), bipolar disorder, psychotic
339 depression and postpartum depression. The disease impairs a person's ability to deal with everyday
340 activities. On daily basis, about 3000 persons commit suicide globally due to the disease.
341 Alzheimer's disease (AD) can be defined as a long-term neuro-degenerative malady that has clearly
342 defined pathophysiological mechanisms (Alzheimer's Association, 2021; De-Paula *et al.*, 2012),
343 which means it's a disease of the brain that worsens as time elapses. It's classified as the commonest
344 cause of the disease dementia because up to 80 percent of dementia cases are Alzheimer's disease
345 while it is the 6th leading death's cause in USA and 5th leading death's cause among those age 65
346 years and above. Its symptoms are not noticeable until after quite a long time, leading to loss of
347 memory and problems associated with language. The neurons or nerve-cells become damaged over
348 time and eventually the memory, thinking and learning become affected. The disease is also fatal.
349 Brain changes such as reduced brain volume (atrophy) that is due to loss of cells, reduced brains'
350 capability to process the main fuel called glucose, inflammation in the brain, clumps of fragments of
351 proteins called beta-amyloid that accumulate outside the neurons/nerve-cells and protein tau's
352 abnormal form that accumulates inside the nerve-cells are linked with Alzheimer's disease due to
353 blocking and damaging of the neurons. Pathways for nutrients' transportation are blocked and
354 communication from one neuron to another is interfered with or hindered. Risk factors could be
355 genes, family history of the disease, age of an individual, risk factors associated with the
356 cardiovascular disease, unlimited use of alcohol, diets, lack of quality and adequate sleep, physical
357 inactivity and depression. By the year 2020, more than 11% of people in USA aged 65 years and
358 above were suffering from the disease while it is projected to increase from 58 million in year 2021
359 up to 88 million people by the year 2050. About 33% of elderly people in USA have succumbed to
360 the disease.

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

378 Schizophrenia disease can be defined a dangerous psychiatric disorder, a heterogenous behavioural as
379 well as a cognitive/mental syndrome in which the brain gets disrupted in its development (Farah,
380 2018; MIRECC, 2013). The individuals' emotions, thinking and behaviours are impaired or affected
381 and offers them hard times in understanding the reality that surrounds them. The characteristics of the
382 disease are disorganized speeches, delusions, disorderly, reduced emotional expression, hallucinations
383 and others. The patients have suspicious thoughts about those surrounding them, they may hear voices

Comment [D26]: Reference

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Comment [D29]: Reference

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

393 2 Methods

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

Comment [D30]: Restructure the sentence

396 2.1 Procedures

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

399 2.2 Materials

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

401 3 Results

402 3.1 Chronic Diseases' Burdens

403 The extremely destroying effects of the diseases have forced the United Nations to prioritize and
404 direct their efforts towards lowering the fatalities from them by about 25% among those aged between
405 30 and 70 years by the year 2025 (AIHW,2014; Hunter & Reddy, 2013; Beaglehole *et al.*, 2011).
406 Failure to check and contain the issue as early as possible would lead to increasing infected persons
407 that may overweigh not only the health-care systems in place but also the economy and the
408 technology. This is due to the fact that the number of risk factors is increasing over time as the
409 population grows and ages. The efforts towards combating the situation have been slow and not
410 matching with the rate of deterioration of the situation (Meetoo, 2008). Malyskin (2014) highlights
411 on the fact the main worry for public health and communities is the chronic diseases.

Comment [D31]: Infected Or affected

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

422 The non-communicable diseases (NCDs) caused approximately 58 million deaths in the year 2005
423 globally (Meetoo, 2008; WHO, 2005), and the value was estimated to rise up to 64 million in the year
424 2015, despite the efforts towards eliminating the diseases. Globally, in the year 2002, the deaths were
425 mainly from stroke and ischaemic heart disease (17 million deaths), 7 million from cancers, 4 million
426 from chronic lung disease and 1 million from diabetes mellitus. It's also noted that, the diseases share
427 principal risk factors such as use of tobacco, diets that are not healthy, lack of physical exercises or
428 activities and consumption of alcohol in excess. Although the diseases develop slowly, they
429 eventually become disasters through their devastating complications, premature deaths, quality of life
430 that is extremely poor and overwhelming burdens on the health care systems, as well as posing a
431 threat to the public health.

Comment [D32]: Reference

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

436 including cervical cancers and HIV/AIDs, which are chronic infections, pose a threat to public health
437 in men and women as a growing menace in both developing and developed nations (Waure *et al.*,
438 2015). WHO (2001) lists chronic infections as among those diseases that pose the greatest burdens on
439 individuals, communities/societies, nations and international communities in both developed and
440 under-developed countries, and these burdens can only be lessened through a combination of
441 strategies like patient treatments, promoting health and preventing the diseases. According to CDC
442 (2003), thousands of ladies succumb to death yearly due to chronic diseases (including genital
443 cancers) that affect the uterus and fallopian tubes, and these ladies are not restricted to those of a
444 specific age.

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

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

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

473 **3.2 Research on chronic diseases**

474 Jha *et al.* (2012) carried out research on costs of the chronic diseases globally. The results show that
475 in the year 2010, cancers cost approximately 290 billion dollars by the year 2010 and estimates that
476 the costs may be up to 458 billion dollars in the year 2030; cardio-vascular diseases cost about 863
477 billion dollars and estimated to be up to 1044 billion dollars in the year 2030; COPD cost about 1.2
478 trillion dollars and the projected cost in the year 2030 is up to 4.8 trillion dollars; diabetes cost about
479 500 billion dollars and the estimate for the year 2030 is up to 745 billion dollars and the mental health
480 conditions cost up to 2.5 trillion dollars, and this is estimated to rise up to 6 trillion dollars in the year
481 2030. From the 5 main non-communicable diseases (NCDs)-chronic diseases- (diabetes,
482 cardiovascular disease, chronic respiratory diseases, mental health conditions and cancers), the value
483 of lost output for the period from year 2011 to year 2030 is estimated to be 47 trillion dollars, with
484 mental health conditions and cardiovascular disease contributing the largest share. It is the illness-
485 related loss of income and the expenses on health care that pose financial risks on individuals and
486 families.

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

Comment [D33]: COVID

491 50% were aged 45 years and above, 50.3% were male participants, about 62% had studied beyond
492 secondary school, about 66% had no problem with mental distress, approximately 11% had frequent
493 mental distress, about 28 percent had obesity, about 9% were suffering from diabetes, 6.1 percent had
494 heart disease in the past, approximately 3% were having stroke, those who had hypertension were
495 about 29%, those who had asthma in the past were 13.4 percent while arthritis infected individuals
496 were about 26%. Approximately 52% had contracted at least one chronic disease among the six
497 mentioned and about 69% had not gotten enough sleep for one month under investigation. The
498 graduates were less likely to fail to have enough sleep compared to those with less education. The
499 relationship between frequent mental distress and obesity on one hand, and each of the six chronic
500 diseases listed on the other hand, was statistically significant. There was also relationship that was
501 significant between insufficient sleep and chronic diseases arthritis, hypertension and asthma. The
502 chances of having coronary heart disease, diabetes and stroke were higher for those having
503 insufficient sleep compared with those enjoying enough sleep.

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

517 The inclusion of chronically diseased students in regular schools has been studied by Muntaner *et al.*
518 (2014) with the aim of identifying the infected students' needs that can help enable the
519 implementation of proposals towards improving learning institutions. The study employed interviews
520 and discussion groups in which students, teachers, health practitioners and families were involved.
521 The findings show that teachers are not familiar with their students' conditions and parents are forced
522 to inform the schools about their children's conditions and the necessary special requirements they
523 need in place while studying. From secondary schools onwards, students become responsible for their
524 own health and this makes them to be totally detached from the teachers and other surrounding
525 people. The students have a feeling that by disclosing their conditions and receiving special care in
526 schools, they might become discriminated, hence they opt not to disclose their status. All the
527 participants in the study agreed that the affected students really need special attention and the chronic
528 diseases pose some challenges for the teachers in the way they handle their subjects/courses/units in
529 class. It's realized that, the relationship between the students and teachers fades as the student
530 advances in school levels and the teachers' roles in taking care of the infected students waxes cold as
531 the student moves from primary to secondary and from secondary to university. The most problematic
532 relationship was found to be that between students/their families and the school administration (both
533 educational and medical administrators), with the consequences that the administration lacks the
534 awareness about the infected students' realities and special treatments they need. Most of the learning
535 institutions lack the necessary infrastructure in place for students with special needs due to chronic
536 infections and this makes the students feel left out and miss the much-needed support from the
537 administrative personnel.

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

Comment [D34]: Break the sentence. Very long sentence

546 decision support and clinical information system, and health system organization with 52%. The
547 elements like support paradigm shift, patient safety, manage political environment, health literacy
548 between treatments and visits, remote patient monitoring, support patients in their communities,
549 community policies, emphasize prevention center care on families and patients, use health-care
550 personnel effectively and built integrated health care were found to have been poorly studied.
551 On the illness experiences among those patients suffering from communicable chronic infections,
552 Oliveira *et al.* (2017) conducted a literature search from the databases PubMed, Scopus and the
553 resources in Latin-America's and the Caribbean's Health Sciences. Most of the studies were found to
554 have been conducted in Brazil, then China and USA. The worst experience that impacted the patients'
555 lives most and pioneered negative feelings in them was the stigmatization that comes with these
556 diseases. The patients were also found to have adopted lifestyle habits that are very health for them
557 and lived in harmony and comfortably with the infections due to the support they got from religions,
558 families and health services. The negative sensations and feelings among the patients after diagnostic
559 are fuelled by the body's fragileness that is caused by the disease and the maintenance of the
560 infections' conditions because this exposes the patients to prejudice, discrimination and
561 stigmatization. The most vulnerable groups of patients to negative sensations and feelings after
562 diagnosis are those suffering from hepatitis, HIV/AIDS and tuberculosis. One of the best ways
563 forward is to ensure that the support network is strengthened around the patients to help them achieve
564 life of quality and ensure their situations improve with time.

565 Literature search on measuring the chronic diseases' treatment burdens was done by Sav *et al.* (2017)
566 from PsychInfo, Scopus, Medline and CINAHL databases for the publications done between year
567 2000 and 2016. About 63% of the publications were based on measuring the treatment burdens
568 quantitatively, about 9% were based on both qualitative and quantitative methods of measuring the
569 burdens while the rest dealt with qualitative criteria only. Approximately 49% of the studies had been
570 done in North America, about 34% in Europe while 10% came from Asia-Pacific. About 60% of the
571 studies had been done on people aged between 18 and 60 years and the chronic diseases encountered
572 included cancers, diabetes, chronic kidney disease, cardio-vascular disease, coeliac disease among
573 others. Majority of the studies were on respiratory issues, diabetes, cancers and multi-morbidities. In
574 first category that was based on direct measures, the researchers focussed on information about how
575 the patients understand the treatment burdens. The second category that was based on inferred
576 measures focussed on time and financial aspects of burdens. Indirect measures were documented by
577 third category that focussed on travel/time, medication and treatment costs based on treatment
578 experiences. In general, there is a variation in the methods used by researchers to determine the
579 treatment of chronic diseases burdens but all reveal the complex nature of the burdens on those
580 suffering from the maladies.

581 Chapel *et al.* (2017) investigated the literature among the publications made from year 2000 to year
582 2016 on prevalence and costs of chronic diseases that are non-communicable among the adult
583 beneficiaries aged between 18 and 64 years in Medicaid program from CINHALL and Medline
584 databases. The prevalences for the various main non-communicable chronic maladies were found to
585 be up to approximately 12% for heart disease, 27% for high blood pressure, 23% for hyper-
586 lipidaemia, diabetes had about 13%, cancer was at 10%, 19% for asthma, depression had
587 approximately 22% while for chronic diseases in general, the prevalence was about 62%. Medical
588 costs (in US dollars) for these diseases per patient were found to be approximately 4700 for diabetes,
589 COPD has about 6500, asthma has approximately 3100 and about 700 for hypertension. The yearly
590 costs for heart-failure patients were about 52000 dollars per patient, about 21000 dollars per
591 schizophrenia patient and the half-year costs per cancer patient was approximately 46200 dollars.
592 There rates and costs are termed as high for the non-communicable diseases among the suffering
593 patients.

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

601 with elements Chronic Care Model having 46%, Decision support having 23%, Delivery system
602 design having 21% and Clinical information systems having 9%. The research notes that education on
603 self-management support should be provided to general population since it provides the best and high-
604 quality primary care for the chronic diseases' patients.
605 Emmert-Streib and Dehmer (2019) conducted a review on survival analysis for multi-variate data,
606 considering the commonly used functions (survival, hazard and density functions). The aim was to
607 make a comprehensive, extensive and detailed presentation on survival analysis. Both parametric and
608 semiparametric models have been well covered as well as substantial definitions that are needed to
609 acquaint the reader with a good background in the field. The work has derived all the important
610 functions in survival analysis including specifying the hazard, survival and density functions for
611 several types of distributions that survival time can assume. The researchers have noted that, many
612 publications that have researched on survival analysis have discussions that easily lead one into
613 confusion due to the complexity of the procedures/methods used on multivariate data. On top of this,
614 many rely on software that are widely used in biostatistics or epidemiology such as SAS and STATA,
615 but the two researchers have majored on use of R programming language in statistics in demonstrating
616 their examples to the reader. However, the examples used in demonstrating the use of R software are
617 not for data from research they have conducted but on lung cancer patients from the survival package.
618 Girma and Ayalew (2020) have studied the stress from Covid-19 on the health of the adults with
619 chronic diseases and their coping mechanisms in Ethiopia, Southwest parts, in which only the adults
620 with chronic diseases were investigated. About 14% of the participants were found to be severely
621 stressed (significant proportion) while about 68% were moderately stressed. Out of the many types of
622 coping mechanisms developed by the participants, three of them were most preferable, namely: active
623 coping strategies, religious and instrumental one. The results also show that 2.4% of the participants
624 had 3 chronic diseases simultaneously, with HIV/AIDs (about 23%) and diabetes (17%) as the most
625 common chronic infections.

626
627 **3.3 Discussion**
628 The day-to-day escalating health complexities including cancers, viral diseases (like HIV/AIDS,
629 Ebola, Corona Virus Disease and Dengue Fever), mental challenges, tuberculosis, asthma among
630 others, are becoming unbearable burdens among humans. On top of this, the resistance of these
631 infections to already discovered drugs and treatments (like malaria) due to mutations have dealt
632 humans a heavy blow and led to additional costs as well as demanding for additional lives for graves.
633 Another bottleneck on the way to healthy humans has been forced in place by the fact that some of the
634 infections cannot be cured such as HIV/AIDS, in which, health practitioners are just treating
635 symptoms and not targeting the disease or the root-cause itself. The long-term/chronic infections that
636 do exist such as asthma and HIV/AIDS, among others, are like a hurricane in life; causing mental
637 instability due to excessive stress, long-lasting pains, long-term cost burdens, lowering individual's
638 productivity, disorienting one's socio-economic life and general shaping of individual's living styles
639 and standards for the worse. They become a real havoc in life! Experience shows that there are many
640 people with chronic infections but do not let the hospitals know because they do not seek medication.
641 One of the invisible dangers is the fact that, since the advent of the ARVs, the visible signs of infected
642 persons have been covered and people seem to deem HIV/AIDs as a gone disease, making it possible
643 for one to spread it easily among colleagues due to lack of suspicion among people. The greatest
644 worry is that these infections do not discriminate any age group but attack all categories of humans
645 including the most productive groups, none have not been left out.
646 Going by the researchers' findings, the whole picture is becoming darker with time, cases increasing,
647 diseases escalating and burdens that come with all these are becoming weightier. The concerned
648 stakeholders need to wake up and deal with the situation in terms of more and intensive research,
649 more funding, more concern and creating general awareness among the people. There is necessity to
650 deal with the mustard seeds before they become fig trees to be cut with razor blades. There is no need
651 to wait for the healthcare systems to collapse so that all can know there is a hidden danger.

652 **4 Conclusions and recommendations**

653 **4.1 Conclusions**
654 By definition, chronic diseases are illnesses that take long time to heal or do not heal at all with
655 persistent effects including HIV/AIDS, asthma, hypertension, cancers and so on. The diseases

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

661 **4.2 Recommendations**

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

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