Akua Amissah Gyasi Principles Of Epidemiology

An Essay of 2800 words that demonstrates knowledge and understanding of theories and contemporary health issues faced by epidemiologists.

The aim of this essay is to demonstrate knowledge and understanding of theories and contemporary health issues faced by epidemiologists. This essay will demonstrate the writer's knowledge and understanding of case control studies. Smoking will be used as a public health issue to analyse the health problem for the target population. Case control studies will be used to evaluate smoking by using epidemiological measures such as the odds ratio and confidence interval. The challenges, advantages and disadvantages of case control studies will be analysed. Case control studies will also be compared and contrasted with cohort studies.

According to Gerstman (2013, p. xiii), "epidemiology studies the causes, transmission, incidence and prevalence of health and disease in human populations". He also said that epidemiology helps to identify the causes of diseases and the knowledge acquired will be used to provide preventive measures and treatment for particular types of diseases. Epidemiology helps to link risk factors to diseases. An example is the link between the smoking of cigarettes and lung cancer (Venook et al., 2010). According to Haveman-Nies et al., (2011), epidemiologist study the health of human populations to identify the host, agent and environmental factors that influence to provide scientists with evidence based theories to prevent diseases and to promote health. They also said that epidemiology helps researchers to establish the actual causes of diseases and their disabilities and their mortalities. It is also used as an evaluation tool to evaluate health services for future improvement.

The case control study design is a type of observational study where the occurrence of disease is measured and it provides the association it has with an exposure within a time frame. The participants of this study are usually interviewed to find out the factors that predisposed them to the disease (Song and Chung 2011). In a case control study design there are always two groups of participants. Those who have the desired outcome is known as the case group whiles those without the outcome are the control group. In this case the researcher cannot interfere with the outcome of the study (Setia, 2016). Setia (2016) also said that the groups should have similar or the same characteristics. The control group could be relatives, friends or patients from the same ward. The researchers of this study will then study how the case group were exposed to the disease. The control group should also have if not the same similar risk of developing the disease of the case group. Gerstman (2013) also emphasised that the number of controls per case can influence the results of a case control study. He said that if the control to case ratio is 1:1, there is maximum efficiency in the results obtained. However if control to case ratio is 4:1, the results obtained are not precise. According to Carlson and Morrison (2009), the participant of the case group should be selected from different sources. Participants should also be selected from different hospitals other than just one hospital and it is desirable to have patients who have been newly diagnosed of a disease then those who have been diagnosed for a long time. Setia (2016) also said that case control studies are applicable when researchers want to investigate the causes of rare diseases and can be used to determine the relative risk factors of a disease but not the incidence or prevalence. Setia (2016) explain that the results of a case control study may not be accurate as participants from the case group may not be able to

remember how they were exposed to the disease.

Odds ratio is the measure of association used when conducting case control studies. It represents the odds that a disease will occur under a particular exposure. Odds ratio is usually used in case control studies however it can also be used be used in cohort and cross sectional studies. Odds ratio compares the relative odds of the happening of a disease. It is the probability of a disease happening divided by the probability of it not happening. When the odds ratio is 1, it means that the odds of the disease is not affected by the exposure. If it is more than 1, it means that the exposure is related to a higher odds of the disease and if odds ratio is less than 1 then the exposure is related to a lower odds of the disease. Odds ratio is calculated by dividing the ratio of the exposed by the ratio of the unexposed (Szumilas, 2010). According to Szumilas (2010). The confidence interval (CI) is also used to measure the accuracy of the odds ratio. A large confidence interval indicates a low level of accuracy of the odds ratio whiles a small confidence interval indicates a higher level of accuracy of the odds ratio.

The interheart case control study is a popular study design that studied acute myocardial infarction in 52 countries. The study was between 12,461 cases and 14,637 control participants. Data was collected regarding their smoking habits, diabetes and hypertension history, hip to waist ratio, physical activity levels, dietary patterns, alcohol consumption and blood lipids. After the study it was found that smoking is a major risk factor for acute myocardial infarction. The study recorded an odds ratio of 2.95 with 95%CI of 2.77-3.14 for smokers and those who had quit smoking within the last 3 years had and odds ratio of 1.87 with 95% CI of 1.55-2.24 (Teo et al., 2006)

Smoking is a major public health issue affecting the United Kingdom and the world. According to the World Health Organisation (2018), the smoking of tobacco products results in about 7 million mortalities in the world each year. Eight hundred and ninety thousand of the mortalities were caused by second hand smoking while a little more of 6 million deaths were caused as a result of direct smoking. About 80% of the people who smoke are living in low and middle income countries. According to NHS Digital (2018), 484,700 hospital admissions were related to smoking in England in 2016/2017. There were also 77,900 mortalities in England in 2016. There are also about 14.9% of the adult population who were smokers in England in 2017 and about 10.8% of pregnant women also smoked at the time of delivery in 2017. According to Huxley and Woodward (2011), a systematic review and a meta-analysis of prospective cohort studies shows that the prevalence of smoking is high in women compared to men and it is also a risk factor for coronary heart disease. The nicotine contained in cigarettes induces stimulations and increases pleasure thereby reduces stress and anxiety and stress however, it increases the risk of developing heart disease, lung disease and cancer (Benowitz, 2009). Cataldo et l., (2011) also said that smoking also increases the risk of developing Alzheimer’s disease.

According to cancer research UK (2018), quitting smoking is the most important behaviour that can prevent the development of cancer. When the chemicals in the cigarette smoke enters the blood stream, it develops into different types of cancer. Smoking causes about 15 different types of cancers. In the UK, 7 out of 10 lung cancer cases is caused by smoking. Smoking can cause cancers of the liver, pancreas, stomach, kidney, bowel, ovary, cervix, mouth, throat, bladder, nose, larynx, oesophagus and some forms of leukaemia. According to Hiscock et al., (2012) smoking is more prevalent in people who have low socioeconomic status.

An example of a case control study is one which was conducted to know the risk of bladder

cancer of smokers over a period of time. The study was conducted between 1170 urothelial carcinoma case patients and 1413 control participants. This study was done in Maine, New Hampshire and Vermont between 2001 and 2004. After the research, it emerged that people who were currently smokers and smoked regularly had a higher risk of bladder cancer than those who had never smoked. The odds ratio for current smokers was 5.2 with 95% CI 4.0-6.6. Regular smokers had an odds ratio of 3.0, 95% CI 2.4-3.6. Both results had an odds ratio of more than 1 which means that smoking is highly associated with bladder cancer. The confidence interval for the current smokers was relatively large compared to that of the regular smokers, this means that the odds ratio for current smokers is not precise (Baris et al., 2009).

Another case control study by Hou et al., (2017) was conducted to know the effect of passive smoking on men and women and its association with stroke. The study was between 16,205 cases of stroke and 16, 205 controls. The participants for this study had similar characteristics. The results of this study showed that passive smoking increases mortality by 10%. After the study, the odds ratio for all stroke mortality was 1.10 with 95% CI 1.05-1.16, the risk of hemorrhagic stroke was also 10% with odds ratio of 1.10 and 95% CI 1.04-1.16 and the risk of ischemic stroke was 12% with odds ratio of 1.12 and 95%CI 1.03-1.23. The odds ratio for all the results is greater than 1, meaning that passive smoking is highly associated with the development of stroke and the confidence interval were small making the data of the results precise.

Case control studies are conducted to know the risk factors that influence the development of certain diseases. An example of such studies is one conducted by ……The study wanted to know the risk factors for ischaemic and intracerebral haemorrhagic stroke in 22 countries. This study was done in the 22 countries between 1st March, 2007 and 23rd April, 2010. The researchers enrolled participants who have had a first acute stroke episode within 5 days of symptoms and 72 hours of being hospitalised. The control group had no history of stroke and the cases and control groups were matched according to their sex, ethnic origin and age. This research enrolled 3000 cases and 3000 controls. At the end of this research, the participants with a history of hypertension recorded an odds ratio of 2.6 with CI (2.26-3.08), current smokers had an odds ratio of 2.09 with CI (1.75-2.51), waist to hip ratio odds ratio of 1.65 and CI (1.36-1.99), diet risk score had an odds ratio of 1.35 and CI (1.11-1.64), regular physical activity odd ratio of 0.69 and CI (0.53-0.90, diabetes mellitus odds ratio of 1.36 and CI (1.10-1.68) and alcohol intake odds ratio of 1.51 and CI (1.18-1.92). These figures clearly indicate that smoking, hypertension, high waist to hip ratio, diabetes and diet are significant risk factors for ischaemic and intracerebral haemorrhagic stroke (O'Donnell et al., 2010).

Case control studies have some advantages which are useful and disadvantages that can be limitations. Case control studies are useful when researchers want to conduct a study that have rare outcomes or diseases that are yet to be discovered. They are very fast to conduct as the data and information needed for the study may have been recorded in the past and there is no follow up to take place as compared to other studies like cohort studies (Song and Chung, 2010). They also said that case control studies do not require a lot of funding to conduct as the participants recruited for this study need not to be large. In a case control study, different types of exposures and risk factors can be studied at the same time. Some of the advantages of a case control study includes the fact that some of the information collected will be bias as the investigator who collects the data can decide which data they want to include to get good results. The selection of a controlled group who have the same characteristics as the case group may be difficult. Sometimes the rates of diseases in the exposed and unexposed group is

difficult to ascertain (Song and Chung, 2010).

Case control studies may have differences and similarities with other study designs. In a cohort study, researchers use different populations for their study which is also the same as case control studies and the study can be conducted in different settings. In a cohort study, the exposure is known before the disease outcome, however in a case control study, the disease outcome is known before the exposure. In a case control study, the association between the exposure and outcome is acquired at a specific point in time whereas in a cohort study the association between the exposure and the outcome is acquired over a period of time (Carlson and Morrison, 2009).

There are challenges that researchers encounter whiles conducting studies. These include selection bias and confounding. Selection bias occurs when there is no association between exposure and disease of participants and non-participants (Gerstman, 2013). Confounding variables in an epidemiological study makes the effects of other variables unclear. Confounding variables makes the findings or results of a study unclear (Ewert and Sibthorp, 2009). For example in the case of a case control study, additional risk factors are mixed with the actual risk factors being studied and as a result making end results misleading.

In conclusion, a case control study design is a type of observational study where the occurrence of disease is measured and it provides the association it has with an exposure within a time frame. The measure of association for this type of study is odds ratio and confidence interval. When the odds ratio is 1, it means that the odds of the disease is not affected by the exposure. If it is more than 1, it means that the exposure is related to a higher odds of the disease and if odds ratio is less than 1 then the exposure is related to a lower odds of the disease. Odds ratio is calculated by dividing the ratio of the exposed by the ratio of the unexposed. Smoking is a major public health issue affecting the United Kingdom and the world. To study how smoking can significantly influence the development of diseases, case control studies can be done.

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