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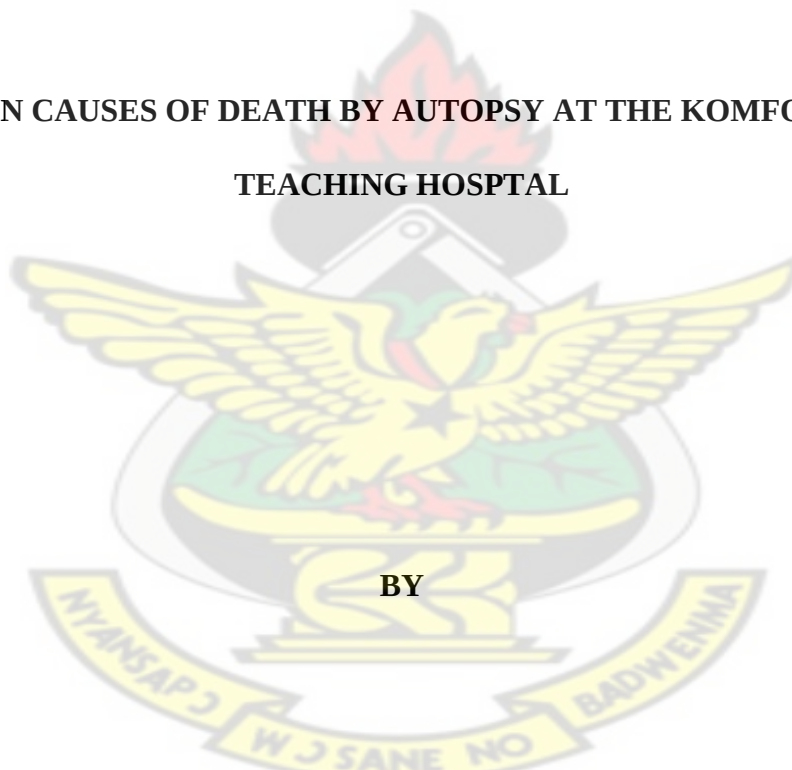
COLLEGE OF HEALTH SCIENCES

SCHOOL OF PUBLIC HEALTH

DEPARTMENT OF HEALTH POLICY, MANAGEMENT AND ECONOMICS

KNUST

**TRENDS IN CAUSES OF DEATH BY AUTOPSY AT THE KOMFO ANOKYE
TEACHING HOSPITAL**



BY

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NOVEMBER 2015

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY,

KUMASI, GHANA

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A THESIS SUBMITTED TO THE DEPARTMENT OF HEALTH POLICY,
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MANAGEMENT)

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DECLARATION

I declare herewith that this thesis write up is entirely my own output. To the best of my knowledge it does not contain any previously published material except those for which acknowledgement has been given in the text.

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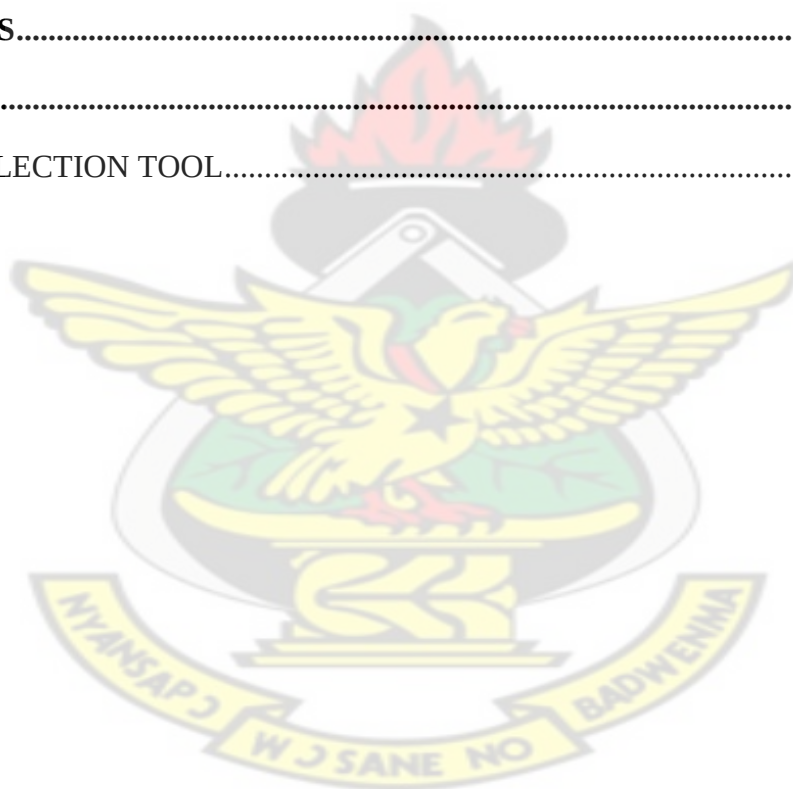
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TABLE OF CONTENT

DECLARATION.....	iii
LIST OF TABLES	vii
LIST OF FIGURES	viii
ACRONYMS	ix
DEDICATION.....	x
ACKNOWLEDGEMENT.....	xi
ABSTRACT	xii
CHAPTER ONE	1
1.1 Background	1
1.2 Problem Statement	3
1.3 Rationale	4
1.4 Research Questions	4
1.5. Study objectives	5
1.5.1 General Objective	5
1.5.2 Specific Objectives	5
CHAPTER TWO	6
LITERATURE REVIEW	6
2.1 Current State of Knowledge on Autopsy	6
2.2 Mortality trends.....	7
2.3 Trends in the Rate Of Autopsy	9
2.4 Indications for Autopsy.....	10
2.5 Mortality by Socio-Demographic Characteristics	12
2.5.1 Age.....	12
2.5.2 Sex.....	14
2.5.3 Residence (urban/rural).....	15
2.5.4 Religion.....	16

CHAPTER THREE	18
STUDY METHOD.....	18
3.1 Study Design and Type	18
3.2 Study Population.....	18
3.3 Data Collection Tools and Technique.....	18
3.4 Sample Size and Sampling.....	19
3.5 Profile of Study Area	19
3.6 Data handling and analysis	21
3.7 Study Variables.....	21
3.7.1 Dependent Variable	21
3.7.2 Independent Variables	21
3.8 Ethical Consideration.....	24
CHAPTER FOUR.....	25
4.0 Results.....	25
4.1 General Characteristics of Study Population	25
4.2 Trends in the Number of Autopsies	26
4.3 Top 10 causes of Death.....	27
4.4 Indications for Autopsy and Five Year Trend	28
4.5 Socio-Demographic Characteristics and Cause of Death	29
4.5.1 Age and Cause of Death	31
4.5.2 Sex and Cause of Death	34
4.6 Public Health Priority of the Aging Population.....	37
CHAPTER FIVE	42
5.0 Discussion	42
5.1 Trends in the Rate of Autopsies and Indications of Autopsy	43
5.2 Top Ten Causes of Mortality by Autopsy.....	44
5.3 Socio-Demographic Characteristics and Cause of Death	44

5.4 Public Health Priority of the Adult Population.....	48
CHAPTER SIX	51
CONCLUSIONS AND RECOMMENDATIONS.....	51
6.1 Conclusion	51
6.2 Recommendations.....	52
6.2.1. Ministry of Health.....	52
6.2.2 Security agencies	52
6.2.3 Komfo-Anokye Teaching Hospital.....	53
6.3 Further Studies	53
REFERENCES.....	54
APPENDIX A.....	63
DATA COLLECTION TOOL.....	63



LIST OF TABLES

Table 3.1 Study Variables Table.....	22
Table 4.1 Background Characteristics of Study Population (N=6632).	26
Table 4.2 Top 10 Causes Of Death.....	28
Table 4.3 Five-Year Trend in Autopsy Indication.....	29
Table 4.4 Ages and Sex Distribution of Study Population	30
Table 4.5 Ages and Cause of Death.....	32
Table 4.6 Sex and Cause of Death.....	35
Table 4.7 Relationship between Number of Diseases/Health Conditions and Severe Disability	40
Table 4.8 Population Attributable Risk Fractions Of Diseases/Conditions Associated With Severe Disability And Priority Ranks Based On Their Population Attributable Risk Fractions	40
Table 4.9 Percentage Mortality by Diseases and Their Priority Ranks Based On Their Frequencies.....	41

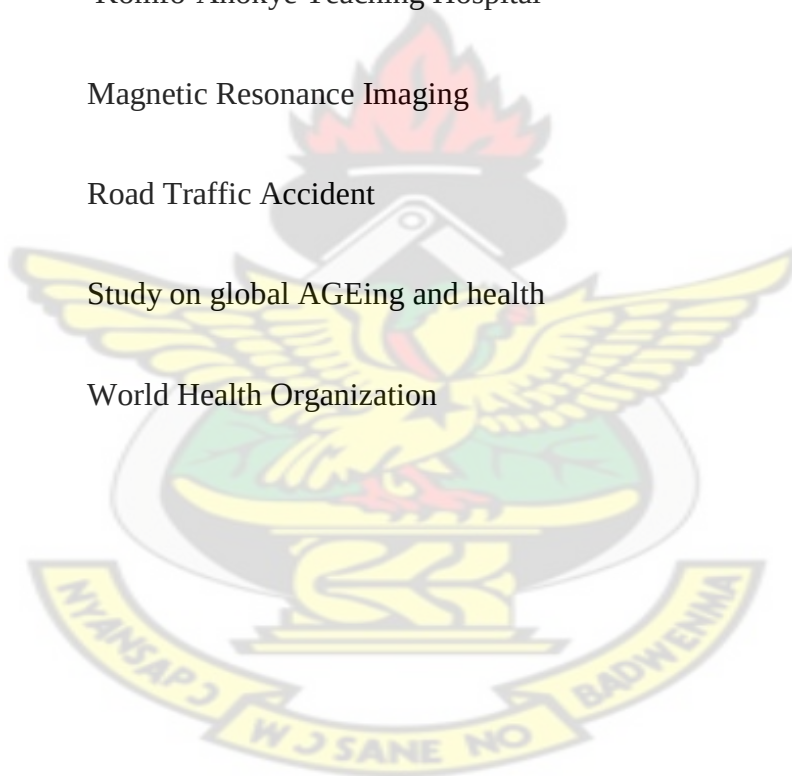
LIST OF FIGURES

Figure 1.1 Conceptual Framework: Association between Socio-Demographic Characteristics, Cause Of Death and Indication for Autopsy.....	17
Fig 3.1 Sampling Flowchart.....	19
Fig 4.2 Five Year Trend in Autopsy Performance from 2009 To 2013	27
Fig 4.3 Four months Trend in Autopsy Performance (January to April).....	27
Fig 4.4 Prevalence of Severe Disability by Age and Sex	39
Fig 4.5 Percentage Mortality by Age and Sex	39



ACRONYMS

BC	Before Christ
CDC	Centre for Disease Control
DEENT	Directorate of Eye, Ear Nose and Throat
GHS	Ghana Health Survey
HIV/AIDS	Human Immunodeficiency Virus/ Acquired Immunodeficiency Syndrome
KATH	Komfo-Anokye Teaching Hospital
MRI	Magnetic Resonance Imaging
RTA	Road Traffic Accident
SAGE	Study on global AGEing and health
WHO	World Health Organization



DEDICATION

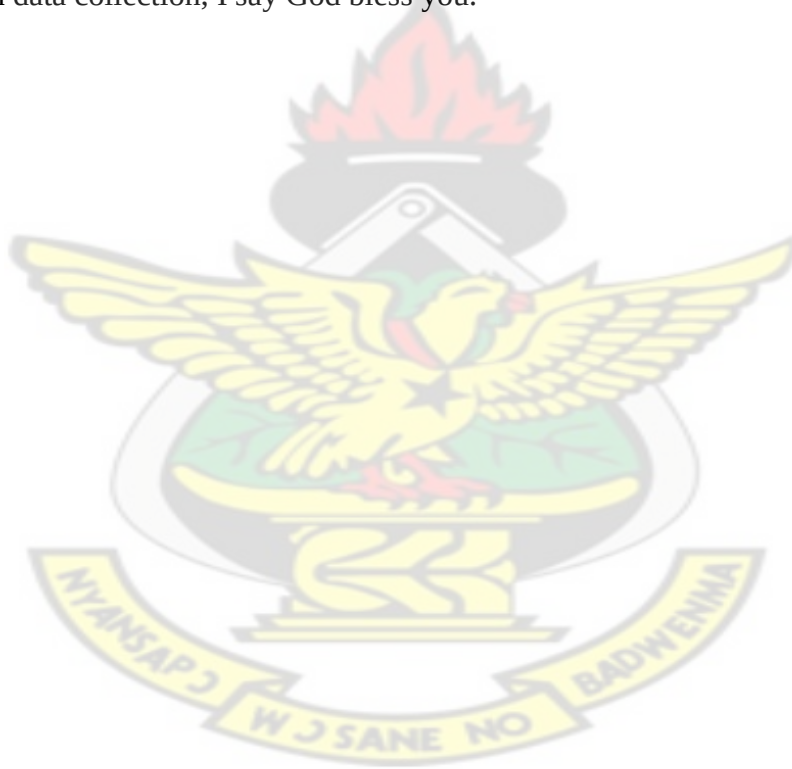
I dedicate this write up to my husband, Mr Michael Osei Fordjour for his encouragement and support throughout the time spent on this work and to my daughter Akua Nyamedoh Fordjour whose comfort was stolen early in life so I could complete my Master's education.

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ABSTRACT

Background: Autopsy remains the most reliable tool for the determination of the actual cause of death. In Ghana, mortality data play an important role in the formulation of health policies. However autopsy data and procedures alone are not audited and analysed for the trends in disease causation. This does not allow for adequate and evidence-based health planning. The available cause of death, which is almost invariably under reported is used in health planning. We therefore set out to determine the trends in causes of death at Ghana's second largest teaching hospital in Kumasi.

Methods: A retrospective cross-sectional study involving the review of secondary data from the Department of Pathology at the Komfo-Anokye Teaching Hospital was carried out from July 15th 2014 to November 15th 2014. A total of 6632 reported deaths that occurred during the period under review and for which autopsies were performed were included in the study. The outcome was then compared with the national health data on top ten (10) causes of death. We also determined the cause of death by trend and socio demographic characteristics and the public health priorities of the ageing population by comparing findings of our study to findings from SAGE. These data were taken from a five-year period between 2009 and 2013.

Results: The rate in autopsy performance showed a declining trend from 41% in 2009 to 21% in 2013.

The top 10 causes of death by autopsy varied from the national top 10; injuries consistently remained as the highest cause of death in all the years, whereas the second and third positions were shared by hypertension and pneumonia respectively.

Two main indications for autopsy made at the Department of Pathology at KATH were statistical and medico legal. The rate of statistical autopsies (67%) was generally high compared with that of medico legal.

Majority of autopsies was carried out in the 25-44 age group (34%). Of all cases sent for autopsies in the department, there were more males than females who died within the period under review (62.5%). Age was significantly associated with injuries [p value<0.001; 95% CI (235.42–236.70)], hypertension [p value=0.003; 95% CI (55.38–57.08)] and cancers [p value<0.001; 95% CI (142.99–147.79)]. Injury constituted the majority cause of death and was significantly associated with gender [p value< 0.001; 95% CI (55.27–57.09)].

The odds of having severe disability increased with the number of diseases or health conditions an adult had. The age-adjusted odds ratio was three times more in an adult with three diseases (3.23) compared with that of an adult without any.

Conclusion: There is a progressive decline in the rate of autopsy at KATH during the period under review. Additionally, top ten cause of mortality clearly varied from that of the national statistics data. Reasons for decline and variation between the causes of death from the clinical point of view and that of pathological viewpoint would make an interesting future study. Health planning should make use of such mortality data for future planning.

CHAPTER ONE

1.1 Background

Autopsy, also known as post-mortem examination, necropsy (particularly as to non-human bodies), autopsia cadaverum, or obduction is a specialized field in medical practice that deals with a thorough examination of a dead body with the aim of determining the cause and manner of death and to evaluate any disease or injury that may be present. In other words, it establishes a final diagnosis.

The practice of autopsy dates back to 3000 BC where ancient Egyptians practiced the removal and examination of the internal organs of humans in the religious practice of mummification.

In 1973, it was recorded that Autopsies that opened the body to determine the cause of death were recorded in the early third millennium BC, although many ancient societies opposed the practice, where it was believed that the outward disfigurement of the dead prevented them from entering the afterlife (King and Meehan 1973).

Autopsy may be used to confirm clinical findings by allowing physicians to relate their clinical and laboratory findings with pathological changes that occurred in the patients, provide information on cause of death or discover other conditions that were not recognized clinically, determine the effectiveness of treatment, study the course and extent of disease processes, and educate medical personnel; when a person has given permission in advance of their death.

Autopsy is also valuable in undergraduate and postgraduate medical education, for the identification and classification of new diseases, and contributes to the understanding of the pathogenesis of diseases.

Autopsies are performed for either medico-legal (coroners') or medical/clinical purposes. For example, a forensic autopsy is performed when the cause of death is not certain, usually in the case of unexpected, unexplained, or unnatural deaths, while a clinical or academic autopsy is performed to find the medical cause of death and is used in cases of unknown or uncertain death, or for research purposes.

In the twentieth century, autopsy contributed to the discovery of many pathological conditions in man including Legionnaires disease, myocardial infarction, acute tubular necrosis, toxic shock syndrome and many other conditions. The practice of autopsy today still contributes to the knowledge of diseases and death.

The main aim of an autopsy is to determine the cause of death, the state of health of the person before he or she passed, and whether any diagnosis made before death was correct. This makes it an important tool for the audit of mortality in any country. The WHO has reiterated that the design of effective public health policies and measures of impact is not possible, when deaths are not counted and causes of deaths established in any country (WHO Factsheet, 2013). Incorrect ascertainment of the cause of death in any nation would affect health policies made, making autopsy an important tool. This is evidenced in a study done in Nigeria where clinical diagnostic errors were made in 18.9% of autopsy cases studied (Afuwape et al. 2014).

It has also been found that the correct determination of the cause of death and the presence of other pathologies at autopsy influences positively the knowledge and attitudes of clinicians in subsequent cases. The knowledge and accounts of the causes of death gathered at autopsy therefore can affect public health prioritization and planning (Costache et al. 2014).

That notwithstanding, the number of autopsies performed in hospitals in many countries has fallen and continue to fall. This has been documented over decades by a number of researchers with the first documentation in 1950 (Tavora et al. 2008).

The reasons for this decline are varied but it has been suggested that the most important single factor related to the fall in autopsies is the level of interest amongst individual consultant clinicians (Loughrey et al. 2000).

Other attributed factors include advancement in diagnostic technology, such as the computed tomography, Magnetic resonance imaging (MRI) and ultrasound scan in developed countries, failure to obtain consent from patient or relatives, fear of litigation, a shortage of pathologists, and concern about costs.

1.2 Problem Statement

Information from death registry is a major source of data to identify problems of public health importance, to monitor progress in public health, to aid the allocation of research funds, and to help conduct scientific research. A detailed and complete report on the circumstances leading to death in the register (death certificates) is therefore important (Hoyert et al. 2007).

Autopsy is a form of medical audit that establishes the actual cause of death. Since morbidity and mortality data are important indicators of the health of any given population or nation, knowledge of the causes of death is therefore an important planning tool for any health policy maker and every government. However, despite the importance of autopsy to health planning, little or no audit has been conducted into the autopsy procedures, quality assurance of data and the causes of death. Additionally, although there is some anecdotal evidence to suggest that trend in autopsies especially at KATH has gone down, there is very little documentation of this. The study therefore sought to establish the five year trend in the causes of death made

by autopsy, the indications and their trends by year and to describe the causes of death by the socio-demographic characteristics of age and sex and to determine the public health priorities of the aging population in Ghana.

1.3 Rationale

Until year 2007, Komfo-Anokye Teaching Hospital was the only teaching hospital serving and receiving cases from the five regions in the northern sector of Ghana and other neighbouring countries. Diseases received in the hospital are varied and could be said to be representative of cases in the northern half of the country, and so are the mortality cases. Knowledge of the causes of death and their characteristics guides the effective planning of healthcare and facilitates the formulation of good and strong national policies. This study therefore sought to study the trends in the causes of death and describe them by their respective socio-demographic characteristics and compare the causes of adult (60yrs and above) mortality with the causes of long term disability in adults. The results of this study will hopefully inform the Ministry of Health and the Komfo-Anokye Teaching Hospital of the Public Health importance of autopsy and help them to adopt strategies to improve upon autopsy procedures and auditing, and determine the public health priorities of the aging population.

1.4 Research Questions

1. What is the five year trend in the causes of death by autopsies and their respective socio-demographic characteristics in KATH?
2. How many autopsies were carried out in each of the years from 2009 to 2013 and do the numbers show any increasing or decreasing trend?
3. What were the Top Ten causes of mortality in each of the study years and do they compare with the national data?

4. What were the indications (coroner's or clinical) of the autopsies performed within the study period and do they show any increasing or decreasing trends?
5. What are the public health priorities of the aging population in Ghana, comparing the causes of adult death to the causes of long term morbidity in the aging population?

1.5. Study objectives

1.5.1 General Objective

To study the trend in the causes of death by autopsies at KATH from 2009 to 2013 and describe them by their respective socio-demographic characteristics.

1.5.2 Specific Objectives

1. Determine the number of autopsies and compare the trends in autopsies from 2009 – 2013 for increasing or decreasing trend.
2. Determine the top 10 causes of mortality made by autopsy, in each year under study and compare with the national top 10 causes of death in the years under study
3. Identify the indications for autopsy and describe the trend over the five- year under study
4. Describe the causes of death by the socio-demographic characteristics of age and sex.
5. Determine the public health priorities of the adult population (50years and above) by comparing the causes of death in the aged with a national survey of long term disability among the aged in Ghana.

CHAPTER TWO

LITERATURE REVIEW

2.1 Current State of Knowledge on Autopsy

The practice of autopsy, though beneficial to every national planning in terms of determining the actual cause of death, is declining especially with clinical autopsies. However as clinical autopsy faces decline, other forms of autopsy are evolving.

Verbal autopsy, a method that helps to determine the probable cause(s) of death based on a history given by a caregiver or a next-of-kin in cases where there was no medical record or formal medical attention given, is gradually gaining grounds worldwide. The purpose of verbal autopsy is to achieve almost exactly what a clinical autopsy would achieve; provide data on cause-specific mortality, to evaluate health interventions aimed at reducing a cause-specific mortality (research), to identify ways of reducing mortality and for researching into factors associated with mortality (Anker et al. 1999).

Though widely used by many settings to estimate the cause of death, cause-specific mortality estimates obtained by verbal autopsy are susceptible to bias due to misclassification of causes of death and issues bordering on standardization, specificity and sensitivity of the tools (Chandramohan et al. 2001).

Despite its drawbacks, Anker suggests that verbal autopsy is a promising tool in establishing the cause of death in areas where most deaths occur at home without medical attention and advocates for more validation studies on standardized instruments in order to collect information about sensitivity and specificity and subsequently improve the design of the verbal autopsy tool (Anker 1997).

The practise of verbal autopsy in Ghana is nationwide, especially in ascertaining the cause of death in children. In a study to determine the diagnostic accuracy of verbal autopsies in

ascertaining the causes of stillbirths and neonatal deaths in rural Ghana, Edmond and Friends (2008) found that overall, the accuracy was good even though it performed poorly for neonatal diagnosis (Edmond et al. 2008).

Virtual autopsy is an advanced non-invasive imaging technology used on dead bodies to identify the cause of death that is also gaining popularity today. It has been widely used in forensic autopsies since its birth some eleven years ago and its value extensively researched and documented.

In a study to compare the value of the virtual autopsy in traditional clinical autopsy in an intensive care unit setting, virtual autopsy was successful in 88% of cases in identifying the cause of death, whereas, traditional clinical autopsy could determine 93% of the cases. Suggesting that, virtual autopsy could be an alternative to the invasive traditional method (Wichmann et al. 2012). However its practice has not reached many countries especially low and middle- income countries and the crude and invasive method of autopsy continues to be used.

2.2 Mortality trends

Globally, the leading cause of death is non-communicable diseases, forming about 6 in 10 deaths. Communicable diseases, reproductive and nutritional conditions form about a third of all deaths in both sexes. Cardiovascular diseases, especially Ischaemic Heart Disease and cerebrovascular accident are the leading cause of death in all ages and sex. Second to this are infectious and parasitic diseases. Diarrhoeal diseases, HIV/AIDS and tuberculosis occupy the 5th, 6th, and 7th positions respectively, with HIV/AIDS and tuberculosis together, causing 3.5million deaths in 2004. At the 12th and 13th positions are Diabetes mellitus and hypertensive heart diseases. Following them is malaria at the 15th position. Strikingly, death

from self-inflicted injuries is part of the top 20 causes of mortality globally and occupies the 16th position (Mathers et al. 2009).

Again, for 2012 non-communicable diseases were in the lead followed in the fourth position by lower respiratory tract infection. HIV/AIDS and Diarrhoeal diseases occupied the sixth and seventh positions. Tuberculosis did not appear in the top ten, whereas Diabetes mellitus and Hypertension took the eighth and tenth positions respectively. (WHO Factsheet No. 310, 2014)

Regional differences however exist in the cause of death and the socioeconomic status of the country accounts for some of these regional differences. In the year 2011 in the USA, cardiovascular diseases ranked highest followed by malignant neoplasms. Influenza and pneumonia ranked 8th, followed by nephrotic syndrome, nephritis and nephrosis in the 15 top causes of mortality (Kochanek et al. 2011).

In sub-Saharan Africa, the leading cause of death in 2004 was HIV/AIDS, causing an estimated 1.5million deaths (Mathers et al. 2009).Whereas the common causes of death tend to be non-communicable in high-income countries, in low-income countries, the common causes tend to be communicable. Malaria, anaemia and pneumonia were the top three causes of mortality in that order, followed by strokes. Hypertension also in the top ten was the seventh cause of mortality in Ghana in 2003. HIV/AIDS trailed the top ten for that year (Aikins 2007).

In 2007, malaria continued to rank first, followed by HIV/AIDS and then anaemia. Cerebrovascular accidents and Hypertension maintained their fourth and seventh positions with diarrheal diseases falling to the tenth position (GHS factsheets, 2008). In 2010 however, the pattern changed with malaria and strokes still maintaining their first and fourth positions, lower respiratory tract infections took the second position, and HIV/AIDS went to the third

position. Meningitis occupied the tenth position. The new entrant into the top ten for this year was road traffic injuries, occupying the ninth position (CDC in Ghana Factsheets 2013).

Globally, death from Road Traffic Accident is a rising concern in young adulthood: 15-49years having high concentrations in Central and West Africa (Sepúlveda and Murray 2014). It is estimated that it kills about 1.4million people a year and if not checked, could rise to be the third leading cause of death by 2020 (Mock et al. 2005).

Agyemang suggests that the place of residence which has an association with the socioeconomic background of the individual significantly impacts health when comparison of overweight among Ghanaians in three geographically different dwelling was made in their study (Agyeman, et al. 2009).

Other studies have also shown that though the socioeconomic status of a group of people influences the kind of diseases and the mortality pattern, this is not always the case. Obesity commonly known to be a problem of the wealthy and a risk factor for conditions such as hypertension, diabetes mellitus and cardiovascular diseases was studied for its gradient in the urban rich and poor. The prevalence was found to be significantly high in the poor compared to the rich (Ziraba et al. 2009).

2.3 Trends in the Rate Of Autopsy

The rate of autopsy has been recorded to show decreasing trends globally by several researchers, despite its numerous advantages and importance. Different reasons have been cited by various researchers for this decline. Loughery et al. (2000), in a study at the Royal Victoria Hospital, Belfast found a significant decreasing trend from 1997-1999. Their study showed a steady decline in the overall autopsy rate from 30.4% in 1990 to 18.4% in 1999. The decline however was mainly in the clinical autopsy (21.6% in 1990 to 7.9% in 1999) compared to medico – legal autopsies that remained steady around 11%. This confirmed

other study findings also in the United Kingdom that had similar findings. Main reasons for the decline given by Loughery and friends, as perceived by physicians are difficulty in obtaining consent from relatives and advances in modern diagnostic techniques (Loughrey et al. 2000)

Eriksson and Sundstrom also found a downward trend in Sweden, upto 30% in the last 20yrs preceding the study, but reason for the downward trend was the lack of interest on the part of clinicians (Eriksson and Sundstom 1993).

In Africa, no study has been found to specifically evaluate the trend in autopsy rate, however in a study to assess medico-legal autopsies in North Central Nigeria, Mandong and friends found a high rate of medico-legal (96%) autopsy compared to clinical autopsy (4%) during the period of study. The reason for that difference as cited by the researchers was as a result of perceived cultural and religious barriers (predominantly an Islamic region where the dead are buried as soon as they pass on) which they stated had been confirmed by other researchers (Mandong et al. 2007).

A study in Korle Bu Teaching Hospital, Ghana to assess the causes of maternal mortality in southern Ghana saw a decrease in the performance of autopsies from 2004 to 2008, partly due to improved diagnostic techniques and alternatives to standard autopsy such as the verbal autopsy (Der et al. 2013).

2.4 Indications for Autopsy

Two main indications are made in autopsy; clinical and medico-legal and these are basically driven by a family member or clinician who wants to establish the actual cause of death. Clinical autopsies are performed to confirm diagnosis and identify other conditions that may have existed prior to death in cases that were under clinical care prior to death and for

teaching purposes. Medico-legal autopsies on the other hand, identify the mode of injury and the cause of death on criminal cases.

Though a decline in autopsy rate has been recorded generally in the Royal Victoria Hospital in Belfast, a marked reduction was found in clinical autopsies from the departments of medicine, surgery and the intensive care units. Coroner's or medico-legal autopsies however remained comparatively stable. Main reasons cited by practitioners for this decline were difficulty in obtaining consent from relatives and advances in modern techniques (Loughrey et al. 2000).

Laishram and Singh reported similarly of a decline in medical autopsies and cited practitioners' confidence in the antepartum diagnosis, lack of interest by relatives and practitioners as reasons for the decline (Laishram and Singh 2013)

In a study in Nigeria, Ekpo Menfin and friends also recorded more cases of medico-legal autopsies (76.9%) as compared to clinical autopsies that accounted for only 23.1% of cases (Dan et al. 2011)

A retrospective study done at the Queen Elizabeth II Health Sciences Centre in Halifax, Nova Scotia and from the Office of the Chief Medical Examiner of Nova Scotia also found steadiness in the medico-legal autopsies as compared to a marked decline in medical autopsies despite its recognised importance to training and research (Wood and Guha 2001).

In Aukland, O'Grady, found a decline in teaching autopsies after a ban in 2000, due to the fear of organ retention following a media report on the retention of children's heart for teaching purposes. This decline was noted to be affecting the practice of the practitioners that completed their education without pathology studies and ultimately affecting the patients (O'Grady 2003)

Despite all reasons given for the decline in autopsies such as technological advancement in diagnosing diseases and clinical confidence of clinicians in diagnosis made, autopsy still remains the single most important tool in establishing the actual cause of death. This fact has not been disputed by any researcher.

Bombí and friends (2003) established a major discrepancy rate in clinico-pathological diagnosis of 3.51% and a minor discrepancy in 3.82%. With regards to the immediate cause of death, major errors were found in 5.89% of cases and minor errors in 6.17% in cases studied. They therefore concluded that post-mortem examination continues to play an important role in auditing clinical practice and diagnostic performance, and also for educational purposes (Bombí et al. 2003).

It has been recorded that in a highly selected group of sudden deaths, in which there was often a question about cause of death, the rate of initial death certificate accuracy is 50%. Furthermore, coronary artery disease as the cause of death is less than 50%, far less than initial death certificate diagnoses would indicate (Tavora et al. 2008).

In a three year prospective study in Ghana, the medico-legal to clinical autopsy rates recorded in Korle Bu Teaching hospital were: 76% to 24%, 78% to 22% and 81% to 19% for the years 1998, 1999 and 2000 respectively (Akosa and Armah 2005). This performance however contradicts reasons given for the importance of clinical autopsies by a section of medical practitioners at the same hospital (Tette et al. 2014)

2.5 Mortality by Socio-Demographic Characteristics

2.5.1 Age

Death is an inevitable end that happens to all and every age. However causes of mortality differ in some ages. In 2004 it was estimated that almost 59 million people died nearly 20%

of whom were children under 5 years of age. Of these child deaths, 99% occurred in low- and middle-income countries. Over 70% of deaths in high-income countries occur among people aged 70, compared with 32% in low- and middle-income countries. A little over 30% of all deaths in low- and middle-income countries occurred at younger adult ages (15–59 years), compared with 15% in high income regions (Mathers et al. 2009). Globally for children under five years, about 8.8 million die before their fifth birthday in a year, more than a third (40%) of these deaths occur during the first four weeks of life. At least two-thirds of all child deaths are preventable, pneumonia and diarrhoea being the predominant (Bhutta et al. 2010).

There have been major declines in mortality rates in this age group over the twentieth century. Predominantly attributed to this decline is the development of vaccines for most of the childhood killer diseases, advancement in knowledge in the proper management of diarrhoea and advancement in medical technology (Cutler et al. 2006)

Development of health information systems to identify, assess and categorize death in children above five years, adolescence and early adulthood has been weak and so far lags behind those for early childhood and adulthood. This is because the age group has been regarded the healthiest age however; adolescence and young adulthood coincide with major changes in health and determinants of health later in life. Traffic accidents and suicide have been found to be the predominant causes of mortality in adolescence and young adulthood; traffic accident being in the lead (Kleinert et al. 2007). An autopsy audit at the Korle Bu Teaching Hospital, Ghana however, did not confirm this. Communicable diseases, pregnancy related conditions and nutritional disorders were found to be the major causes of death in adolescence, followed marginally by non-communicable diseases where blood borne diseases were the major cause. Accidents and suicide together caused only 6.8% of the deaths (Ohene et al. 2010).

Adult deaths have been widely studied globally and regionally. In sub-Saharan Africa, HIV/AIDS ranked first in 2004. An autopsy audit in Ghana revealed that the median age at death for all-cause mortality was 41yrs to 43yrs in a five year period from 2006 to 2010. The proportion of infant deaths in that period was higher than that of child deaths. However child deaths picked up after age 4yrs and levelled at ages 35-44yrs, at which decline starts and ends at age 85yrs (Sanuade et al. 2013).

2.5.2 Sex

Sex variation also exists in the cause of death. For all-cause mortality globally, no variation was found in sex among the leading causes of death, however it has been recorded that in almost all parts of the world, women live longer than men; the cause of the differential between male and female life expectancy being uncertain. WHO (2013), as cited by Gretchen (2013). Again Gretchen and friends found that the common cause of death in older women was from cancers followed by cardiovascular diseases in high income countries, the reverse being true for middle income countries, whereas cardiovascular, followed by communicable diseases were in the lead for low income countries.

Based on sibling history and orphanhood data from Demographic and Health Surveys from 23 countries in sub-Saharan Africa from 1992 to 2000, adult mortality rates were found to have risen sharply due to HIV/AIDS prevalence; excess mortality was found in men more than in women (Timæus and Jasseh 2004). Sex differentials have also been reported in some studies of autopsies done in Ghana. The male to female death ratio of cardiomegaly from 1998 to 2000 was 1.85:1, where the male preponderance was true for all except the extremes of age (Akosa and Armah 2005).

2.5.3 Residence (urban/rural)

The residence of an individual as in urban or rural could impact positively or negatively on health and thus cause of death. The residence (urban/rural) could also indicate the socioeconomic status of the individual which then will impact health and thus cause of death.

The impact of geographical location as in urban or rural on diseases causation has been widely studied. Nilsson has stated that living in an urban area increases once susceptibility to allergic diseases in the first years of life hence increased susceptibility to death from these conditions (Nilsson et al. 1999). This was also the case in a comparative study in Africa where the urban dwellers had an increased susceptibility to allergy (Yemaneberhan et al. 1997).

For another chronic non-communicable disease like sickle cell disease, no variation was found among rural and urban dwellers in Jamaica (Asnani et al. 2008)

A study done in Africa on the impact of geographical location as in urban or rural on the endemicity of falciparum malaria showed a significant difference in rural and urban endemicity (Tatem et al. 2008).

Rural settlements in East Africa reported a significantly high parasitic prevalence among children from 0-14years than their urban counterparts (Omumbo et al. 2005).

Slums in urban and rural Africa have also showed differences in disease pattern. An urban slum in Niarobi had a higher mortality burden from treatable and preventable conditions such as pneumonia, diarrhoeal diseases, HIV/AIDS and tuberculosis than their urban counterparts who were not living in slums (Kyobutungi et al. 2008).

Obesity commonly known to be a problem of the wealthy and a risk factor for conditions such as hypertension, diabetes mellitus and cardiovascular diseases was studied for its

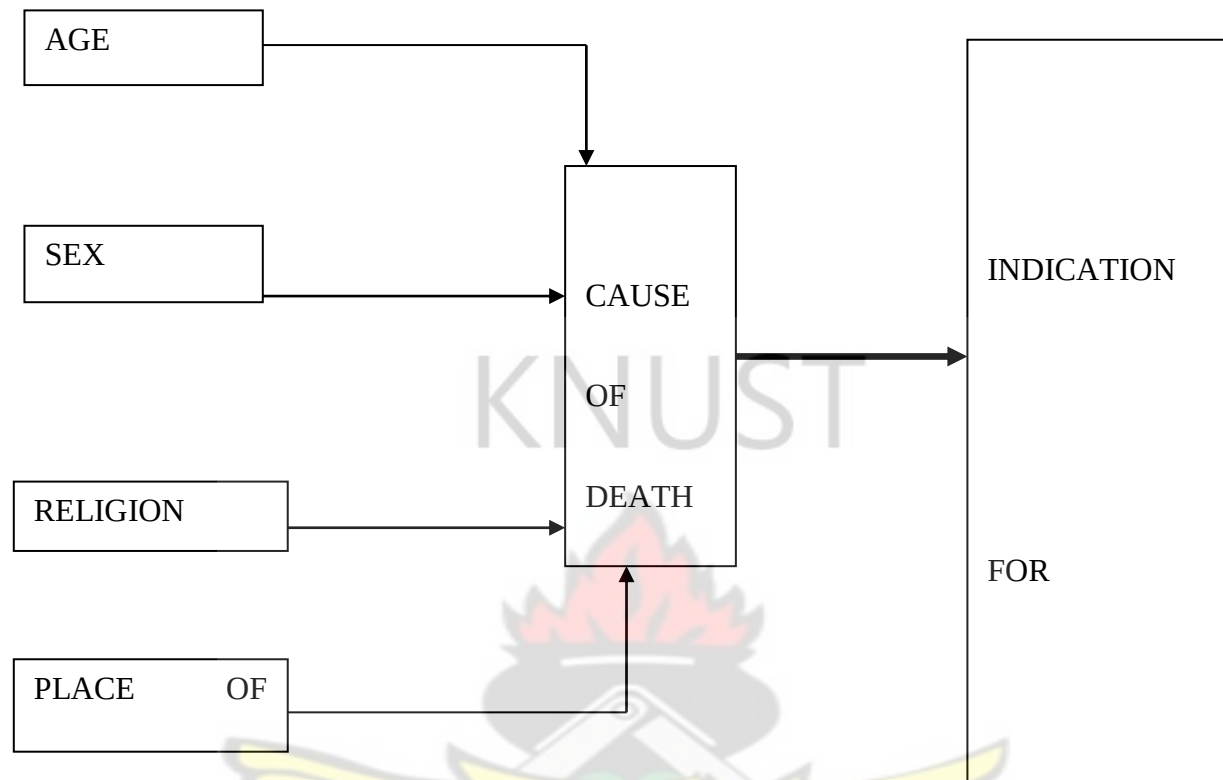
gradient in the urban rich and poor. The prevalence was found to be significantly high in the poor compared to the rich (Ziraba et al. 2009). A study in Tanzania, however, found the prevalence of hypertension, obesity and hypercholesterolemia in the rural dwellers to be lower than the urban dwellers (Njelekela et al. 2003).

Agyemang found that place of residence significantly impacted health when a comparison of overweight amongst Ghanaians in three geographically different dwelling showed that urbanization increased the risk of overweight (Agyemang et al. 2009)

2.5.4 Religion

Religious beliefs have been found to affect decisions that border on health and disease and hence death. In trying to curb the high maternal mortality in Ghana, to achieve the millennium development goal, Islamic and traditional religions were found to influence the use of maternal health services, where Moslem and traditional women were less likely to use such services compared to Christians (Gyimah et al. 2006)

Figure 1.1 Conceptual Framework: Association between Socio-Demographic Characteristics, Cause Of Death and Indication for Autopsy



Source: Author's Construct, 2014

There are several causes of death but no matter the cause of death certain factors run through them all. These factors are age, sex, religion and residency. Despite the fact that these factors tend to be common to all death cases, they can directly be linked to the cause of death.

The cause of death will then decide whether or not an autopsy will be done and if so what the indication will be; medical or medico legal.

CHAPTER THREE

STUDY METHOD

3.1 Study Design and Type

A retrospective cross-sectional study was carried out to study the trends in autopsy from January 2009 to December 2013. Secondary autopsy data was reviewed at the department of pathology, Komfo-Anokye Teaching Hospital to measure the study variables. An inclusion criterion was all autopsies performed at the department from 2009 to 2013.

For the fifth objective; determining the public health priority of the aging population, national adult population data gathered by the WHO cross-sectional study on Global Ageing and Adult Health, “SAGE” was analysed and compared with data from the present study.

3.2 Study Population

All autopsy cases performed during the period under review at the Department of Pathology at the Komfo-Anokye Teaching Hospital, Kumasi were included in the study.

3.3 Data Collection Tools and Technique

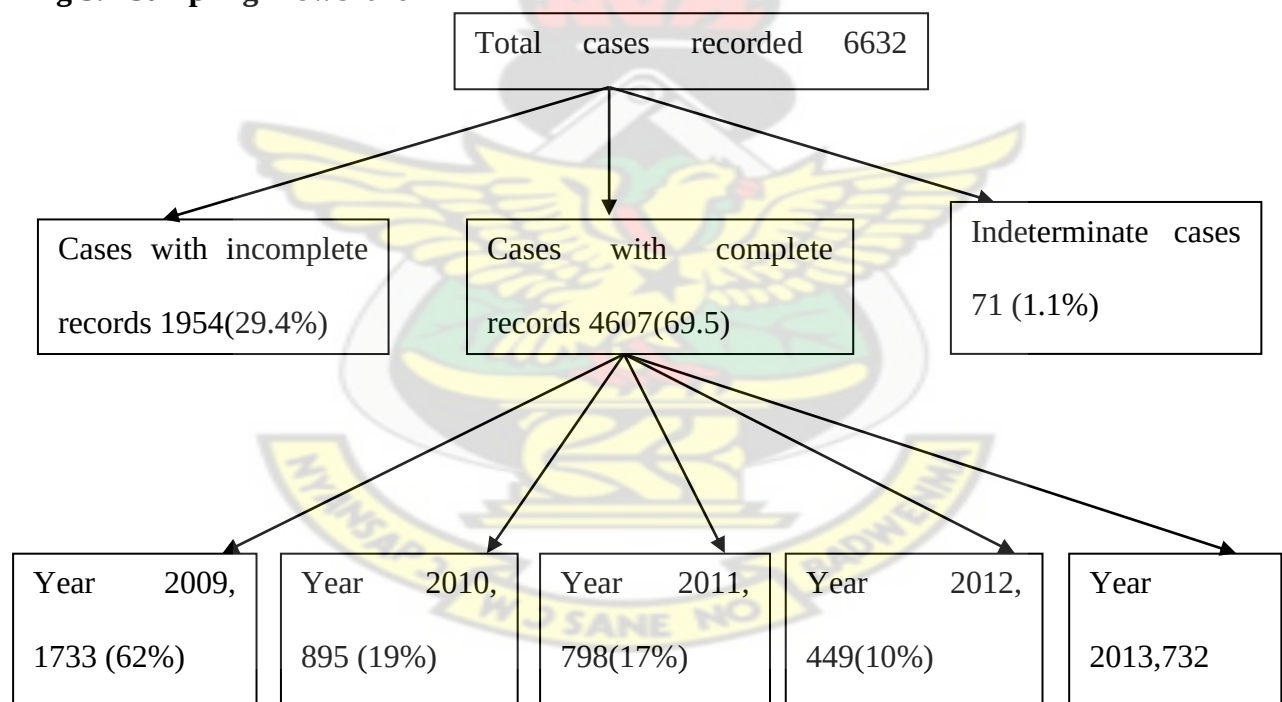
Data collection were from a secondary source; the autopsy logbook at the Department of Pathology, Komfo-Anokye Teaching Hospital. A checklist that covered all study variables; total cases done in the study period, indications of the cases, sex, age, and the cause of death was used. The Department of Pathology keeps a register of each case of autopsy performed where the date of autopsy, name, age, sex, clinical diagnosis and autopsy findings are recorded. To determine the public health priority of the aging population secondary data from “SAGE” was used. The outcome variable, severe disability was determined from self-assessed disability with cognition, mobility, self-care, life activities and participation in line with the International classification of Functioning, Disability and Health. From the assessment, 10 predictor variables were derived namely, musculoskeletal diseases, respiratory

diseases, tuberculosis, stroke, cardiovascular conditions, Hypertension, Diabetes mellitus, dental conditions, cataracts and other vision-related conditions. The main predictor variable (exposure) was the age.

3.4 Sample Size and Sampling

The Department of Pathology performs on average 800 – 1000 cases every year. Data from the cases on the socio demographic characteristics of age and sex, the indication for autopsy; statistical or legal, the clinical diagnosis and the pathological diagnosis are then entered into a register. All cases (N=6632) having entries for the characteristics stated above were included in the study.

Fig 3.1 Sampling Flowchart



3.5 Profile of Study Area

The Komfo-Anokye Teaching hospital is situated on a hill overlooking the city of Kumasi, the capital of the Ashanti region, on the former site of the African and European hospitals.

The hospital, now sixty (60) years old was completed in 1954, and named after the legendary Komfo-Anokye, a fetish priest of the Ashanti kingdom.

The hospital took over the Nurses Training College (established in 1945) and the Midwifery Training School (built in 1950), from the African and European hospitals on its completion. It was further converted into a teaching hospital in 1975, in pursuance of a policy by the Ministry of Health to establish a second medical school in Ghana and is now the second largest teaching hospital in the country.

Besides medical doctors, nurses and midwives, it provides training for other health and auxiliary workers.

Until 2007, it was the only teaching hospital serving the northern half of Ghana and also receiving cases from other countries sharing borders with that part of the country. This gives it a wide catchment area serving a population of about 10million people.

The hospital has 9 Directorates; Obstetrics and Gynaecology, Surgery, Child Health, Polyclinic, Anaesthesia, DEENT, Medicine, Diagnostics, and Oncology. In all, about 483,000 Out Patient attendances are registered and 58,000 admissions made annually. It has a bed capacity of about 1,200.

The Department of Pathology under the directorate of Diagnostics is an ultramodern facility commissioned for use in 2009. It is a 200bodies storage capacity facility which does both microscopic and macroscopic investigations into the cause of death. It receives cases from the Teaching hospital, as well as cases within the Kumasi Metropolis, neighbouring towns and districts and in some instances cases from all other regions. It has 1 consultant pathologist and 5 specialists. It sub serves the school of medical sciences in training of the undergraduate

medical students and also does postgraduate studies in pathology under the auspices of the Ghana College of Physicians and Surgeons.

3.6 Data handling and analysis

Data collected were under the strict control of the principal researcher, kept under lock in an external hard drive available to only the principal investigator. The data were subsequently entered into excel for cleaning and editing for duplication and typographical errors. Data enhancement was then done with the source data after which data were transported into Stata statistical software (StataCorp LP), version 12.0, for analysis.

The relationship between sociodemographic characteristics and the outcome variable was explored using the chi square test of significance and a p-value less than or equal to 0.05 was considered to be statistically significant.

To determine the public health priority of the adult population using the SAGE data, the chi square test was used to test associations between covariates and the outcome variable. Variables that were significant were then modelled into bivariate and multivariate logistic regression to determine the predictors of severe disability. The population attributable risks of the predictors of severe disability were then calculated and used in ranking the public health priorities of the adult population.

3.7 Study Variables

There were two main study variables; the independent variables and the dependent variable.

3.7.1 Dependent Variable

The dependent variable in this study was the cause of death.

3.7.2 Independent Variables

The independent variables in this study were age, sex, and indication for autopsy.

Table 3.1 Study Variables Table

Objective	Dependent Variable	Independent variable	Conceptual Definition of dependent variable	Scale of measurement	Indicators	Data Collection Method	Type of statistical analysis
1.To determine the number of autopsies and compare the trends in autopsies from 2009 – 2013	Trends in autopsy	Number of autopsies	Increasing or decreasing trends of autopsy	Numerical	Frequencies	Checklist	Descriptive
2.To determine the top 10 causes of mortality made by autopsy, in each year under study and compare with the national top 10 causes of death in the years under study	Top 10 causes of mortality by autopsy	Cause specific mortality by autopsy	All definitive diagnosis made by pathologist as ultimate cause of death	Nominal	Frequencies	Checklist	Descriptive

3.To identify the indications for autopsy and describe the trend over the five years under study	Trend indicators of for autopsy	Medico legal or clinical autopsy	Increasing or decreasing trends in medico legal or clinical autopsy	Nominal	Frequencies	Checklist	Descriptive
4.To describe the causes of death by the socio-demographic characteristics of age and sex,	Sociodemographic determinants of cause of death	Age, Sex,	The socio demographic characteristics of cases autopsied	Nominal	Frequencies	Checklist	Descriptive
5. To compare the causes of death in the aged (60yrs and above) with causes of long term disability among the aged in Ghana.	Cause of adult mortality	Specific diseases	Specific cause of death made at autopsy	Nominal	Frequencies	checklist	Descriptive

3.8 Ethical Consideration

The Institutional Review Board of the Kwame Nkrumah University of Science and Technology gave approval for the study to be carried out. Again permission was sought from the authorities of the Komfo-Anokye Teaching hospital before the commencement of the study.



CHAPTER FOUR

4.0 Results

This section presents the results of a retrospective cross-sectional study on 6632 autopsy cases performed from January 2009 to December 2013 at the Department of Pathology, Komfo-Anokye Teaching Hospital.

All the cases were categorised into two groups. The first group had records on the study variables whereas the second group were either indeterminate due to decomposition or not recorded. This categorisation was necessary for the purposes of analysis.

4.1 General Characteristics of Study Population

The objectives of the study were to determine the total cases performed each year under study and compare them for increasing or decreasing trend, determine the Top 10 causes of death per year and compare with the National Top 10 for any similarities or differences, determine the indications for autopsy and study its pattern for any increasing or decreasing trend, describe the causes of death by the socio demographic characteristics of age and sex and to determine the public health priority of the ageing population by comparing the causes of adult death with the causes of severe disability in the same age group.

The department recorded a total of 2259 cases in the year 2009, 1280 cases in 2010, 1113 cases in 2012 and 1283 cases in 2013. Total number of cases performed for 2011 could not be ascertained due to missing records but 1090 cases for the year were available for analysis.

Although 1113 cases were done in 2012, only 720 of these were available for the study. 71 cases were dropped from the analysis because the cause of death could not

be determined due to advanced decomposition. Of these, 38 were from 2009, 10 from 2010, 6 from 2011, 11 from 2012 and 6 from 2013. The rate of non-record for the entire five years was 29.4%. The non-record rate per year was 24.9% for 2009, 19.2% for 2010, 14.6% for 2011, 13.3% for 2012 and 27.9% for 2013.

Table 4.1 Background Characteristics of Study Population (N=6632).

Characteristics	Frequency	Percentage
Age		
<1	157	2.4
1 – 14	642	9.7
15 – 24	623	9.4
25 – 44	2279	34.4
45 – 64	1666	25.1
65+	989	14.9
Missing	273	4.1
Sex		
Male	4142	62.5
Female	2451	37.0
Missing	69	0.5
Indication		
Statistical	4372	66.0
Medicolegal	2163	32.6
Missing	97	1.4

Source: Field Data, 2014

4.2 Trends in the Number of Autopsies

Total numbers of autopsies recorded in each year within the study period were used in the estimation of the trends in the number of autopsies. 6632 cases in all, 2259, 1280, 1090, 720 and 1283 for 2009, 2010, 2011, 2012 and 2013 respectively. Four months from January were also used to describe the trends to see if there would be any difference from the trend shown by the total numbers recorded because for 2011 the total number of cases could not be ascertained.

The findings show that though there is a decline, the rate seem to be rising again. Patterns from the first 4 months of 2011, compared with three other years show a rising trend and an indication of possible rise in rate from the same year.

Fig 4.2 Five Year Trend in Autopsy Performance from 2009 To 2013

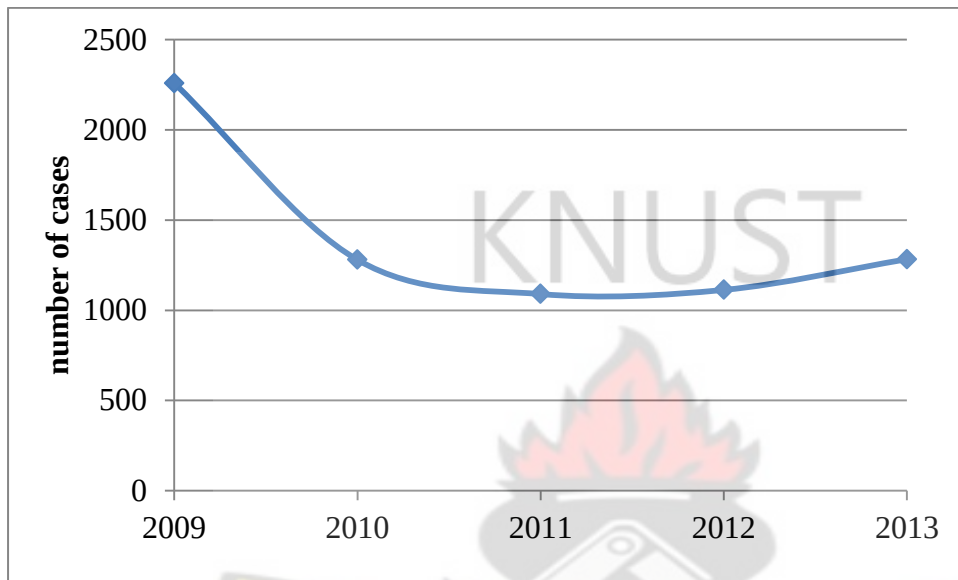
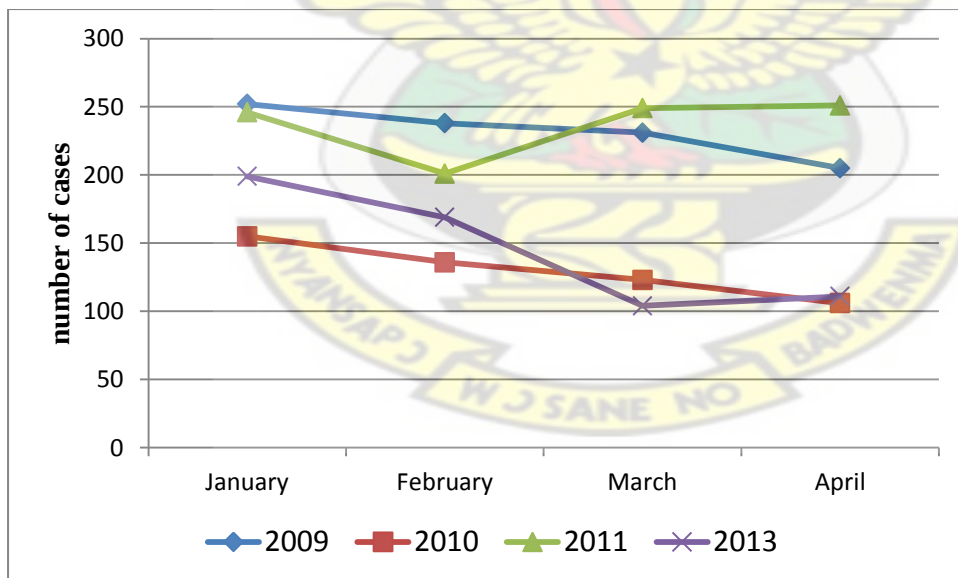


Fig 4.3 Four months Trend in Autopsy Performance (January to April)



4.3 Top 10 causes of Death

Injuries were the major causes of death within the five years under study. They ranked first in all the years. The people, who died of injury, suffered various forms;

road traffic accident, falls, burns, electrocution, assault, drowning etc. Pneumonia followed in second position in three out of the five years and hypertension in two years.

Table 4.2 Top 10 Causes Of Death

No	2009	2010	2011	2012	2013
1.	Injuries	Injuries	Injuries	Injuries	Injuries
2.	Pneumonia	Pneumonia	Pneumonia	Hypertension	Hypertension
3.	Hypertension	Hypertension	Hypertension	Pneumonia	Pneumonia
4.	Tuberculosis	Cardiovascular	Tuberculosis	Renal diseases	Cardiovascular
5.	Cardiovascular	Sev. Anaemia	Liver cirrhosis	Cerebrovascular	Tuberculosis
6.	Renal diseases	Tuberculosis	Cardiovascular	Cardiovascular	Renal disease
7.	Cancers	Sepsis	Meningitis	Tuberculosis	Liver cirrhosis
8.	Liver cirrhosis	Liver cirrhosis	Cancers	Cancers	Sepsis
9.	Typhoid	Cancers	Renal diseases	Sepsis	Cerebrovascular
10	Sepsis	Renal diseases	Sepsis	Liver Cirrhosis	Severe Anaemia

Source: Field Data, 2014

4.4 Indications for Autopsy and Five Year Trend

Two main indications are made for autopsy in the department: medicolegal and statistical. The definition for statistical cases for the purpose of this study was all cases that died within and out of the hospital for which no legal issues were attached but cause of death was necessary for statistical purposes; hospital cases and some “Brought in Dead” were therefore considered here. The records at the department enabled for this distinction.

Table 4.3 Five-Year Trend in Autopsy Indication

Year	Statistics N (%)	Legal N (%)
2009	1371(31.4)	881(40.7)
2010	840(19.2)	426(19.7)
2011	797(18.2)	284(13.1)
2012	483(11.1)	216(10.0)
2013	879(20.1)	356(16.5)
Total	4370(100)	2163(100)

4.5 Socio-Demographic Characteristics and Cause of Death

A number of socio demographic characteristics determine the health status of a group of people and hence the cause of death. The Age and Sex of the cases performed at the department were used in describing the cases. 2965(62.9%) males in all were included in the study; the highest age group was 25-44years.

Table 4.4 Ages and Sex Distribution of Study Population

Age	Sex		Total(100)	X ² (P-Value)	95% CI
	Male	Female			
<1	55(45.8)	62(51.7)	120	82.97(P< 0.001)	82.08 – 83.86
1-14	251(54.5)	205(44.5)	461		
15-24	281(60.0)	186(39.7)	468		
25-44	1085(64.7)	583(34.7)	1678		
45-64	842(67.9)	391(31.5)	1241		
65+	451(58.4)	319(41.3)	772		
	Statistical(indication)	Medicolegal			
<1	111(3.4)	9(0.6)	120(2.4)	423.73(P<0.001)	423.09 - 424.34
1-14	272(8.2)	188(11.9)	461(9.4)		
15-24	269(8.1)	195(12.4)	468(9.5)		
25-44	1059(32.1)	601(38.1)	1678(34.0)		
45-64	917(27.8)	311(19.7)	1241(25.2)		
65+	640(19.4)	126(8.0)	772(15.7)		
Total	3303(100)	1577(100)	4932(100)		
Sex	statistical	Medicolegal			
Male	1886(57.1)	1196(75.8)	3113(63.1)	166.24(P<0.001)	164.90 - 167.58
Female	1397(42.3)	370(23.5)	1787(36.2)		
Total	3303(100)	1577(100)	4932(100)		

Source: Field Data, 2014

4.5.1 Age and Cause of Death

Age was significantly associated with injury as a cause of death, hypertension and cancers. More deaths from injury occurred in the 25-44 age group and the highest offender was road traffic accident. It was almost impossible for hypertension or cancer to be recorded in the less than one age group.

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Table 4.5 Ages and Cause of Death

Characteristic	<1	1 - 14	Age 15 - 24	25 - 44	45 - 64	65+
Injury						
Assault	0(0.0)	2(1.1)	4(2.3)	11(2.4)	3(1.4)	0(0.0)
Burns	3(50.0)	11(6.0)	7(4.1)	12(2.6)	9(4.3)	6(6.6)
Drowning	0(0.0)	40(22.0)	17(9.9)	20(4.3)	10(4.7)	1(1.1)
Electrocution	0(0.0)	0(0.0)	6(3.5)	10(2.2)	0(0.0)	2(2.2)
Fall	0(0.0)	3(1.6)	4(2.3)	9(2.0)	6(2.8)	2(2.2)
Hanging	0(0.0)	4(2.2)	12(7.0)	21(4.6)	4(1.9)	4(4.4)
Knockdown	0(0.0)	64(35.2)	29(16.9)	75(16.3)	49(23.2)	31(34.1)
Poisoning	3(0.0)	6(3.3)	6(3.5)	12(2.6)	4(1.9)	1(1.1)
RTA	0(0.0)	49(26.9)	78(45.3)	269(58.3)	119(56.4)	42(46.1)
Stab	0(0.0)	0(0.0)	6(3.5)	8(1.7)	3(1.4)	1(1.1)
Other	0(0.0)	3(1.6)	3(1.7)	14(3.0)	4(1.9)	1(1.1)
Total (100)	6	182	172	461	211	91
Pearson chi2	236.06 (P<0.001)					
95% Ci	235.42 - 236.70					
Hypertension						
HPT Only	-	0(0.0)	3(18.7)	45(27.9)	66(25.7)	51(26.7)
HPT/CARDIO	-	1(50.0)	2(12.5)	42(26.1)	70(27.3)	61(31.9)
HPT/CARDOTH	-	0(0.0)	1(6.3)	0(0.0)	8(3.1)	0(0.0)
HPT/CARDREN	-	0(0.0)	1(6.3)	3(1.9)	5(2.0)	1(0.5)
HPT/CVA	-	1(50.0)	1(6.3)	85(33.2)	55(28.8)	
HPT/OTHER	-	0(0.0)	4(25.0)	51(31.7)	14(5.5)	9(4.7)
HPT/RENAL	-	0(0.0)	4(25.0)	13(8.1)	8(3.1)	14(7.3)
Total(100)	-	2(100)	16	161	256	191
Pearson Chi2	56.23(P= 0.003)					
95% Ci	55.38 - 57.08					

Cancers				0(0.0)	7(10.3)	6(10.9)
Abdominal	0(0.0)	1(6.2)	1(6.6)	7(10.1)	2(2.9)	2(3.6)
Brain	0(0.0)	0(0.0)	1(6.6)	9(13.0)	10(14.7)	5(9.1)
Breast	0(0.0)	1(6.2)	0(0.0)	4(5.8)	1(1.5)	3(5.5)
Gynaecologic	0(0.0)	1(6.2)	2(13.3)	1(1.4)	2(2.9)	2(3.6)
Hematologic	0(0.0)	7(43.8)	1(6.6)	41(59.4)	28(41.2)	11(20.0)
Liver	1(100.0)	1(6.2)	1(6.6)	6(8.7)	5(7.4)	3(5.5)
Other	0(0.0)	2(12.5)	7(46.7)	1(1.4)	7(10.3)	6(10.9)
Pancreatic	0(0.0)	0(0.0)	1(6.6)	0(0.0)	3(4.4)	14(25.5)
Prostate	0(0.0)	0(0.0)	2(13.3)	0(0.0)	3(4.4)	3(5.5)
Renal	0(0.0)	3(18.8)	0(0.0)	69	68	55
Total (100)	1	16	15			
Pearson chi2	145.39(P<0.001)					
95% Ci	142.99 - 147.79					
Pneumonia				168(86.2)	155(88.1)	122(89.7)
Pneum	25(96.1)	39(84.8)	32(76.2)	27(13.8)	21(11.9)	14(10.3)
Pneum/other	1(3.9)	7(15.2)	10(23.8)	195	176	136
Total	26	46	42			
Pearson chi2(6)	7.71 (P=0.260)					
95% Ci	6.80 - 8.62					

Source: Field data, 2014

HPT; Hypertension

HPT/CARDOTH; Hypertension + Other Cardiovascular event + Another Disease

HPT/CARDIO; Hypertension + Cardiovascular event

HPT/CARDREN; Hypertension + Cardiovascular event + Renal disease

HPT/CVA; Hypertension + Cerebrovascular accident

HPT/OTHER; Hypertension + Any other disease eg Pneumonia, Diabetes etc

HPT/RENAL; Hypertension + Renal disease

Pneum; pneumonia only

Pneum/other; Pneumonia + Other Disease

4.5.2 Sex and Cause of Death

Sex was significantly associated with injury and cancer. More males than females died from road traffic accidents and more breast cancers were recorded in females than males where it was almost impossible.

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Table 4.6 Sex and Cause of Death

Pathology	SEX		Total(100)	X ² (P-value)	95% CI
	Male	Female			
Injury					
Assault	19(86.4)	3(13.6)	22	56.18 P<0.001	55.27 - 57.09
Burns	31(57.4)	23(42.6)	54		
Drowning	70(76.9)	20(21.9)	91		
Electrocution	17(89.5)	2(10.5)	19		
Fall	24(92.3)	2(7.7)	26		
Gunshot	83(89.3)	10(10.8)	93		
Hanging	39(86.7)	5(11.1)	45		
Knockdown	193(68.7)	84(29.9)	281		
Other	25(96.2)	1(3.9)	26		
Poisoning	21(67.7)	10(32.3)	31		
RTA	489(77.7)	139(22.1)	629		
Stab	13(68.4)	6(31.6)	19		
Total	1024(76.7)	305(22.8)	1336		
Hypertension					
HPT	90(53.9)	75(44.9)	167	19.06 P= 0.087	
HPT/CARDIO	98(54.8)	78(43.6)	179		
HPT/CARDOTH	7(70.0)	3(30.0)	10		
HPT/CARDREN	7(70.0)	2(20.0)	10		
HPT/CVA	106(54.1)	88(44.9)	196		
HPT/OTHER	29(70.7)	12(29.3)	41		
HPT/RENAL	12(36.4)	21(63.6)	33		
TOTAL	349(54.9)	279(43.9)	638		
Cancers					
Abdominal	8(53.3)	7(46.7)	15	72.84 P<0.001	
Brain	9(75.0)	3(25.0)	12		
Breast	1(4.0)	24(96.0)	25		

Gynaecological	0(0.0)	11(100)	11	
Hematologic	10(76.9)	3(23.1)	13	
Liver	65(73.0)	23(25.8)	89	18.19 - 19.93
Other	10(55.6)	8(44.4)	18	
Pancreatic	9(56.3)	7(43.8)	16	
Prostatic	17(100)	0(0.0)	17	
Renal	6(66.7)	3(33.3)	9	
Total	135(60.0)	89(39.6)	225	
3.87 (P= 0.144)				
Pneumonia				
Pneum	345(62.4)	204(36.9)	549	
Pneum/other	43(52.4)	39(47.6)	82	
Total	388(61.1)	243(38.2)	631	71.31 - 74.37
				2.16 - 5.58

Source: Field data, 2014

HPT; Hypertension

HPT/CARDOTH; Hypertension + Other Cardiovascular event + Another Disease

HPT/CARDIO; Hypertension + Cardiovascular event

HPT/CARDREN; Hypertension + Cardiovascular event + Renal disease

HPT/CVA; Hypertension + Cerebrovascular accident

HPT/OTHER; Hypertension + Any other disease eg Pneumonia, Diabetes etc

HPT/RENAL; Hypertension + Renal disease

Pneum; pneumonia only

Pneum/other; Pneumonia + Other Diseases

4.6 Public Health Priority of the Aging Population

For this objective, data from the 2007/08 WHO multi-country study on global AGEing and adult health (SAGE) Wave 1 in Ghana where 4724 adults aged 50 and above were sampled across the nation and issued with questionnaires that assessed their general well-being were compared with mortality data from the same age group from the field to describe the public health priority of this aging population.

Of the 4724 adults interviewed, 50.3% were female and the mean age (SD) was 64.2 (10.7) years.

From the “SAGE” data, 2,818 (67.4%) of the adult population had either one of eleven health conditions or diseases; 40.5% had musculoskeletal problems whereas 3.0% had heart problems.

From the field data, out of 1628 adults, 62.9% were males and the mean age (SD) was 65.1(11.4) years. Overall, 233(14.3) died from various kinds of injuries, 380(23.3) died from respiratory sources, 378(23.2) from hypertension,

Eleven health conditions were reported by adults with severe disability and each adult had either one or more of these. A positive association was found to exist between the number of diseases or health conditions one had and perceived severity of disability. The odds of having severe disability with three diseases or health conditions was three times more than having none. (See Table 4.7).

The number of conditions that led to death ranged from one to twenty six from the field data.

A fourth (25%) of the mortality cases died from two or more conditions whereas nearly half (~50%) of the people who reported severe disability from the SAGE project had two or more conditions.

The prevalence of severe disability decreased with increasing age and was higher in males but levelled out with age, Fig 4.4. The field data also shows that mortality rate for adults decreased with increasing age however the rate of death in females at the later age (80+), far exceeds disability at the same age, Fig 4.5.

Tables 4.8 and 4.9 demonstrate that different diseases occupy the priority ranks for morbidity and mortality data. If only morbidity data is considered in policy formulation, disabling conditions such as that affecting vision and dentition occupy the first and second positions; however mortality data shows that even though these two are the worrisome conditions in adulthood, what is actually killing them are hypertension and injuries, also occupying the first and second positions respectively on the mortality rank.

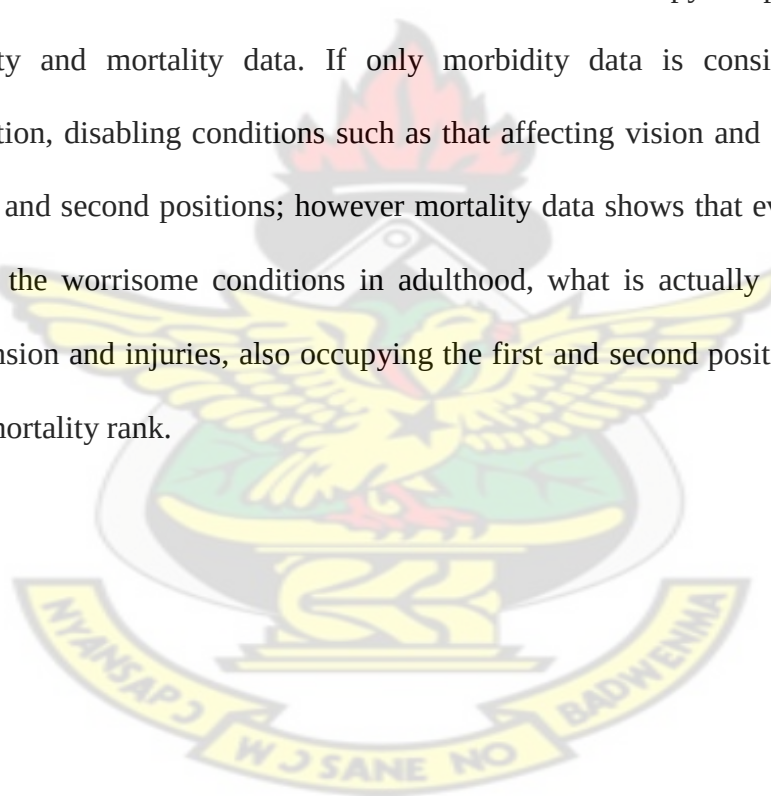


Fig 4.4 Prevalence of Severe Disability by Age and Sex

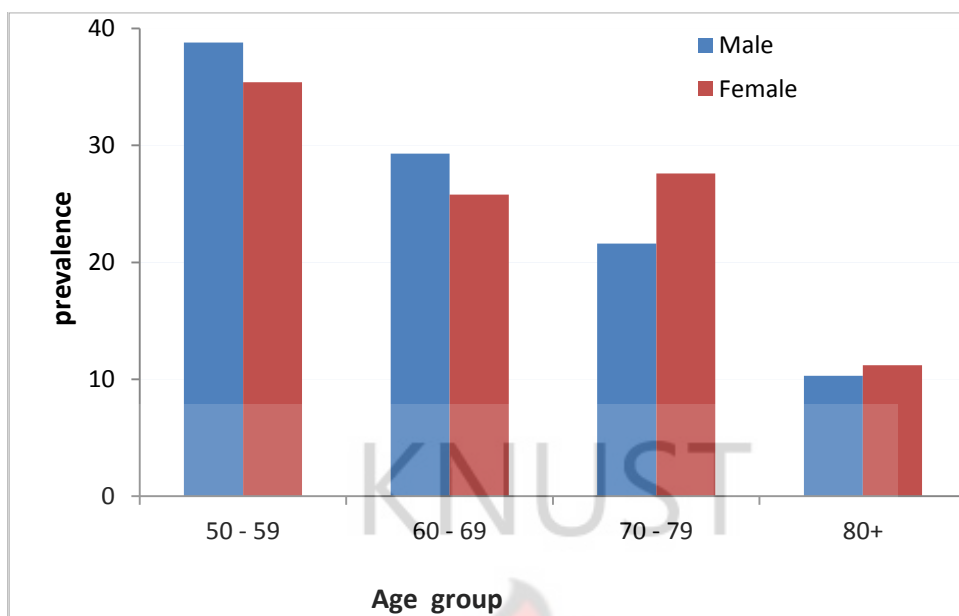


Fig 4.5 Percentage Mortality by Age and Sex

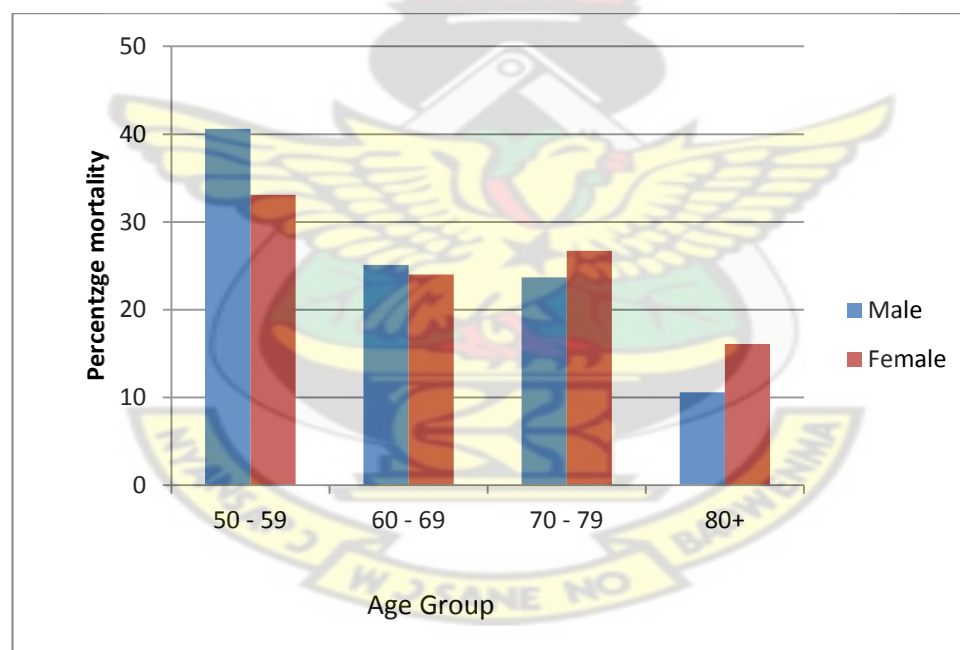


Table 4.7 Relationship between Number of Diseases/Health Conditions and Severe Disability

Number of health conditions	Total number of cases	(%) with Disability	Number	Age-adjusted Odds ratio	95% Confidence Interval
0				1.00	
1	1,488	13.2		1.75	1.37 - 2.22
2	847	17.2		2.39	1.84 - 3.09
3	314	22.0		3.23	2.33 - 4.47
4	123	22.8		3.38	2.13 - 5.36
5+	46	17.4		2.41	1.09 - 5.29

Source; SAGE Data, 2010

Table 4.8 Population Attributable Risk Fractions Of Diseases/Conditions Associated With Severe Disability And Priority Ranks Based On Their Population Attributable Risk Fractions

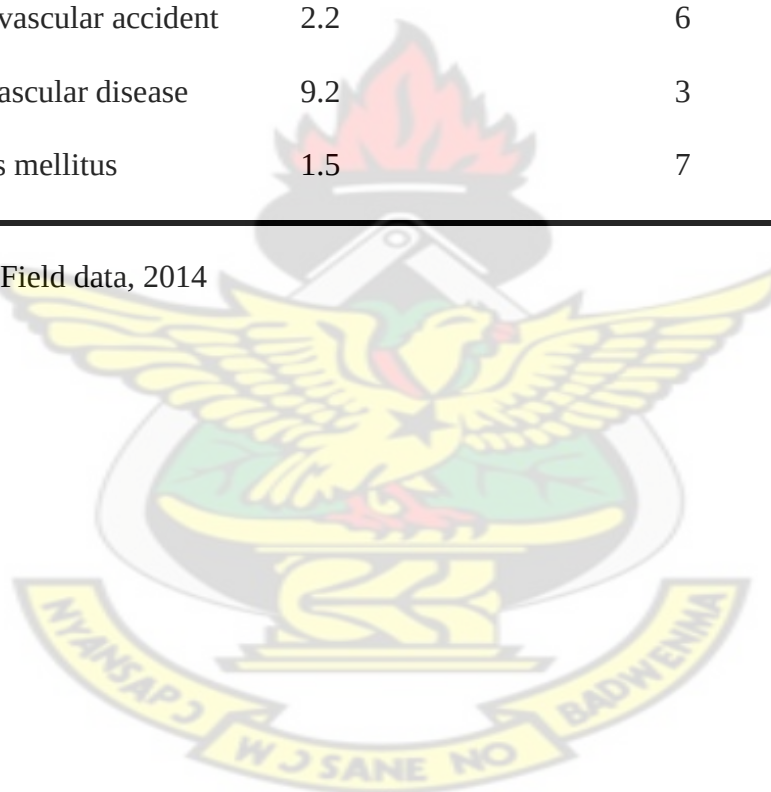
Disease/Condition	Population Attributable Risk Fraction(100)	Priority Rank
Cardiovascular diseases	5.6	4
Conditions associated with sight	30.4	1
Respiratory diseases	1.5	6
Musculoskeletal Diseases/Pain	6.6	3
Dental conditions	7.3	2
Tuberculosis	2.0	5

Source; SAGE Data, 2010

Table 4.9 Percentage Mortality by Diseases and Their Priority Ranks Based On Their Frequencies

Disease Condition	Percentage mortality	Priority Rank
Injuries	20.3	2
Hypertension	21.7	1
Respiratory Diseases	1.5	7
Cancer	5.9	4
Tuberculosis	5.7	5
Cerebrovascular accident	2.2	6
Cardiovascular disease	9.2	3
Diabetes mellitus	1.5	7

Source; Field data, 2014



CHAPTER FIVE

5.0 Discussion

This discussion is centred on background characteristics of study population, the research questions and the objectives, in the light of previous studies done. The key socio-demographic variables that were studied include age, and sex. Religion and Residence were variables that were originally included in the study but were not included in the secondary source so were not analysed.

Key Findings: The rate of autopsy performance in the Komfo-Anokye Teaching Hospital has declined from 41% in 2009 to 21% in 2013.

Unlike the National top 10 causes of death, injury remained the highest cause of death by autopsy in all the years reviewed.

The 25-44 age group formed 34% of all cases sent for autopsies in the department and more males than females who died during the period under review were taken for autopsy. Age was significantly associated with injuries [p value < 0.005, 95% CI (235.42 – 236.70)], hypertension [p value < 0.005, 95% CI (55.38 – 57.08)] and cancers [p-value < 0.005, 95% CI (142.99 – 147.79)]. Whereas sex was significantly associated with injuries [p value < 0.005, 95% CI (55.27 – 57.09)] and cancers [p value < 0.005, 95% CI (71.31 – 74.37)]

The odds of having severe disability increased with the number of diseases or health conditions an adult had. The odd was three times more in an adult with three diseases (3.23) than in an adult without any disease.

The life expectancy at birth for both sexes in Ghana is 65.5years by the 2013 estimates (Ghana Demographics Profile, 2014), and the present study confirms it as the mean age of death is 65.1years.

The risk of dying as a man in Ghana is higher than a woman for all age groups except in the less than one year group where the risk equals that of women. This is confirmed by studies done to assess all cause and cardiovascular mortality where more men than women were found to die from all causes, adjusted for social risk factors (Cappuccio et al. 2014).

5.1 Trends in the Rate of Autopsies and Indications of Autopsy

The number of autopsies performed showed a decreasing pattern over the years studied even though 2013 showed a small leap towards rising. This decreasing pattern is in line with findings from the study in Korle Bu to assess the causes of maternal mortality (Der et al. 2013)

The Nigerian study on knowledge, attitude and perceptions of Doctors and relatives of the deceased on autopsy also confirmed the decline in autopsy rate (Oluwasola et al. 2009).

This present study did not seek to find reasons for the decline in the rates of autopsy, however other studies that also confirmed the decline and found reasons for the decline include works of Tavora (Tavora et al. 2008), Wood and Guha (2001), Loughrey et al. (2000) and Laishram and Singh (2013).

The present study found two main indications for autopsy; statistical and medico legal. Although there was a general fall in the rate of autopsy, the rate of statistical autopsy was higher in all the years reviewed. This contradicts findings from the

Akosa and Armah studies where medico legal autopsy rates over their three year review period remained consistently higher (Akosa and Armah, 2005).

5.2 Top Ten Causes of Mortality by Autopsy

For all the years under review, injuries from all sources; road traffic accidents, falls, burns, electrocution, assault etc. remained as the number one cause of death. This does not agree with the country data on all-cause mortality available at the World Bank (CHIM/PPME-GHS, 2009& 2010) where injuries do not appear in the top ten. For the statistics available at the World Bank, Pneumonia, a communicable disease ranked fifth both in 2009 and 2010, however autopsy data revealed that more cases died of pneumonia than malaria where it shared the second position with hypertension.

Tuberculosis rather than HIV/AIDS conditions appeared to be a common cause of death by autopsy as it appeared in the top ten in all the years under study.

Cerebrovascular accident that ranked fourth both in 2009 and 2010 in the World Bank statistics was only an emerging disease for 2012 and 2013 from the field data.

Cancers which were never found in the comparative data (World Bank) appeared in the top ten for all the years under review.

5.3 Socio-Demographic Characteristics and Cause of Death

Four conditions that appeared in the top 10 causes of death; Injuries, Hypertension, Pneumonia and Cancers were selected by convenience for description, however no significant finding was found for pneumonia as far as the socio demographic characteristics are concerned.

Findings from this study showed that **Injuries**, a worldwide public health concern was the second leading cause of death (20.3%) in all-cause mortality by autopsy and the number one cause of death per year in all the years under study. Globally it forms 9% of mortality by all cause and it is estimated that for every death from injury, there are 12 hospitalizations, hundred emergency department visits and thousand Doctor's appointment (WHO 2014).

From the present study, Road Traffic Accident was the number one killer in all ages and sex in this category; however more deaths were recorded in the youth and men than the other extremes of age and women. Burns appeared to be the second killer after Road Traffic Accident in children under 15years and adults beyond 65years, this perhaps due to their vulnerability, whereas gunshot injuries followed after Road Traffic Accident from age 15 to 64years. For both sexes, gunshot injuries followed after Road Traffic Accident as the leading cause of death.

This is confirmed by Amo and Meirmanov in Ghana, where RTAs are found to be a growing threat to life and properties with a total death per 100,000 of 7.9, a number that is greater than most neighbouring countries. More men than women died and the at risk age was 1-40years (Amo and Meirmanov 2014)

Findings from the present study indicate that the RTA canker cannot be over emphasised, considering the damage to life, health and properties. More men than women lose their lives meaning an increasing rate in widowhood and orphan hood. More deaths are also recorded in young adults: the workforce of the nation, putting a stress on the nation's economy.

Hypertension (high blood pressure) is an important risk factor for cardiovascular disease morbidity and mortality and as well contributes to the burden of renal failure,

Strokes, Premature death and heart diseases. It has been recorded to be on the increase recently, not only in high economic nations but even in low developed nations.

Globally, it accounts for about 9.4million deaths every year and is recorded to be responsible for at least 45% of death due to heart diseases and 51% of death due to strokes. Its prevalence is high in Africa where it forms 46% of adult population aged 25 and above (WHO 2013).

The present study showed that Hypertension is truly a rising concern as it shares the second and third positions with pneumonia on the top 10 cause of death by autopsy. Its prevalence increases with increasing age from 25years as documented by Amoah in 2002 and Addo et. al in 2013 in Ghana (Amoah 2002), (Addo et al. 2013).

The male to female risk of dying from hypertension is 1.3(male):1(female) from this study which is not so different from a 1.2:1, male to female prevalence ratio obtained by Adeloye et al in Nigeria (Adeloye et al. 2014) and Wiredu et al (Wiredu and Nyame 2001). Bosu also confirmed this slight male predominance in the prevalence of hypertension in a study to determine the Epidemic of Hypertension in Ghana. However, this sex differential has been shown to be of no statistical significance by many researchers across the globe (Bosu 2010) as found in this study.

The risk of dying from hypertension is also shown by the study to increase with cardiovascular and cerebrovascular events (2% and 5% respectively) than hypertension alone. This is also confirmed by a WHO report (WHO 2013) and Wiredu and Nyame in studying Stroke-related mortality at Korle bu Teaching Hospital (Wiredu and Nyame 2001).

Cancer was initially thought of as a disease of the developed nations. However, recent statistics from various parts of the world indicate a rising trend in its occurrence in middle and low income countries. From the present study it was found in the top 10 causes of death by autopsy in four out of the five years under study and ranked fifth for all the years under study, put together. The global report on cancers for 2008 put it at number 2 in developing countries (American Cancer Society 2011).

It was estimated from the same global report that anybody could be affected, however the incidence increased with increasing age with 58% occurring at age 55 and older in developing nations. The present study also gives the same picture where cancer was recorded in all ages however its prevalence increased with age and did not show any high record for any particular age.

The sex ratio for cancer is 1.5:1, male to female by this present study which is not so different from a study by Wiredu and Armah in Ghana where a ratio of 1.2:1 was recorded (Wiredu and Armah 2006).

The commonest cause of cancer mortality in females was breast malignancies, liver and cervical cancers stood at second and third positions. For males liver cancer was the highest cause of cancer mortality followed by prostate and then hematologic malignancies. Findings from a study into the cancer incidence in Ghana by Laryea et al also had a similar sex pattern for the various causes of cancer as in the present study (Laryea et al 2014). The male findings of the study are similar to the findings of the study into the Cancer mortality patterns in Ghana (Wiredu and Armah 2006) and the global report on cancers.

Wiredu indicated in his study that hematologic cancers came after breast cancer as the common causes of cancer in females this however was not the case in the present study as, liver and cervical cancers came before hematologic cancers in females.

5.4 Public Health Priority of the Adult Population

The present study unlike other studies done across the globe gives a better understanding and picture of the real and perceived health status of the adult population since it compares a living and mortality data of adult health. It therefore is important for planning and policy formulation of adult health. The data however were gathered from two different populations; hence a follow up study on the same population would give a perfect picture of the situation.

The sampling technique and sizes of both data are also good for generalization to the general adult population. The sex ratio found in the SAGE data is comparable with the National demographic sex ratio estimates for 2013. One in twelve adults at 50-59years complained of severe disability from their health conditions and this increases with age to one in two at 80years and above. This is comparable to one in three in an adult Thai population (Jitapunkul et al. 2003).

Increasing age is associated with increasing health conditions, mostly affecting sight, the sense of hearing and feeling and mobility; the combined effect of which increases disability. It is therefore not a haphazard finding in this present study that conditions affecting sight and musculoskeletal system ranked first and third. The number of morbid conditions increases with increasing age and determines self-perceived disability, there is however a higher risk of having perceived severe disability with health conditions that are associated with physical challenges.

Yawson and Dogbe in Ghana, demonstrate that the prevalence of cataract is high in adults with diabetes, hypertension and stroke, it is therefore not surprising that in this present study conditions associated with sight instead of any of the above three were positively related to severe disability (Yawson et al. 2014).

However, in a longitudinal follow-up study, Abdul found that rate of mortality was high in adult who perceived their health conditions as bad (severe), than those who didn't (Abdul 2014). In following, it would have been expected from this study that more deaths would have been recorded from conditions or complications of sight but the opposite is true.

Our analysis indicates that the various conditions that determined perceived disability were diseases/conditions of sight and the musculoskeletal system. However mortality data on the other hand demonstrates that more deaths occur with Hypertension and cardiovascular diseases than any other condition that caused severe disability. Cardiovascular diseases appeared in the disability ranking possibly due to its debilitating symptoms on the individual and mortality data also confirms how important it is to adult health.

Adult Tuberculosis appears to occupy an important position as far as Ghanaian adults' health is concerned as it ranks fifth both in the disability and mortality rankings. Its debilitating effect on adults cannot be over emphasised since it can affect major organs and even bones. The effects of treatment and the stigma associated with it all stress its importance as a major disability factor and cause of mortality.

Many of the diseases associated with severe disability and mortality in the aged are preventable and offer a window of hope that when particular attention is given to

adult health considering both morbidity and mortality data, adult life will be improved and more adults will be saved from premature deaths from these conditions.

KNUST



CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

Introduction

This chapter presents the conclusions regarding the trends in autopsy performance and as it relates with adult health. The conclusions were drawn about autopsies performed at the Department of Pathology at the Komfo-Anokye Teaching Hospital according to the objectives set for the study and based on the findings of the study. Recommendations to facilitate the performance of autopsy are also presented.

6.1 Conclusion

1. This study revealed that there is a progressive decline in the rate of autopsy from 41% in 2009 to 23% in 2013 in line with other study documentations in other parts of the world. Unlike other studies done elsewhere reasons for the decline were not studied and so cannot be explained.
2. The Top Ten causes of Death by autopsy were different from the National Top Ten. Injuries occupied the first position in all the study years and hypertension and pneumonia shared the second and third positions. The contribution by the various forms of injuries such as road traffic accidents, assaults, gunshots, burns etc were not studied.
3. Two main indications were made at the Department of Pathology, namely statistical and Medico legal. The statistical autopsy rate was found to be generally higher than the medicolegal cases unlike documentations from other studies.
4. The socio demographic characteristics of age and sex were strongly associated with some causes of death. More males than females died from injuries with a sex ratio of 3:1 respectively.
5. Morbidity and Mortality data

together are necessary in determining the health needs of the ageing population in Ghana since the perceived health needs of adults in the country are different from the potential health conditions that could lead to death.

6.2 Recommendations

6.2.1. Ministry of Health

1. Autopsy is by far the single and most accurate way of determining the cause of death, it is therefore recommended that standard operating procedures be developed and its use encouraged in the process of autopsy and reporting to enable accurate and standardised cause of death assessment.
2. Health policies formulation are mainly based on the mortality data of a group of people, it is therefore recommended that the Ministry of Health and the District Health Management Team pay particular attention to mortality data from autopsy to accurately estimate and prioritise the health needs of the people.
3. The study revealed that the self-assessed priority ranks of conditions that caused severe disability to adults were different from conditions that killed them. It is therefore recommended that both morbidity and mortality data from adult are used in determining their public health priorities.

6.2.2 Security agencies

Injuries were the number one cause of death in all the years reviewed. Road Traffic Accidents being the major cause of injury death. These are preventable causes which can easily be eliminated by enforcement of laws. It is therefore recommended that the security, traffic regulatory bodies and all other agencies responsible for the

protection of human lives and dignity come together and device means of curtailing this preventable problem.

6.2.3 Komfo-Anokye Teaching Hospital

Autopsy being one of the effective ways for medical education, it is recommended that clinicians are encouraged to make more request and a study into emerging diseases done.

6.3 Further Studies

1. The researcher recommends that another study is done to find reasons for the decline in autopsy rates.
2. A follow up study to ascertain the actual cause of adult mortality given their disabilities (morbid conditions) while alive will be a better assessment of the public health priority of the adult population.
3. Head injuries appear to be the number one cause of injury death, a study into the contributory factors of this is recommended.

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APPENDIX A

DATA COLLECTION TOOL

Date	Age	Sex	Indication for autopsy	Pathological Diagnosis
				