

MAKERERE



UNIVERSITY

**ANALYSIS OF THE RELATIONSHIP BETWEEN SECURITY
MEASURES AND CRIME OCCURRENCE AT THE SCHOOL OF
STATISTICS AND PLANNING**

BY

ATWIINE DESIRE

23/U/06988/PS

**A DISSERTATION SUBMITTED TO THE SCHOOL OF STATISTICS IN PARTIAL
FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE
OF BACHELOR OF STATISTICS OF MAKERERE UNIVERSITY**

AUGUST 2026

DECLARATION

I, ATWIINE DESIRE, hereby declare that this dissertation is my own original work and has not been submitted to any other university or institution for the award of any academic qualification. All sources of information used in this study have been acknowledged through proper referencing.

Signature: 

Date: 05. 08. 2026

ATWIINE DESIRE

2300706988

APPROVAL

This research report has been submitted for examination with my approval as the University Supervisor.

Signature: Kakaire Date: 05/08/2026

MR. KAKAIRE GRACE

SCHOOL OF STATISTICS AND PLANNING

MAKERERE UNIVERSITY

DEDICATION

This work is dedicated to my family whose love, encouragement and unwavering support made this achievement possible

ACKNOWLEDGEMENT

First and foremost, I give thanks to God for the good health, strength, and wisdom that enabled me to complete this study.

I am deeply grateful to my supervisor, MR KAKAIRE GRACE, for the guidance, patience, and constructive feedback provided throughout the entire research process. Your insights and suggestions greatly improved the quality of this work.

I also wish to thank the lecturers and staff of the School of statistics and planning, Makerere University, for the knowledge and skills imparted during my course of study. The statistical foundation laid in this school was critical in shaping this research.

Special appreciation goes to all the students at the School of statistics and planning who took time to fill in the questionnaire. Your responses formed the backbone of this study and without your participation, this research would not have been possible.

Finally, I thank my family and friends for their moral support, understanding, and encouragement throughout this academic journey. Your belief in me never wavered, and for that I am truly grateful.

TABLE OF CONTENTS

DECLARATION	Error! Bookmark not defined.
APPROVAL.....	Error! Bookmark not defined.
DEDICATION	iii
ACKNOWLEDGEMENT.....	iv
TABLE OF CONTENTS.....	v
ABSTRACT	x
CHAPTER ONE.....	1
INTRODUCTION	1
1.1 Background to the study	1
1.2 Problem Statement.....	2
1.3 Major Objective	3
1.4 Specific Objectives	3
1.5 Hypotheses of the Study	3
1.6 Scope of the study	4
1.7 Significance of the study.....	5
1.8 Conceptual framework.....	5
CHAPTER TWO	7
LITERATURE REVIEW	7
2.1 Introduction.....	7
2.2 Overview of the Prevalence and Types of Campus Crimes	7
2.3 Security Personnel and Crime Occurrence	8
2.4 CCTV Camera Coverage and Crime Occurrence	9
2.5 Lighting Conditions and Crime Occurrence	10
2.6 Research Gaps.....	11
CHAPTER THREE	13
METHODOLOGY	13
3.1 Introduction.....	13
3.2 Research Design.....	13
3.3 Target population	13
3.4 Sample Size determination	14
3.5 Sampling Technique.....	15

3.6 Data collection instrument	15
3.7 Data Analysis	16
3.8 Validity and Reliability	17
3.8.1 Validity	17
3.8.2 Reliability	18
3.9 Ethical Considerations	18
CHAPTER FOUR	19
RESULTS AND FINDINGS	19
4.1 Univariate statistics	19
4.1.1 Crime rate prevalence	19
4.1.2 Types of Crime witnessed.	19
4.1.3 Frequency and proportions	20
4.2 Bivariate statistics	23
4.2.1 CCTV availability and witnessing crime.	23
4.2.2 Security availability and crime occurrence.	24
4.3 Logistic regression	25
CHAPTER FIVE	29
DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS	29
5.1 Discussion of findings	29
5.2 Conclusion	32
5.3 Recommendations	33
5.4 Limitations of the study	34
APPENDICES	39
Appendix i: Questionnaire	39

LIST OF TABLES

Table 4. 1Univariate statistics for the different variables	21
Table 4. 2Relationship between CCTV camera availability and witnessing crime	23
Table 4. 3: Relationship between security availability and crime occurrence	24
Table 4. 4: Model summary	26
Table 4. 5: Model coefficients.....	27

LIST OF FIGURES

Figure 1. 1:Conceptual framework	6
Figure 4. 1: Number of people who witnessed crime	19
Figure 4. 2: Types of crime witnessed	20

LIST OF ABBREVIATION

CCTV	Closed-Circuit Television
CPTED	Crime Prevention Through Environmental Design
SCP	Situational Crime Prevention
SPSS	Statistical Package for the Social Sciences
Makerere	Makerere University
SSP	School of statistics and planning
COBAMS	College of Business and Management Sciences
n	Sample size
N	Population size
e	Margin of error

ABSTRACT

Campus security is a growing concern in institutions of higher learning due to the continued occurrence of crimes such as theft, assault, vandalism, and unauthorized access despite the implementation of security measures. This study examined the relationship between security measures and crime occurrence at the School of Statistics and Planning, Makerere University. Specifically, the study assessed the influence of security personnel availability, CCTV camera availability, and lighting conditions on students' likelihood of witnessing crime. Data was collected from 300 undergraduate students using KoboToolbox, and data was analysed using descriptive statistics, Pearson's chi-square tests of independence, and binary logistic regression using SPSS version 26 and Stata. The dependent variable was whether a student had witnessed a crime, while security personnel availability, CCTV camera availability, and lighting conditions were the explanatory variables.

The findings showed that 58.3% of respondents had witnessed at least one crime incident. Theft was the most commonly witnessed crime (43.4%), followed by assault or physical attacks (24.5%), burglary (17.2%), vandalism (13.1%), and cybercrime (1.7%). Most incidents occurred during nighttime (53.0%), with hostels or halls of residence (68.0%) and parking areas (30.9%) identified as the main crime-prone locations. However, adequate lighting significantly reduced the likelihood of witnessing crime by 93% compared to areas with very limited lighting (AOR = 0.07, $p = 0.014$).

The study concludes that security measures such as CCTV cameras and security personnel require effective deployment, monitoring, and maintenance to improve their crime prevention effectiveness. Adequate lighting emerged as the most influential security measure associated with reduced crime occurrence. The study recommends improving lighting coverage, increasing night patrols, deploying security personnel to crime-prone areas, and ensuring proper functioning and monitoring of CCTV cameras

CHAPTER ONE

INTRODUCTION

1.1 Background to the study

Security is a critical requirement for effective teaching, learning, and research in institutions of higher education. A safe learning environment enables students and staff to participate fully in academic activities without fear of crime or victimization. To enhance campus safety, universities have adopted various security measures, including security personnel, closed-circuit television (CCTV) surveillance, perimeter lighting, access control systems, and routine security patrols to reduce crimes, protect university property, and promote a secure academic environment.

Despite these efforts, crime remains a significant concern in many universities across East Africa. In South Africa, (McCahill & Norris, 2019; Mkhize et al., 2022) reported that theft of laptops, mobile phones, housebreaking, and vehicle theft were among the most common crimes experienced on university campuses. Similarly, (Bromley, 2007; Murenga, 2019) found that 86.5% of students in a Kenyan university feared property theft more than any other campus offence. These findings indicate that campus crime continues to pose a challenge despite the presence of security interventions.

Ugandan universities face similar security concerns. Makerere University, as the country's largest public university, accommodates a large student population on an open campus with substantial daily movement of students, staff, and visitors. (Fisher et al., 2010) observed that security personnel at universities are primarily deployed at entry points and administrative buildings, leaving academic and residential areas relatively less protected.

The School of statistics and planning has implemented several security measures, including security guards, CCTV cameras, lighting, and routine patrols. Nevertheless, incidents of theft of laptops and mobile phones, vandalism, and unauthorized access to buildings continue to be reported. Although these measures are intended to reduce crime, there is limited empirical evidence on how effectively they influence crime occurrence within the school. This study therefore examines the relationship between existing security measures and crime occurrence at the School of statistics and planning, Makerere University, to generate evidence that can support more effective security planning and resource allocation.

1.2 Problem Statement

Despite the presence of security personnel, CCTV cameras, perimeter lighting, and periodic patrols at the School of statistics and planning, students and staff continue to report theft of personal belongings, vandalism, and unauthorized access to buildings, particularly around lecture rooms, computer laboratories, hostels, and poorly lit pathways. Similar challenges have been documented elsewhere in African universities. In Kenya, (Murenga, 2019) found that 86.5% of students feared property theft more than any other campus offence, while (Mkhize et al., 2022) reported that housebreaking and the theft of laptops and mobile phones were the most prevalent crimes at a South African university

In Uganda, (Fisher et al., 2010) observed that security personnel at Universities were mainly deployed at entry points and administrative buildings, leaving academic and residential areas comparatively vulnerable. Likewise, (Fisher et al., 2010) reported that CCTV coverage in universities is largely concentrated at main gates and administrative offices, with academic blocks receiving limited surveillance. Although the university has invested in several security

measures, management lacks empirical information on which security measures are significantly associated with reduced crime occurrence and which require improvement. Cases involving stolen property and unauthorized access remain a concern, raising questions about the effectiveness of existing security measures. This study therefore examines the relationship between security measures and crime occurrence at the School of statistics and planning to provide evidence that can guide more effective security planning.

1.3 Major Objective

To analyse the association between campus security measures and crime occurrence at the School of statistics and planning, Makerere University

1.4 Specific Objectives

- I. To examine the relationship between availability of security personnel and crime occurrence at the School of statistics and planning.
- II. To assess the relationship between CCTV camera coverage and crime occurrence at the School of statistics and planning.
- III. To determine the joint effect of campus security measures (security personnel, CCTV cameras, and street/security lighting) on the likelihood of students witnessing crime at the School of statistics and planning.

1.5 Hypotheses of the Study

In line with the specific objectives, the study tested the following hypotheses:

H01: There is no statistically significant relationship between the availability of security personnel and crime occurrence at the School of statistics and planning, Makerere University.

Ha1: There is a statistically significant relationship between the availability of security personnel and crime occurrence at the School of statistics and planning, Makerere University.

H02: There is no statistically significant relationship between CCTV camera coverage and crime occurrence at the School of statistics and planning, Makerere University.

Ha2: There is a statistically significant relationship between CCTV camera coverage and crime occurrence at the School of statistics and planning, Makerere University.

H03: There is no statistically significant relationship between lighting conditions and crime occurrence at the School of statistics and planning, Makerere University.

Ha3: There is a statistically significant relationship between lighting conditions and crime occurrence at the School of statistics and planning, Makerere University.

H04: Campus security measures (security personnel, CCTV cameras, and street/security lighting) do not jointly and significantly predict the likelihood of students witnessing crime at the School of statistics and planning.

Ha4: Campus security measures (security personnel, CCTV cameras, and street/security lighting) jointly and significantly predict the likelihood of students witnessing crime at the School of statistics and planning.

1.6 Scope of the study

The study will be conducted at the School of statistics and planning, College of Business and Management Sciences, Makerere University, located on the main campus in Kampala, Uganda. It will focus on examining the relationship between selected campus security measures and crime occurrence. The security measures considered include the presence of security

personnel, CCTV surveillance, security lighting, and routine security patrols. Crime occurrence will be assessed in terms of students' reported experiences and observations of theft, vandalism, and unauthorized access within the school.

1.7 Significance of the study

The findings of this study will be beneficial to several stakeholders. The management of Makerere University and the School of statistics and planning and Planning will gain empirical evidence on the effectiveness of existing security measures, including security personnel, CCTV surveillance, lighting, and security patrols. This information will support informed decision-making and more efficient allocation of resources to improve campus security. Improved security is expected to reduce fear of crime, minimize property loss, and encourage greater use of university facilities during both daytime and evening hours. Finally, the study will contribute to the existing body of knowledge on campus security and crime prevention in higher education institutions in Uganda. It will serve as a useful reference for future researchers conducting studies on campus security, crime prevention, and safety management

1.8 Conceptual framework

The conceptual framework illustrates the relationship between campus security measures and crime occurrence among students at the School of Statistics and Planning, Makerere University. The framework identifies security personnel availability, CCTV camera coverage, lighting conditions, and security patrol frequency as the independent variables, while crime occurrence, measured through students' experiences and reports of theft, vandalism, and unauthorized access, is the dependent variable. Guided by the Routine Activity Theory, the framework assumes that effective security measures act as capable guardians by reducing

opportunities for criminal activities, whereas inadequate security increases the likelihood of crime

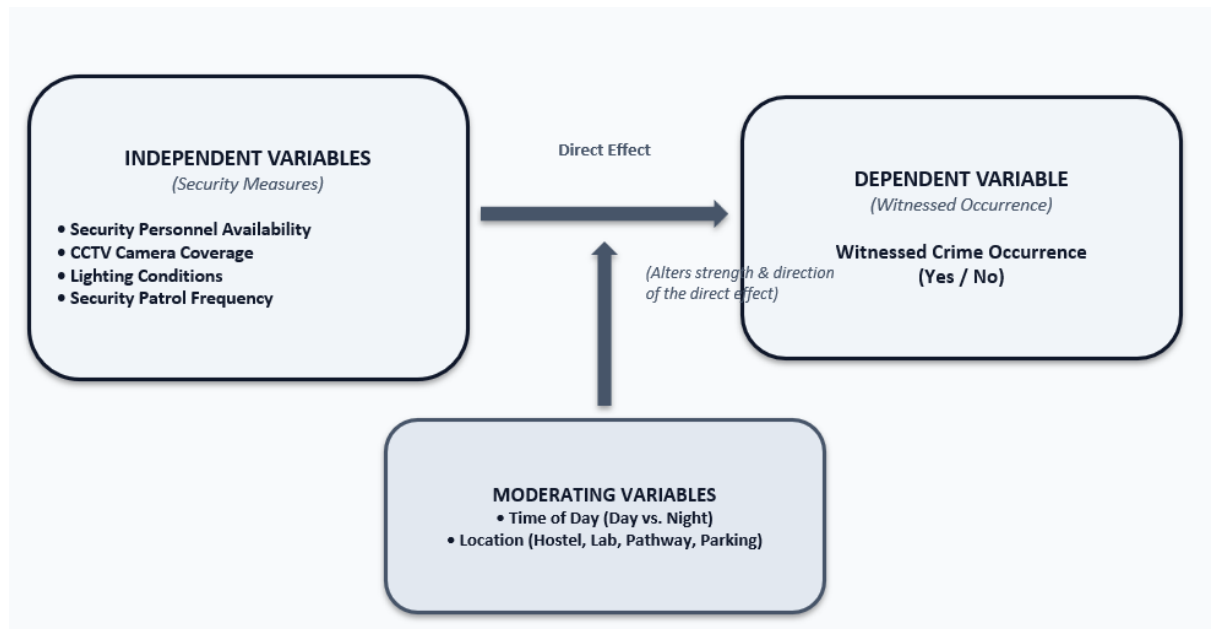


Figure 1. 1: Conceptual framework

The relationship between security measures and crime occurrence is further influenced by moderating factors such as time of day, location of the place, and the functionality of security systems, which may affect the effectiveness of security interventions in preventing crime.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter reviews existing literature on campus security, crime occurrence, and the effectiveness of security measures.

2.2 Overview of the Prevalence and Types of Campus Crimes

Crime in universities is a recognized global challenge. As open institutions with large and diverse populations, universities are inherently exposed to a range of security risks. Common crimes reported on university campuses by students include theft, assault, vandalism, and unauthorized access to buildings and facilities (Fisher et al., 2010). The openness of campuses, characterized by multiple entry points and high volumes of people moving through them, makes maintaining effective security particularly challenging.

Evidence from African universities indicates that campus crime is a persistent and significant problem rather than an isolated occurrence. A qualitative study conducted at the University of KwaZulu-Natal's Howard College campus in South Africa found that housebreaking involving the theft of laptops, mobile phones, and other valuables, as well as vehicle theft, sexual and verbal assault, and unauthorized entry, were among the most frequently reported incidents (Mkhize et al., 2022). Similarly, in Kenya, (Murenga, 2019) identified theft, alongside drug and alcohol abuse, as the most common offences at Egerton University's Njoro campus. The same study further reported that 86.5% of students considered property theft to be their greatest security concern. In Uganda, universities such as Makerere University continue to experience incidents of theft and unauthorized access despite existing security

measures(Mugisha, 2018). These challenges are likely to be even more pronounced at the college or school level, including within the School of statistics and planning but there is insufficient statistical evidence about which crimes are most prevalent among students in this specific setting and how frequently they occur. Therefore, this study addresses this gap by examining the most prevalent and types of crimes experienced by students at the School of statistics and planning, Makerere University

2.3 Security Personnel and Crime Occurrence

Security personnel deployment is one of the most widely used measures for preventing crime in universities. Their visible presence serves as a deterrent by signalling to potential offenders that an area is under surveillance and that the likelihood of detection and apprehension is high, thereby discouraging criminal activity(Fennelly, 2012).

Empirical studies support the effectiveness of security personnel in reducing crime. (Ratcliffe et al., 2011) found that deploying additional foot patrol officers in crime hotspots significantly reduced violent crime, demonstrating that a visible security presence can effectively deter criminal behaviour. Similarly, (Wakefield, 2003) reported that private security personnel in public spaces contributed to reductions in theft and disorder. However, the study also noted that their effectiveness depended on appropriate management, adequate supervision, and active patrol of assigned areas.

In African universities, the effectiveness of security personnel is often constrained by inadequate staffing, limited training, and insufficient resources. (Mofokeng & Tlou, 2022) observed that university security personnel are frequently underpaid, inadequately trained, and too few in number to provide effective campus-wide security. Similarly, (Molokomme, 2025)

found that security guards in South African universities often lacked adequate emergency response training, limiting their capacity to prevent and respond effectively to criminal incidents. In Kenya, (Mwangi et al., 2024) documented that theft, burglary, and even large-scale violent attacks have continued to occur in public universities despite the presence of security personnel. In Uganda, (Mugisha, 2018) noted that security guards at Makerere University are primarily stationed at the main gates and administrative buildings, leaving academic buildings and student residential areas with relatively limited security coverage.

At the School of statistics and planning, students have reported that security personnel are few with limited patrols, particularly during the evening hours which may create opportunities for criminal activity. Therefore, this study examines the relationship between the availability of security personnel and crime prevention at the School of statistics and planning.

2.4 CCTV Camera Coverage and Crime Occurrence

Closed-circuit television (CCTV) cameras are widely used in universities as a crime prevention measure. They deter potential offenders by increasing the perceived risk of being detected while also providing recorded evidence to support investigations of criminal incidents (Farrington & Welsh, 2017). A systematic review by (Welsh & Farrington, 2009) found that CCTV reduced crime by an average of 16%, particularly in enclosed areas such as parking lots. Similarly, (McCahill & Norris, 2019) reported that CCTV improved students' and staff members' perceptions of safety, although the actual reduction in crime varied across settings.

The effectiveness of CCTV depends on factors such as camera visibility, functionality, and continuous monitoring (Clarke, 2013). Cameras that are poorly maintained or not actively

monitored have limited deterrent value. In Kenya, (Kerich et al., 2024) found that electronic surveillance systems in educational institutions contributed to improved security only when they were properly maintained and regularly monitored. In Uganda, (Nabwire, 2020) observed that CCTV adoption in universities remains limited, with surveillance often concentrated at main entrances and administrative buildings, leaving academic blocks and residential areas with inadequate coverage.

At the School of statistics and planning, CCTV cameras have been installed in selected locations, but questions remain regarding their functionality and the adequacy of their coverage. Areas such as computer laboratories, offices, and surrounding pathways may not be fully monitored, potentially reducing the effectiveness of CCTV in preventing crime. This study therefore examines the relationship between the functionality and coverage of CCTV cameras and crime prevention at the School of statistics and planning.

2.5 Lighting Conditions and Crime Occurrence

Adequate lighting is widely recognized as one of the most cost-effective environmental measures for preventing crime. Well-lit environments increase visibility, making it more difficult for offenders to conceal their activities while enabling potential victims to identify threats and seek assistance. (Farrington & Welsh, 2017), in a meta-analysis of 13 studies, found that improved street lighting reduced overall crime by approximately 20%. They argued that, beyond improving visibility, better lighting enhances community confidence and signals that an area is actively maintained and monitored.

Studies conducted in university settings also highlight the importance of adequate lighting for campus safety. (Nellis, 2009) found that students, particularly female students, perceived

poorly lit areas as unsafe and often avoided using pathways and parking areas at night. Such avoidance can limit access to campus facilities and increase feelings of insecurity. Similarly, (Cozens et al., 2005) reported that well-lit environments, as a key principle of Crime Prevention Through Environmental Design (CPTED), are effective in reducing opportunistic crimes such as theft.

At the School of statistics and planning, Makerere University, some pathways, parking areas, open spaces, and areas beneath trees have been identified by students as inadequately lit, particularly during the evening hours. Poor lighting in these locations may reduce natural surveillance and create opportunities for criminal activity. This study therefore examines the relationship between the adequacy of campus lighting and crime prevention at the School of statistics and planning.

2.6 Research Gaps

The reviewed literature shows that campus crime is a persistent challenge globally with security measures such as security personnel, CCTV surveillance, security patrols and adequate lighting contributing to crime prevention. However, most existing related studies have been conducted in countries outside Uganda which have largely focused on universities in general rather than specific schools or college level. In Uganda, the available literature largely describes campus security challenges without providing quantitative evidence on the effectiveness of individual security measures and specific types of crimes experienced by students within particular academic units. At the School of statistics and planning, Makerere University, there is limited empirical evidence on the prevalence and types of crime experienced by students and on how security personnel, CCTV camera coverage, and lighting

conditions influence crime occurrence. Therefore, this study seeks to fill this gap by examining the prevalence and types of crime and assessing the relationship between selected security measures and crime occurrence

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter explains in detail how the study was carried out. It describes the research design, the study area, the target population, sampling methods, the data collection instrument, procedures for data collection, and the methods of data analysis.

3.2 Research Design

This study uses a quantitative, cross-sectional survey design. A quantitative design was chosen because the study aims to measure and statistically test relationships between security measures and crime occurrence, which requires numerical data. A cross-sectional design means that data is collected from respondents at one point in time, which is appropriate for this study given the time and resource constraints of an undergraduate research project

Because the dependent variable, whether a student had witnessed a crime, is binary (yes/no), a categorical-data approach was adopted for the inferential analysis. Chi-square tests of independence were used to examine bivariate associations between each security measure and crime occurrence, while binary logistic regression was used to test the hypotheses on the combined effect of security personnel, CCTV coverage, and lighting on the odds of witnessing crime.

3.3 Target population

The target population comprised all undergraduate students enrolled in the School of statistics and planning, Makerere University, during the 2025/2026 academic year. The population

included students pursuing Bachelor of Statistics, Bachelor of Quantitative Economics, Bachelor of Actuarial Science, and Bachelor of Population Studies across Years One, Two, and Three, with a total enrolment of 1,355 students.

Table 3.1 students enrolled for different courses at SSP 2025/26

Programme	Year 1	Year 2	Year3	Total
Bachelor of Population Studies	111	83	66	260
Bachelor of Actuarial Science	107	78	117	302
Bachelor of Quantitative Economics	161	125	152	438
Bachelor of Statistics	127	106	122	355
Total	506	302	457	1355

3.4 Sample Size determination

The sample size for this study was determined using Yamane's (1967) formula, which provides a simplified method for calculating sample size from a finite population at a specified level of precision. The formula is expressed as:

$$n = \frac{N}{1 + N * e^2}$$

Where;

- **n** = required sample size
- **N** = population size

- e = margin of error

The formula yielded a minimum sample size of approximately 309 respondents. However, due to practical considerations such as time and financial constraints, the researcher adopted a sample size of 300 respondents, which is very close to the statistically recommended sample size and is considered adequate to provide reliable and representative results for the study. The reduction from 309 to 300 respondents decreases the sampling fraction from 22.8% to 22.1% of the target population, the margin of error changes from 5 % to approximately 5.1% at a 95% confidence level which has negligible effect on the reliability of parameter estimates. The difference of nine respondents (approximately 2.9% decrease) is negligible and does not materially affect the precision of the findings..

3.5 Sampling Technique

The study employed stratified random sampling to select respondents from the target population. The population was divided into three strata based on the year of study: Year One, Year Two, and Year Three. An equal sample of 100 students was selected from each stratum, giving a total sample size of 300 respondents. Within each stratum, respondents were selected using simple random sampling to ensure that every student had an equal chance of being included in the study. This technique ensured adequate representation of students from all years of study.

3.6 Data collection instrument

Data for this study were collected using a structured questionnaire designed by the researcher based on the study objectives. The questionnaire was designed, deployed and administered electronically using Kobo Toolbox (Kobo Collect). It consisted mainly of closed-ended

questions to enable respondents to provide standardized responses that could easily be coded, entered, and analysed statistically. The use of Kobo Toolbox facilitated efficient data collection and secure storage of responses.

3.7 Data Analysis

Data collected through the Kobo Toolbox questionnaire were analysed using the Statistical Package for the Social Sciences (SPSS) version 26 and Stata. Because the dependent variable, whether a student had witnessed a crime, is binary, the analysis plan combined descriptive statistics, chi-square tests of independence, and binary logistic regression. The following methods were used:

- Descriptive (univariate) statistics: Frequencies and percentages were used to summarize respondents' background characteristics (e.g. gender), the prevalence and types of crime witnessed, and perceptions of security personnel availability, CCTV coverage, lighting, and night patrols. This provided an overall picture of the security situation as perceived by students at the School of statistics and planning.
- Bivariate analysis (Pearson chi-square test of independence): This was used to test H01 and H02 by examining whether there was a statistically significant association between each individual security measure (security personnel availability, CCTV camera availability) and whether a student had witnessed a crime. Cross-tabulations with row/column percentages were produced alongside each chi-square statistic and its associated p-value.
- Binary logistic regression: Because the outcome variable (witnessed crime: yes/no) is dichotomous, a binary logistic regression model was used, rather than multiple linear

regression, to determine how security personnel availability, CCTV camera availability, and street/security lighting jointly predict the odds of a student witnessing crime, holding the other predictors constant. This tested H03 and H04. The model is specified as:

$$\text{logit}(p) = \ln[p / (1 - p)] = \beta_0 + \beta_1(\text{Security Personnel}) + \beta_2(\text{CCTV Coverage}) + \beta_3(\text{Lighting: all areas}) + \beta_4(\text{Lighting: some areas}) + \varepsilon$$

where p is the probability that a student witnessed a crime. Coefficients (β) were converted to adjusted odds ratios ($\text{AOR} = e^{\beta}$) to aid interpretation: an AOR above 1 indicates increased odds of witnessing crime, while an AOR below 1 indicates a protective (crime-reducing) effect, relative to the reference category.

A significance level of 0.05 ($p < 0.05$) was used throughout the analysis. Results are presented using tables and written interpretation to make them accessible and easy to understand.

3.8 Validity and Reliability

3.8.1 Validity

To ensure content validity, the questionnaire items were developed based on the study objectives and the literature reviewed in Chapter Two. The questionnaire was reviewed by the research supervisor and two other academic staff members familiar with security research, who confirmed that all key variables were adequately covered and that the questions were clear and appropriate for the student respondents.

3.8.2 Reliability

In this study, the reliability of the questionnaire was assessed to ensure that the items used to measure campus security measures and crime occurrence produced consistent results. A pilot study was conducted among 30 undergraduate students from the School of Statistics and Planning who were not included in the final sample. The pilot respondents were selected to evaluate the clarity, consistency, and suitability of the questionnaire items before the main data collection.

The internal consistency of the questionnaire items was assessed using Cronbach's Alpha coefficient. The reliability analysis was conducted for items measuring key study constructs, including security personnel availability, CCTV camera coverage, lighting conditions, and students' experiences of crime occurrence. The reliability assessment ensured that the questionnaire was appropriate for collecting valid and consistent data on the relationship between security measures and crime occurrence at the School of Statistics and Planning, Makerere University.

3.9 Ethical Considerations

The study followed all ethical guidelines for research involving human participants. Participation in the study was entirely voluntary, and respondents were free to withdraw at any time without any consequences. The online questionnaire on KoboToolbox was anonymous; no names, student numbers, or identifying information was collected. Permission to carry out the study was formally sought from the School of Statistics and Planning, Makerere University. Data collected was stored securely on a password-protected device and was only accessed by the researcher.

CHAPTER FOUR

RESULTS AND FINDINGS

4.1 Univariate statistics

4.1.1 Crime rate prevalence

The results show that more than half of the respondents (58.3%) reported having witnessed a crime, while 41.7% indicated that they had not. This suggests that witnessing crime is relatively common among the surveyed population.

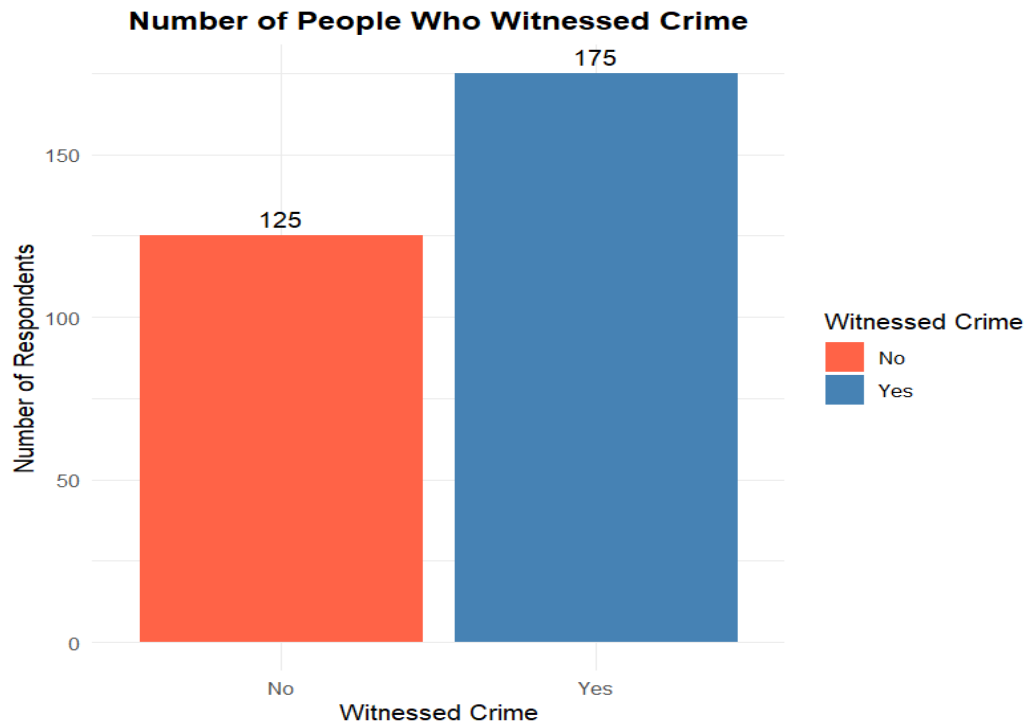


Figure 4. 1: Number of people who witnessed crime

4.1.2 Types of Crime witnessed.

The pie chart below shows that theft is the most commonly witnessed crime at 43.4%, making up nearly half of all responses. Assault and physical attacks account for 24.5%, showing a

significant level of exposure to violent crime, though less common than theft. Burglary or breaking into rooms makes up 17.2%, representing a moderate level of property intrusion cases. Vandalism stands at 13.1%, indicating fewer but still present cases of property damage. Cybercrimes are the least witnessed at 1.7%, suggesting they are rare or less visible compared to other types of crime.

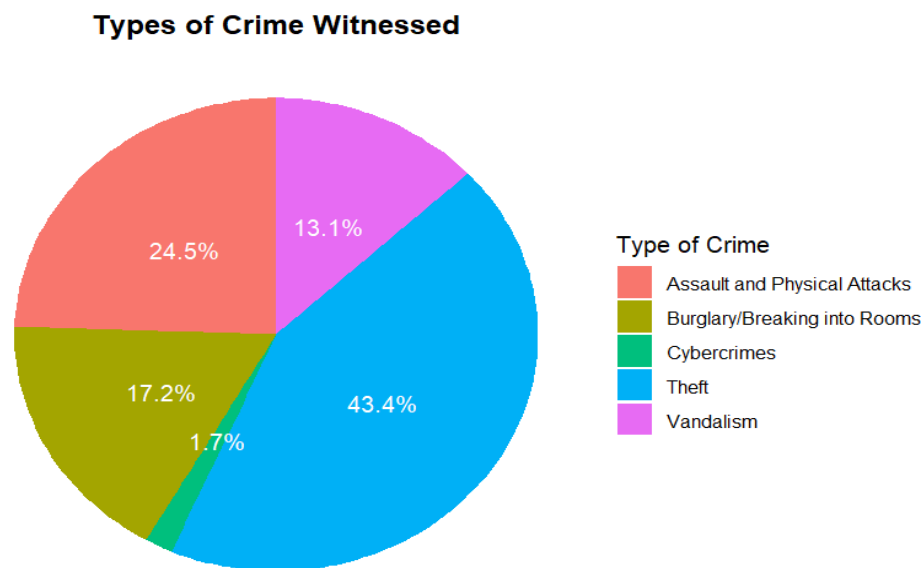


Figure 4. 2: Types of crime witnessed

4.1.3 Frequency and proportions

Overall, the sample is slightly dominated by females (56.3%) compared to males (43.7%). Most security-related issues are concentrated around specific times and locations, with nighttime (53.0%) being the period when most incidents are reported, followed by both day and night (39.0%), indicating that risks are not limited to a single time but increase significantly after dark.

In terms of locations, hostels and halls (68.0%) are identified as the most affected areas, followed by parking lots (30.9%). This suggests that residential and less controlled spaces within campus are the most vulnerable.

On security conditions, although a large proportion of respondents reported the presence of general security (81.0%) and CCTV cameras (80.3%), there are still notable gaps. The absence of night patrols (71.3%) stands out as a major concern, especially given that most incidents occur at night.

Table 4. 1Univariate statistics for the different variables

Category	Response	Frequency	Percentage/Note
Gender	Male	131	43.7%
	Female	169	56.3%
Time of crime occurrence	Nighttime	92	53.0%
	Both day & night	69	39.0%
	Daytime	14	8.0%
Areas prone to crimes	Hostel/Halls	119	68.0%
	Parking lots	54	30.9%
	Library	23	13.1%

	Open spaces	17	9.7%
Security availability	Yes	243	81.0%
	No	57	19.0%
Night patrols conducted	Yes	86	28.7%
	No	214	71.3%
CCTV cameras	Yes	241	80.3%
	No	59	19.7%
Lighting availability	Yes, all areas	11	3.7%
	Some areas	145	48.3%
	Very limited	144	48.0%

Lighting conditions also appear problematic. Only a very small proportion (3.7%) reported full lighting coverage, while the majority indicated that lighting is either available in some areas (48.3%) or very limited (48.0%). This is particularly alarming because poor lighting is concentrated in high-risk areas such as parking lots (166 responses) and spaces under trees (176 responses), which are known to reduce visibility and increase vulnerability. Overall, while security infrastructure such as personnel presence and CCTV cameras is relatively available, key weaknesses remain in night patrols and adequate lighting

4.2 Bivariate statistics

4.2.1 CCTV availability and witnessing crime.

Table 4. 2Relationship between CCTV camera availability and witnessing crime

Witnessed crime	CCTV not available,n (%)	CCTV available ,n(%)	total
No	29(23.2)	96(76.8)	125
Yes	30(17.1)	145(82.9)	175
Total	59(19.7)	241(80.3)	300

Chi-square value: $\chi^2(1) = 1.33, p = 0.249$

Overall, 241 (80.3%) students reported that CCTV cameras were available on campus, while 59 (19.7%) reported that CCTV cameras were not available. Among students who reported the availability of CCTV cameras, 145 (60.2%) had witnessed a crime in areas with cameras, whereas 96 (39.8%) had not witnessed a crime. Among students who reported that CCTV cameras were not available, 30 (50.8%) had witnessed a crime and 29 (49.2%) had not witnessed a crime.

The Pearson chi-square test indicates that the association between witnessing crime and CCTV camera availability was not statistically significant ($\chi^2(1) = 1.33, p = 0.249$). This indicates that within this study, the availability of CCTV cameras was not significantly associated with students' reports of witnessing crimes. These findings indicate that crimes were more frequently witnessed in areas where CCTV cameras were reported to be available because these are areas prone to crimes that CCTV cameras are placed. However, because the association was not statistically significant, there is insufficient evidence to conclude that

CCTV camera coverage is related to crime occurrence among students at the School of statistics and planning.

4.2.2 Security availability and crime occurrence

Among students who reported that security personnel were available on campus, 146 (60.3%) had witnessed a crime, while 97 (39.7%) had not witnessed a crime. In contrast, among students who reported that security personnel were not available, 29 (50.9%) had witnessed a crime and 28 (49.1%) had not witnessed a crime. A Pearson's chi-square test of independence was conducted to assess the relationship between the availability of security personnel and crime occurrence at the School of statistics and planning. The analysis showed that the association was not statistically significant ($\chi^2(1) = 1.25, p = 0.263$). These findings indicate that the reported availability of security personnel was not significantly associated with crime occurrence among students

Table 4. 3: Relationship between security availability and crime occurrence

Availability of security personnel	Crime witnessed, n (%)	Crime not witnessed, n (%)	Total
Available	146 (60.3)	97 (39.7)	243
Not available	29 (50.9)	28 (49.1)	57
Total	175 (58.3)	125 (41.7)	300

4.3 Logistic regression

A binary logistic regression analysis was conducted to examine the relationship between campus security measures and the likelihood of students witnessing crime at the School of statistics and planning, Makerere University. The dependent variable was whether a student had witnessed a crime (yes/no). The independent variables included the availability of security personnel, CCTV cameras, and street/security lighting. The model was used to estimate adjusted odds ratios (AORs), which show the effect of each security factor on the odds of witnessing crime while controlling for the other variables in the model. A significance level of 0.05 was used to determine statistical significance.

Table 4. 4: Model summary

Statistic	Value
Number of observations	300
LR χ^2 (4)	18.55
p-value	0.001
Log likelihood	-194.4832
McFadden's Pseudo R ²	0.0455
Hosmer–Lemeshow χ^2 (3)	0.54
Hosmer–Lemeshow p-value	0.9093
Area under ROC curve (AUC)	0.609
Overall classification accuracy	62.33%

Diagnostic tests were conducted to assess the adequacy of the logistic regression model. The overall model was statistically significant (LR $\chi^2(4) = 18.55$, $p = 0.001$), indicating that the explanatory variables jointly contributed to predicting whether crime was witnessed. The Hosmer–Lemeshow goodness-of-fit test was not statistically significant ($\chi^2 = 0.54$, $p = 0.909$), suggesting that the model adequately fitted the observed data. The link test showed that the predicted value ($\hat{\mu}$) was statistically significant ($p = 0.002$), while the squared predicted value ($\hat{\mu}^2$) was not significant ($p = 0.859$), indicating no evidence of model

misspecification. The model correctly classified 62.33% of the observations. The area under the ROC curve was 0.609, indicating poor to fair discriminatory ability

Table 4. 5: Model coefficients

Variable	β	p-value	Adjusted Odds Ratio (AOR)	95% CI for Odds Ratio
Security personnel available (Yes vs No)	0.421	0.173	1.523	0.829–2.798
CCTV cameras available (Yes vs No)	0.380	0.207	1.462	0.810–2.640
Street/security lights available in all areas (vs very limited lighting)	-2.622	0.014	0.073	0.009–0.596
Street/security lights available in some areas (vs very limited lighting)	0.376	0.128	1.456	0.895–2.369
<i>Constant</i>	-0.658	0.052	0.518	0.267–1.006

The availability of security personnel was associated with higher odds of witnessing crime (AOR = 1.52), meaning students in areas with security personnel were more likely to report having witnessed crime compared to those in areas without security personnel. However, this relationship was not statistically significant ($p = 0.173$), indicating that the evidence is insufficient to conclude a real effect.

Similarly, the presence of CCTV cameras was associated with increased odds of witnessing crime (AOR = 1.46), but this association was also not statistically significant ($p = 0.207$). This suggests that CCTV coverage alone did not significantly influence whether students witnessed crime or not.

In contrast, street/security lighting availability in all areas showed a strong and statistically significant protective effect. Students in well-lit areas had 93% lower odds of witnessing crime (AOR = 0.07, $p = 0.014$) compared to those in areas without lighting. This indicates that adequate lighting is significantly associated with reduced crime occurrence or visibility. However, having lighting in only some areas was not significantly associated with crime ($p = 0.128$), suggesting that partial lighting may be insufficient to reduce crime effectively

CHAPTER FIVE

DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Discussion of findings

This study examined the relationship between campus security measures and crime occurrence at the School of statistics and planning and Planning, Makerere University. Specifically, the study investigated the prevalence and types of crime witnessed by students, assessed the relationship between security personnel availability and crime occurrence, examined the relationship between CCTV camera coverage and crime occurrence, and determined the joint effect of security personnel, CCTV cameras, and lighting conditions on the likelihood of students witnessing crime.

5.1.1 Prevalence and Types of Crime

The study established that 58.3% of the respondents had witnessed crime, indicating that crime occurrence is relatively common within the School of statistics and planning and Planning. Theft emerged as the most frequently witnessed crime (43.4%), followed by assault (24.5%), burglary (17.2%), vandalism (13.1%), while cybercrime was least reported (1.7%).

These findings are consistent with the studies that suggests that students remain vulnerable despite the existence of several security measures.

Furthermore, most respondents indicated that crimes occurred predominantly during the night and in hostels, halls of residence and parking areas. This supports the Crime Prevention Through Environmental Design (CPTED) theory, which emphasizes that environmental

conditions such as poor lighting and limited surveillance create opportunities for criminal activity.

5.1.2 Security Personnel and Crime Occurrence

The chi-square analysis revealed that there was no statistically significant relationship between the availability of security personnel and crime occurrence ($\chi^2 = 1.25$, $p = 0.263$). Similarly, the logistic regression model showed that although the presence of security personnel increased the odds of witnessing crime (AOR = 1.52), the relationship was not statistically significant ($p = 0.173$).

These findings imply that merely deploying security personnel may not be sufficient to deter crime effectively. One possible explanation is that security personnel are concentrated at entry points and administrative buildings rather than in areas where crimes frequently occur, such as hostels, parking lots, and isolated walkways.

The findings agree with (Mugisha, 2018), who observed that university security personnel in Uganda are mainly stationed at strategic entry points, leaving several academic and residential areas inadequately protected. They also support (Mofokeng & Tlou, 2022), who argued that insufficient staffing, inadequate training and poor deployment reduce the effectiveness of university security personnel.

5.1.3 CCTV Camera Coverage and Crime Occurrence

The finding that CCTV availability was not significantly associated with crime occurrence ($\chi^2 = 1.33$, $p = 0.249$) and was not a significant predictor in logistic regression (AOR = 1.46, $p = 0.207$) may be explained by the fact that the presence of cameras alone does not always prevent crime. CCTV systems are more effective when they are strategically placed, actively

monitored, and supported by quick responses from security or law enforcement. In some cases, cameras are installed in areas that already have high crime levels, which may make it appear that CCTV is linked with more crime when it is actually a response to existing risks(Piza et al., 2019). Although more than 80% of respondents reported that CCTV cameras were available, crimes continued to occur in areas where cameras were installed. This suggests that camera availability alone does not necessarily prevent crime. It is possible that cameras are inadequately monitored, poorly positioned, or not fully functional.

These findings are partly consistent with (McCahill & Norris, 2019) , who reported that CCTV mainly improves perceptions of safety rather than consistently reducing crime. Similarly, (Kerich et al., 2024) emphasized that CCTV systems only become effective when continuously monitored and properly maintained.

5.1.4 Lighting Conditions and Crime Occurrence

Lighting emerged as the only security measure that significantly influenced crime occurrence. Students studying in areas with adequate lighting had 93% lower odds of witnessing crime compared to those in areas without lighting (AOR = 0.07, $p = 0.014$). This finding demonstrates that adequate lighting substantially reduces opportunities for crime by improving visibility, increasing natural surveillance and discouraging offenders from operating in exposed environments. The findings strongly agree with (Farrington & Welsh, 2017), who found that improved lighting significantly reduces crime across different settings. They are also consistent with (Cozens et al., 2005), who identified proper lighting as one of the most effective CPTED strategies for crime prevention. Since almost half of the respondents reported that lighting was either limited or only available in some areas, improving campus lighting

presents one of the most practical interventions for reducing crime within the School of statistics and planning and Planning.

5.1.5 Joint Effect of Security Measures

The logistic regression model showed that, after controlling for other security measures, only adequate lighting remained statistically significant. Neither security personnel nor CCTV cameras significantly predicted crime occurrence. These findings suggest that environmental security measures may currently have a greater influence on crime prevention than surveillance technologies or personnel deployment. This may be because lighting directly improves visibility across all users of the campus, whereas the effectiveness of security personnel and CCTV depends heavily on deployment strategies, monitoring, staffing levels and maintenance. Overall, the findings indicate that improving lighting throughout campus is likely to yield greater reductions in crime than merely increasing the number of guards or CCTV cameras without addressing operational effectiveness.

5.2 Conclusion

The study sought to analyse the relationship between campus security measures and crime occurrence at the School of statistics and planning and Planning, Makerere University. The findings revealed that crime remains relatively common within the school, with theft being the most frequently witnessed crime. Most incidents were reported to occur during nighttime and within hostels, parking areas and other poorly lit locations.

Although security personnel and CCTV cameras were widely available, neither measure showed a statistically significant relationship with crime occurrence. Their presence alone therefore appears insufficient to prevent students from witnessing crime. Conversely, adequate

lighting across all campus areas significantly reduced the likelihood of crime occurrence. This finding highlights the critical importance of environmental design in improving campus safety.

The study therefore concludes that improving campus lighting should be prioritized alongside strengthening the effectiveness of existing security personnel and CCTV systems. An integrated security strategy combining environmental improvements, active surveillance, effective patrols and routine monitoring is likely to provide greater protection for students and university property.

5.3 Recommendations

Based on the study findings, the following recommendations are made:

To Makerere University Management

- Improve lighting across all academic buildings, hostels, parking areas, walkways and spaces under trees where students identified poor visibility.
- Replace faulty security lights and establish routine maintenance schedules to ensure continuous illumination.

To the University Security Department

- Increase night patrols since most crimes were reported to occur after dark.
- Deploy security personnel according to crime hotspots rather than concentrating them only at main entrances.
- Introduce regular patrol schedules around hostels, parking lots and isolated pathways.

Regarding CCTV Surveillance

- Ensure all CCTV cameras remain functional through regular maintenance.
- Increase camera coverage in identified crime-prone areas.
- Establish continuous monitoring of CCTV footage to facilitate timely response to criminal incidents.

To Students

- Report suspicious activities promptly to university security.
- Avoid walking alone through poorly lit areas at night.
- Secure valuable personal property, particularly laptops and mobile phones.

For Future Researchers

Future studies should:

- include several colleges or the entire university for broader generalization;
- investigate additional determinants of campus crime such as access control systems, student behaviour, alcohol consumption and emergency response mechanisms;
- employ longitudinal research designs to examine changes in crime patterns over time.

5.4 Limitations of the study

The study experienced several limitations that should be considered when interpreting the findings.

First, the study relied on self-reported information from students. Respondents may have forgotten previous crime incidents or provided socially desirable responses, introducing recall and response bias.

Secondly, the study was conducted only at the School of statistics and planning and Planning, Makerere University. Therefore, the findings may not be fully generalizable to other schools, colleges or universities with different security environments.

Finally, the study focused on selected security measures security personnel, CCTV cameras and lighting conditions. Other factors that may influence campus crime, such as access control systems, student behaviour, police response time, alcohol and drug use, and security awareness, were not included in the analysis.

REFERENCES

- Bromley, M. L. (2007). The evolution of campus policing: Different models for different eras. *Campus Crime: Legal, social, and policy perspectives*, 2, 280–303.
- Clarke, R. V. (2013). Situational crime prevention. In *Environmental criminology and crime analysis* (pp. 200–216). Willan.
- Cozens, P. M., Saville, G., & Hillier, D. (2005). Crime prevention through environmental design (CPTED): a review and modern bibliography. *Property management*, 23(5), 328–356.
- Farrington, D. P., & Welsh, B. C. (2017). *Effects of improved street lighting on crime: a systematic review* (Vol. 251). Home Office London.
- Fennelly, L. J. (2012). *Handbook of loss prevention and crime prevention*. Elsevier.
- Fisher, B., Sloan, J., Cullen, F., & u, C. (2010). Crime in the ivory tower: The level and sources of student victimization. , 671–710.
- Kerich, N., Omuterema, S. O., & Pepela, M. M. (2024). Evaluating the role of electronic security surveillance in enhancing safety in secondary schools: A case study of Trans Nzoia County, Kenya. *African Journal of Empirical Research*, 5(4), 163–173–163–173.
- McCahill, M., & Norris, C. (2019). CCTV in Britain. *Center for Criminology and Criminal Justice-University of Hull-United Kingdom*, 1–70.

- Mkhize, S., Cinini, S. F., & Ngcece, S. (2022). University campuses and types of crime: A case study of the university of KwaZulu-Natal/Howard campus in the city of Durban-South Africa. *Cogent Social Sciences*, 8(1), 2110199.
- Mofokeng, J. T., & Tlou, K. N. (2022). Towards development of security and safety education support sustainability regime to tackle gender-based violence and femicide on campuses. *OIDA International Journal of Sustainable Development*, 15(01), 23–38.
- Molokomme, R. T. (2025). Examining fatigue and workflow disruptions with strategic interventions for enhanced performance of police officers in the South African Police Service. *Interciencia Journal*, 50(1), 3–26.
- Mugisha, R. (2018). Campus security challenges in Ugandan universities.
- Murenga. (2019). Common types of crime and deviance among university students in Kenya: The case of Njoro campus of Egerton University. *Advances in Social Sciences Research Journal*.
- Mwangi, M. J., Auya, S., & Bor, E. (2024). Effect of Emergency Preparedness on Security in Kenyan Universities: A Case Study of Garissa University. *European Journal of Development Studies*, 4(4), 56–61.
- Nabwire, S. (2020). Technology and campus security in East African universities: Current status and challenges. 14–29.
- Nellis, A. M. (2009). Gender differences in fear of terrorism. *Journal of Contemporary Criminal Justice*, 25(3), 322–340.

- Piza, E. L., Welsh, B. C., Farrington, D. P., & Thomas, A. L. (2019). CCTV surveillance for crime prevention: A 40-year systematic review with meta-analysis. *Criminology & public policy*, 18(1), 135–159.
- Ratcliffe, J. H., Taniguchi, T., Groff, E. R., & Wood, J. D. (2011). The Philadelphia foot patrol experiment: A randomized controlled trial of police patrol effectiveness in violent crime hotspots. *Criminology*, 49(3), 795–831.
- Wakefield, A. (2003). Selling Security: The Private Policing of Public. *Space*.
- Welsh, B. C., & Farrington, D. P. (2009). Public area CCTV and crime prevention: an updated systematic review and meta-analysis. *Justice quarterly*, 26(4), 716–745.

APPENDICES

Appendix i: Questionnaire

ANALYSIS OF THE RELATIONSHIP BETWEEN SECURITY M...

<https://ee.kobotoolbox.org/preview/i/g4ay68wo>

ANALYSIS OF THE RELATIONSHIP BETWEEN SECURITY MEASURES AND CRIME OCCURRENCE AT SCHOOL OF STATISTICS AND PLANNING

Dear Participant, My name is Desire Atwiine, a final year student offering bachelor of statistics at Makerere University. I am conducting a study titled " Analysis of the Relationship Between Security Measures and Crime Occurrence at school of statistics and planning" The purpose of this study is to examine how different security measures, such as security personnel, CCTV cameras, lighting, and patrols, influence crime occurrence on campus. Your participation in this survey is voluntary, and all responses will remain strictly anonymous and confidential. The information you provide will be used solely for academic purposes and will contribute to improving understanding of campus security. Thank you for your time and cooperation.

Do you consent to participate in this study?

- ☐ Yes
☐ No

SECTION A: DEMOGRAPHIC INFORMATION

Gender

- ☐ Male
☐ Female

Age

- ☐ 18 - 20
☐ 21 - 25
☐ 26 - 30
☐ Above 30

Year of study

- ☐ Year one
☐ Year two
☐ Year three

Place of Residence

- ☐ on-campus
☐ Off-campus

SECTION B: CRIME OCCURANCE

Have you ever experienced/witnessed any crime on ever since you joined campus?

- ☐ Yes
☐ No

Which type of crime is most common?

- ☐ Theft
☐ Assault and physical attacks
☐ Vandalism(damaging university property)
☐ Burglary/ Breaking into rooms
☐ cyber crimes

How many times have you ever experienced/witnessed a crime ever since you joined campus?

When do most crimes occur?

- ☐ Day time
☐ Night time
☐ Both daytime and Night time
☐ not sure

Which areas are more prone to crimes?

- ☐ Hostels
☐ Lecture rooms
☐ Library
☐ parking lots
☐ open spaces

SECTION C: SECURITY PERSONNEL

Are security personnel available at campus?

- ☐ Yes
☐ No
☐ not sure

How often do you see security personnel on campus?

- ☐ Sometimes
☐ often
☐ Rarely
☐ never

Do security personnel respond accordingly in event of crime occurrence?

- ☐ Yes
- ☐ No
- ☐ Not sure

Are security patrols conducted on campus?

- ☐ Yes
- ☐ No

Are patrols more frequent at night?

- ☐ yes
- ☐ No

SECTION D: CCTV CAMERA COVERAGE

Are there CCTV cameras on campus?

- ☐ yes
- ☐ no

Are CCTV cameras functional?

- ☐ Yes
- ☐ No
- ☐ Not sure

Do CCTV cameras help reduce crime?

- ☐ Yes
- ☐ No
- ☐ Not sure

ISECTION E: LIGHTING CONDITIONS

Are streetlights and security lights available in most areas of the campus?

- ☐ Yes, in all areas
- ☐ Yes, in some areas
- ☐ No, they are very limited
- ☐ Not sure

Have you ever experienced or witnessed a crime in poorly lit areas?

- ☐ Yes
☐ No
☐ Not sure

Do you feel safe walking at night?

- ☐ Yes
☐ No

Which areas are poorly lit on campus?

- ☐ Pathways/walkways
☐ Parking lots
☐ open space
☐ Areas covered by trees
☐ other

please specify

Which security measure(s) is most effective?

- ☐ Security personnel
☐ CCTV cameras
☐ lighting conditions
☐ security patrols

What should be improved to reduce crime?

- ☐ Increase security personnel
☐ Install more CCTV cameras
☐ Improve lighting
☐ Increase patrols

THANK YOU FOR YOUR TIME
