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Informal Sector's Response to Shocks: Lessons from Kenya

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Kenya Institute for Public Policy
Research and Analysis

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Abstract

The informal sector, often characterized by small scale enterprises, is prone to diverse shocks that pose a threat to their survival. The sector employs most of the people in developing countries such as Kenya. Using World Bank Informal Enterprise 2013 Survey data, this study identified some of the shocks that informal enterprises face, and how the sector responds to them by adopting various coping mechanisms. The study identified three shocks: losses due to crime, harassment by government officials or police, and power outages. The enterprises responded to loss due to crime by paying for private security. Harassed businesses intended to formalize their businesses as a coping mechanism, whereas those facing power outages used generators to cope with the outages. Loses due to crime were influenced by the location of business, gender of the main owner, sector of operation, and ownership of the business location. Harassment of the enterprises was influenced by the region of operation, education level of the owner, age of the business, and ownership of the location. On the other hand, power outage shock was influenced by location, sector, age of the business, and ownership of the location. Overall, the shocks led to lower returns on investment for the informal enterprises. To enhance the enterprises' shock coping mechanisms while reducing the incidences of the shocks, the study makes both policy and enterprise initiative recommendations. Overall, the informal enterprise owners need sensitization on risk and risk mitigating measures, especially for owners with lower levels of formal education. This can be done by both private and public sector actors seeking to enhance the quality of jobs and returns for people employed in the informal sector. To mitigate losses due to crime, the government could consider beefing up security in areas where the informal enterprises operate, while informal enterprise operators can supplement this by coming together to hire private security. The enterprises could also use modern technologies such as Closed Circuit TV (CCTV) to keep records of incidences of crime. To address cases of harassment by government officials, the study recommends that there should be a reliable and elaborate framework for reporting and dealing with genuine cases of harassment. This can be spearheaded by both the national and county governments. To address power outages, the government together with development partners could come up with a model that encourages the informal enterprises to use cheaper renewable sources of energy such as solar power.

Abbreviations and Acronyms

ACCTV	Closed Circuit TV
GDP	Gross Domestic Product
GoK	Government of Kenya
IFS	Informal Enterprise Survey
ILO	International Labour Organization
KENASVIT	Kenya National Alliance of Street Vendors and Informal Traders
KNBS	Kenya National Bureau of Statistics
KRA	Kenya Revenue Authority
MSEA	Micro and Small Enterprise Authority
MTP	Medium-Term Plan
MVP	Multivariate Probit
NHIF	National Health Insurance Fund
NSSF	National Social Security Fund
PWDs	Persons with Disabilities
SGBV	Sexual Gender-Based Violence
SMEs	Small and Medium Enterprises

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1.   Introduction

1.1   Background

The informal sector is affected by unexpected occasional or seasonal events which substantially affect the operations of its enterprises. Most of these events are shocks and tend to have a drastic negative impact on the affected enterprises. Heitzmann, Canagarajah and Siegel (2002) define *shocks* as a risk that leads to a "significant" negative welfare effect, such as high income loss and major health-related costs. The Kenya National Bureau of Statistics (KNBS) defines *shocks* as an event that may trigger a decline in the well-being of an individual, community, region, or nation (KNBS, 2018a). Specific to the informal sector, some of the shocks that affect enterprises therein include violent political events, abrupt government policy changes (allocation of new work spaces), insecurity, fire, power outages and health shocks. These shocks are worsened by the enterprises' lack of proper legal documents, which leads to inhumane treatment by government officials, poor working environments with limited social amenities such as security, lighting services and proper drainage, and lack of policies directly targeting the informal small scale businesses (ACEPIS, 2018).

To survive through the effects of shocks or reduce the effect of such shocks, enterprises design or take up different coping mechanisms. Snel and Staring (2001) and Holzmann (2005) define shock coping strategies as calculated and rational strategies that individuals and households in a poor socio-economic situation, or other agents, take up to reduce the impact of a risk once it occurs. Coping mechanisms for informal enterprises can be self-initiated or initiated by external factors such as the government and development partners. Government programmes and policies which could help the informal enterprises cope with shocks tend to fail to reach small scale informal traders. This is due to lack of public awareness of the existence of such avenues. As a result, these traders tend to circumvent government-initiated coping mechanisms such as National Health Insurance Fund (NHIF), National Social Security Fund (NSSF) and affirmative action programmes and funds for the youth, women and persons with disabilities (PWDs), and prefer reaching out to their social networks to get help when shocks hit them (ACEPIS, 2018).

Despite facing diverse shocks, informal sector enterprises tend to be numerous and display their merchandise along road reserves, on the streets and in the markets. In Kenya, the informal sector accounts for 95 per cent of businesses and enterprises (World Bank, 2016; Safavian, Wimpey and Amin, 2016). Most of the businesses in the sector are unlicensed micro enterprises in trade, small manufacturing and services (KNBS, 2016). The sector activities in rural areas is

primarily in the agricultural sector. In urban areas, labour activities in the service and trade sectors (food outlets, grocery, retail general shop items, transport, clothes repair, hair salons, barbershops, shoe shinning and waste management), small manufacturing (*jua kali* such as handicrafts, artisan metal and carpentry works) provide the informal jobs (British Council, 2017). The Informal Enterprises Report by World Bank (2016) describes the informal sector in Kenya as large and growing at an exponential rate owing to the fact that jobs created annually do not match with the number of young people leaving schools. This is an indicator of increasing self-employment in the country. However, it also shows relatively low labour productivity, with majority in the population relying on less decent low earning jobs. Less decent jobs refer to employment opportunities that provide a source of livelihoods for those it employs, but the gains may not be sufficient to support acceptable fair standards of living.

Despite relatively low labour productivity amid shocks in the informal sector, Kenya is among developing countries that rely, to a large extent, on the sector to provide employment for her populace. The informal sector contributes to the country's Gross Domestic Product (GDP) indirectly through the manufacturing and wholesale and retail sectors. Over the last two decades, there has been a steady rise in total employment in the sector, rising from 3.4 million informal jobs in 1998 to 14.9 million in 2018, which was a rise by 22.5 per cent (KNBS, 2019). The KNBS (2019) Economic Survey indicated that the 14.9 million persons employed in the sector in 2018 accounted for 83.6 per cent of total employment, which was a rise by 5.4 per cent compared to 2017. In addition, out of 840,600 new jobs created, 90.7 per cent were in the informal sector (762,100 new jobs). This is attributable to a growing population in need of jobs that does not match the jobs created in the formal sector.

Given the importance of the informal sector enterprises to the country, there is need to identify practical and sustainable ways of dealing with the shocks that affect their returns. This can be informed by a study of specific shocks to inform policy directions and individual initiated coping mechanisms.

1.2   Problem Statement

Enterprises in the informal sector still face unanticipated challenges which could lead to business closure, losses or sluggish recovery (KNBS, 2016). The Global Competitiveness Report 2017-2018 ranks corruption, inadequate supply of infrastructure, crime and theft among the top problematic factors for doing business in Kenya; at number one, four and six, respectively (Schwab, 2017). In Kenya, crime-related shocks annually account for losses of almost 50 per cent of

sales in informal businesses (Safavian, Wimpey and Amin, 2016). These shocks are aggravated by lack of proper spatial plans, unresponsive policies, and lack of suitable and legal work sites as indicated by insufficient work spaces and inadequate social amenities in the sector. This further widens the existing inequalities between formal and informal businesses. Further, entrepreneurs in the sector in most cases are not aware of existing guidelines in dealing with such shocks. As a result, coping strategies are individual initiated and seem to work better than the government-initiated strategies during shocks. The individual initiated strategies include seeking solutions from social networks, such as borrowing from family and friends and investing in mitigating measures. To inform designing of appropriate policies and programmes while appreciating the diverse shocks enterprises in the informal sector face, this study sought to identify the shocks the enterprises face and determine how the enterprises cope with the shocks.

1.3   Objectives

1. To identify shocks affecting returns on investment of informal enterprises in Kenya.

2. To determine factors influencing shocks facing informal enterprises in Kenya.

3. To determine factors influencing choice of shock coping mechanisms of informal enterprises in Kenya.

1.4   Institutional Framework

The crucial role of the informal sector is guided by Kenya's institutional frameworks. The national development blueprint, the Kenya Vision 2030, seeks to transform Kenya into an industrialized middle-income country, providing a high quality life to all its citizens by the year 2030. Given that the informal sector employs the highest proportion of people in the economy and contributes to the GDP majorly through manufacturing, retail and service sectors, its role in realizing the Vision's goal needs to be prioritized. However, despite the importance of the informal sector being underscored in the KNBS 2019 Economic Survey report, it is relatively ignored in Kenya's Medium-Term Plan (MTP) III which aims to advance socio-economic development between 2018 and 2022 through the "Big Four" agenda. The MTP III aims to create an additional 1,000 manufacturing Small and Medium Enterprises (SMEs) and provide them with training to enhance their skills, access to affordable capital, access to markets and establish at least one industry in each county (Government of Kenya, 2018). This stands to benefit more formal sector

enterprises than informal enterprises, given that most informal enterprises in Kenya are classified as micro and not small or medium.

To address shocks facing workers, the Kenya National Social Protection Policy of 2011 recognizes that those in employment or self-employment need financial cushion from diverse economic, natural and social shocks. The policy seeks to ensure that workers and their dependents are cushioned against the effects of income threatening risks through social assistance to vulnerable groups, such as those in active age groups who are unable to earn sufficient incomes in the labour market. The policy identifies some schemes such as the National Social Security Fund (NSSF) and the National Hospital Insurance Fund (NHIF) for financial security and health cushioning, respectively, for both formal and informal sectors. Membership to NHIF rose by 13.7 per cent to 7.7 million in 2017/18, with membership from the informal sector rising by 23.3 per cent compared to 4.3 per cent rise from the formal sector (KNBS, 2019). This shows some more uptake of health insurance among people working in the informal sector. However, uptake of insurance policies for their businesses still remains low, given lack of necessary legal documents for the enterprises.

The sector has attracted other lesser formal institutions to cushion its workers and enterprises from shocks. These include welfare groups formed around a given activity, such as street vendors, second hand clothes sellers, and *jua kali* works. The Kenya National Alliance of Street Vendors and Informal Traders (KENASVIT) which was formed in 2005 acts as an umbrella lobby group for street vendors, traders and other types of workers in the informal sector from 12 towns in Kenya. The Alliance currently has more than 8,600 members who are members of 170 local associations. However, the ability of the informal institutions to cushion their members from shocks or help in recovery after shocks occur remains limited due to weak financial muscle and skill sets.

The institutional frameworks in Kenya not only recognize the importance of the informal sector but also show some gaps and low support, relative to the formal sector especially by the government. This could not only aggravate the shocks the sector faces but also limits adoption of more sustainable government initiated coping strategies for the shocks.

2.   Literature Review

This section provides a review of literature on global and national perspective of the informal sector, shocks affecting informal enterprises focusing on identifying the shocks, drivers of vulnerability, coping mechanisms and their implications to the informal enterprises and the economy.

2.1   Theoretical Literature

Disturbances in businesses or business environments potentially affect informal enterprises operations negatively or positively, therefore affecting returns on investment. This is often attributed to informal enterprises being small businesses, which are in most cases destabilized by both internal and external negative shocks leading to either closure of the businesses, losses or slowed operations with lesser profits (La Porta and Schleifer, 2008; Gelb et al., 2009; Kanbur, 2017). This calls for a rational choice of coping strategies to either alleviate the effect of negative shocks when they occur or reduce the impact based on the benefits and costs. The choice of whether to take up or not take a coping mechanism is essentially a discrete choice between two or more alternatives. Discrete choice models are derived under the assumption of profit or utility maximization behaviour of the decision maker. The models are used to show the relationship between the choices made and the explanatory variables without necessarily referring to how the choice was made (Train, 2002).

A decision maker n faces a choice among J alternatives. The decision maker would obtain a certain level of profit (or utility) from each alternative. In a business setup, the profit maximization theory postulates that a business enterprise makes decisions with the simple objective of maximizing profits and minimizing costs. The profits that an enterprise makes from choice J is therefore πnj, $j=1,...,J$. Therefore, the behavioural model is: choose alternative i if and only if $\pi ni > \pi nj$ $\forall j \neq i$. The researcher may not be able to observe the reasons behind the choice of given alternatives but can model the relationship between the available choices denoted as $\gamma_{nj} \forall j$ and the observable characteristics of the decision maker, the enterprise or the business environment denoted as x_{nj} (Train, 2002).

Most shock-coping choices involve a monetary expenditure aspect. Due to cash constraints indicated by low capital base, low savings and difficulties in accessing formal credit, informal enterprises tend to employ more of post-ante coping mechanisms (after shocks occur) rather than pre-cautionary ex-ante coping mechanisms such as savings and insurance. The post-ante strategies aim at smoothing consumption, unlike ex-ante which seek to smoothen income (Berloffa

and Modena 2009). Examples of ex-ante coping mechanisms include paying for private security to mitigate crime shocks, or investing in power generators to cope with power outages. However, informal enterprises mainly resort to post-ante coping mechanisms such as social networks, family members and other platforms with less stringent formality requirements to access credit when shocks such as harassment by government officials leads to losses in their businesses. Low-cost ex-ante coping mechanisms also list among the choices, including bribing government officials, evading taxes and avoiding trading in areas where they may clash with legal business over working space (La Porta and Schleifer, 2008; Webb et al., 2012). Informal businesses are often run by poor households who tend to use own labour supply to compensate losses and smoothen consumption (Berloffa and Modena, 2009). Low-cost shock-coping mechanisms can also be supported by the rational exit model, which posits that in making decisions to remain informal, entrepreneurs assess the advantages of formalization versus the demerits of operating an informal enterprise. In most cases, the informal businesses benefit by not paying taxes, use of cheap labour, and reduced cost of compliance with business law by paying bribes to government officials (Rothenberg et al., 2016).

Informed by the shock coping rationale and profit maximization objective of informal enterprises, their profit function can be specified as $\Pi_{nj}=\pi(x_{nj},s_t)$ where: s_t is the random shock in time *t* and x_{nj} is the observable characteristics of the decision maker, the enterprise or the business environment. Enterprise profits are positively correlated with positive shocks, and negatively correlated with negative shocks, such that $\partial\Pi/\partial s < 0$ for a negative shock.

2.2   Empirical Literature

2.2.1   Defining the informal sector

Definitions of informality tend to look at it from the enterprise perspective 'productivity view' or from the 'working conditions' point of view 'social protection view'. The social protection view allows informality to take place in both formal and informal enterprises as it looks at the employees' working conditions as opposed to the productivity view which mainly looks at the legality of an enterprise. The International Labour Organization (ILO) defines informal sector as the labour activities which are not 'decent'; that is, the working poor work very hard but are not recognized, recorded, protected or regulated by public authorities (ILO, 2002a). As a result, the informal sector operations are often in conflict with the regulatory authorities, but it should not be confused with trade in illegal products (ILO, 2002b). In Kenya, the World Bank Group refers to the informal sector as '*Jua kali*' where people in their different workshops make hand-made tools and

equipment, auto-parts, furniture, and handicrafts, literally under the hot sun, day in day out (World Bank Group, 2017).

2.2.2 Why the informal sector?

Literature indicates that the contribution of the informal sector to a country's economy cannot be overlooked. ILO (2014) shows that in non-agricultural employment, the informal sector contributes 82 per cent of the entire employment in Southern Asia, 62 per cent in Southern and Eastern Asia, 10 per cent in Eastern Europe and 66 per cent in Sub-Saharan Africa. In Kenya, the sector is growing and contributing to over 80 per cent of total employment (AfDB, 2013; KNBS, 2019). This is despite government policies such as affirmative funds for enterprises and one-stop-shop for formal registration tending to encourage formalization. The high level of informality could therefore be because the benefits of informality (like less taxes to pay and low licensing costs) outweigh the costs (like lower access to credit) (World Bank Group, 2016).

In the 1990s, ILO's dilemma of the informal sector was promoting the informal sector to provide more jobs while addressing issues of exploitation and inhuman working conditions. However, in the last decade, the dilemma is becoming more complex especially in developing countries due to the bulk of new employments (over 90%) being in the informal sector (Brown and McGranahan, 2016; World Bank Group, 2017). Creating and promoting decent work for the working poor in the informal sector is important for the development of any country whose majority rely on the sector. However, for this to be achieved, there should be a clear definition of the informal sector for targeted interventions. This paper refers to informal enterprises as those not formally registered with the Kenya Revenue Authority (KRA) or the Registrar of Companies. They include unregistered micro and small enterprises involved in small manufacturing, trade, services and agribusiness. Further, to make evidence-based conclusions and recommendations, there is need to understand informal work environment and enterprise challenges, which include shocks that affect their business environment, the enterprises and the owners.

2.2.3 Global perspective of the informal sector

The informal economy is not unique to developing countries as it exists in all economies around the globe. International Labour Organization's (ILO) global employment trends estimate that globally, 42 per cent of workers (1.4 billion) are in vulnerable forms of employment, working as either contributing family workers

in family-owned enterprises or own-account workers mainly in the informal sector (ILO, 2018). The report projects that in 2018 and 2019, the numbers of those in vulnerable employment is likely to increase by 17 million per year. In developing countries, the proportion of workers in vulnerable employment is even higher at 76 per cent, out of which over 50 per cent are in non-agricultural employment in the informal sector (ILO, 2018). In these developing nations, those in the informal sector majorly earn from operating small unregistered businesses or from subsistent farming (Rajeevan, Sulphey and Rajasekar, 2015). As a result, these workers are exposed to a higher risk of being unprotected. Therefore, there is a likelihood that the working poor are those in the informal sector.

Deeper analysis of the informal sector has gained significant focus in various countries across the globe. This has often covered a wide spectrum of issues around the informal sector, especially on the causes, importance, challenges and consequences of the existence of the informal sector. Gardes and Starzec (2009) indicated that whenever the country experienced crisis and reforms, there is an increase in the formation of the informal enterprises to provide the market with low priced goods. This indicates that the sector seemingly exhibits a form of social multiplier, given the sprouting of informal businesses.

2.2.4   Labour force in the informal sector

An analysis of informal enterprises across 38 nations by Williams (2018) uncovered that approximately 16.6 per cent of the people work in non-agricultural informal business. In those countries, 31.5 per cent of the workforce were either entrepreneurs in the informal sector or had their jobs in informal enterprises. Despite informal enterprises providing a source of livelihoods for those it employs, the gains may not be sufficient to support acceptable decent standards of living. In developing countries, workers in the informal sector live with an income of below the poverty line threshold of US\$ 1.9 a day mainly because they begin their career in the informal sector (ILO, 2017). Low incomes can further be associated with lack of proper work spaces, high labour turnover, lack of social protection, low productivity, low wages, poor working conditions, financial constraints and lack of safety legislation in the informal sector (ADB, 2011; Blades, Ferreira and Lugo, 2011). This is further attributable to lack of access to productive assets, including the necessary skill sets that the market needs, and costly entrepreneurial startups (Brixiová, Ncube and Bicaba, 2015).

2.2.5   Shocks affecting the informal sector

Despite the importance of the informal sector, diverse shocks affect the operations of enterprises in the sector. Shocks are classified into two broad categories, namely idiosyncratic (those that affect individuals or households) and covariant shocks (which affect groups, communities, institutions or an entire country, PEP-CBMS, 2011). Gunther et al. (2009), PEP-CBMS (2011) and ACEPIS (2018) further classify shocks as either natural, such as fires, floods, drought, earthquakes and tsunamis; economic such as business closures, crimes, mass lay-offs, price increases, wage cuts and decline of profits; health such as serious illness, injury and death, or social, such as civil unrest, war, crime, eviction and violence.

Studying informal enterprises in Nairobi ACEPIS (2018) noted that more than half (55%) of the informal businesses lacked suitable worksites, making them vulnerable to shocks such as disruptions in access to amenities such as electricity and water. Other shocks include extreme weather conditions, mainly heavy rains at 51.9 per cent, illness at 43.6 per cent, political violence at 35.8 per cent, poor transport network at 32.5 per cent, slow economic growth-related hardships at 20.8 per cent, and insecure neighbourhoods (crime) at 19.7 per cent. In addition, fire outbreaks, deaths, forced evictions by cartels, changes in consumer patterns, Sexual Gender-Based Violence (SGBV), and violent political events are also identified as shocks affecting informal sector enterprises (Legodi and Kanjere, 2015; ACEPIS, 2018). In addition, informal businesses at an infant stage struggle to adjust to various challenges such as cost of electricity, and lack of social protection schemes (Legodi and Kanjere, 2015). Neves (2010) identifies violence, harassment by government agencies, and crime as some of the shocks affecting informal enterprises.

2.2.6   Factors influencing vulnerability to shocks and choice of shock coping mechanisms

Studies conducted to assess the vulnerability of the informal businesses to shocks have revealed that most businesses are severely affected by shocks based on the intensity, frequency and the type. Given that a large proportion of the informal sector comprises of unregistered micro and small enterprises, they face challenges in building resilience when they encounter various shocks. On numerous occasions, informal businesses, particularly those operating without legal working spaces face threats of demolition, displacement and evictions (Brown, McGranahan and Dodman, 2014; ACEPIS, 2018). ACEPIS (2018) argue that natural calamities and crises may substantially add complications to economic, environmental and social factors affecting enterprises in the informal sector. Further, lack of recognition of

the informal sector by governments of most developing countries often leads to policies that do not take care of their interests, leading to structural weaknesses and more vulnerability to shocks (Brown and McGranahan, 2016; ACEPIS, 2018).

In assessing the vulnerability of the informal sector in urban centres, Brata (2014) revealed that traders dealing with the food items were more vulnerable to shocks compared to other categories. In addition, the location of the vending determined the level of vulnerability. Omoegun, Mackie, and Brown (2018) concluded that street venders take both collective and individual approaches in trying to reestablish a space for their operations. The study, however, noted that maintaining operations in public spaces was challenging given that vendor associations were not effective, since they were co-opted by the urban authorities. In a comprehensive review of literature, Webb et al. (2012) make a note that avoidance and manipulation is used as a tactic to escape from enforcement pressures. This includes cases of street vendors selling merchandise that they can easily carry when government officials crack down on them. In addition, they also avoid competing directly with registered enterprises that may use legal means to mobilize enforcement; this is done by selling products that are not similar.

Health shocks also present a significant threat to smallscale businesses around the world. In trying to establish the nexus between informality and health risks protection, Cho (2010) indicated that majority of informal workers and the self-employed did not have social protection, hence are vulnerable to disruption of businesses in the event of sickness. The study further found that formal sectors were adequately protected in terms of health care compared to informal businesses. Similar findings were reported by Ahmad and Aggarwal (2017) who revealed that households involved in the informal economy spent a significant amount of their budgets on health services, which pushes some of them into poverty. This shows that informal sector workers are more susceptible to health shocks and they incur high cost of treatment due to low insurance coverage. This is an indication that health shocks can cripple informal sector business operations, which in turn would lead to low returns.

In trying to mitigate the population from health shocks, the Government of Kenya has focused on improving health coverage as stipulated in the "Big 4" agenda. The Kenya Economic Updates 2018 report from the World Bank acknowledges that about 70-80 per cent of Kenyans do not have health insurance cover, majority being the population that is engaged in the informal sector (Awiti et al., 2018).

Relative to the formal sector, the informal sector is more vulnerable to credit access constraints. Since most venders cannot provide collateral to financial institutions while accessing credit, they seek alternative sources such as informal loans and savings for start-up capital and to address financial crises during operation

(Kusakabe, 2010; Willemse, 2011). These include resorting to informal networks such as the family and friends for support of the businesses (Finnegan and Singh, 2004). However, the informal sources often charge higher interest than formal financial institutions (Kusakabe, 2010). Some firms also chose to embrace other non-financial coping strategies such as employing family members who work for longer hours to add to household income (Martinoty, 2015).

Traders in the informal economy often conduct their business activities within the law. Nevertheless, they are perceived to be operating their businesses illegally. Neves (2010) argues that informal traders often face shocks such as violence, harassment by government agencies, and crime. In most cases, harassment is attributed to the perception that informal traders are operating in illegal or unauthorized workspaces.

The size of the informal enterprise could be an advantage in the event of market shocks. Studies seeking to find the competition environment of the informal and formal sectors have revealed a flexibility advantage of the informal sector. Ali and Najman (2015) make note of formal businesses competing with the informal businesses a a hard task. The finding indicated that small firms have flexible managerial innovation capabilities especially in their production processes and communication strategies. Faced with the challenges of market shocks, they easily change tactics and produce goods that suit the market or move closer to the market.

2.2.7   Effect of shocks on returns on investment

Studies have shown that informality and returns on investment have a strong negative correlation. On average, businesses in the formal sector are more productive than those in the informal sector (Gelb et al., 2009; Kanbur, 2017). This is attributed to diversities in the quality of the environment they operate in and the way rules are enforced. A wide review of literature shows that the informal sector's returns were relatively lower than that of formal businesses due to differences in obtaining inputs, shocks and diversity in the scale of production (La Porta and Schleifer, 2008). Further, there is a negative correlation between the size of the informal sector and economic growth indicators such as GDP per capita and tax revenues mainly attributed to petty trading, tax evasion and subsistence agriculture.

Informal firms also tend to be very small and employ less than five employees who earn lower wages than those in large firms, making them unproductive (Rothenberg et al. 2015; Kanbur, 2017). The low returns on investment can further be attributed to informal sector managers' and employees' lower skills set, limited

formal education, lack of social protection mechanisms, and the choice to mainly supply their merchandise to the local markets.

2.3   Summary of the Literature Review

Literature has indicated that the informal sector plays a significant role in absorbing huge number of the workforce that fails to secure jobs in the formal economy. This is not unique to developing countries alone. However, informal sector enterprises were less productive, and in most cases the informal work is not decent (Gelb et al., 2009; Kanbur, 2017). This is attributed to the difference in the quality of the environment the informal traders operate in and the way rules are enforced. This situation is substantially heightened by negative shock events which often affect informal enterprises. These shocks include crimes and political violence, social amenity interruptions such as electricity and water, forced evictions, and harassment by government authorities.

The review of literature shows that diverse enterprise and owner characteristics influence the shocks the enterprises face and the coping mechanisms they choose to adopt. These characteristics are used to inform the variables selected for further analysis in this study. These include location of the enterprise, ownership of legal working spaces, the size of the enterprise (number of employees and net-worth), lack of recognition of the informal sector by governments, sector and type of merchandise an enterprise deals with, lack of social protection, length of working hours, and the relationship between the owner and workers like having family members as workers.

Despite the tremendous growth of the informal sector in Kenya, studies that focused on the vulnerabilities narrowed down on a small study area with no national representation. For example, ACEPIS carried out research on the vulnerability of the informal enterprises in Nairobi in 2018. This paper seeks to go beyond identifying shocks and shock-coping mechanisms but also explore factors influencing the vulnerability to shocks and choice of coping strategies in the informal sector. This study has a more national representation by covering more regions in the country to generate more robust findings to inform policy formulation processes, and increase the sector's returns on investment with a view to creating decent jobs.

3.   Methodology

The methodology outlines the authors' conceptualization of the study and the process to be used in addressing the objectives of this study.

3.1   Conceptual Framework

Figure 1 represents the conceptual framework of shocks affecting enterprises in the informal sector and how enterprises cope with the shocks which ultimately influences their entrepreneurial outcomes such as business returns after recovery.

Figure 1: Conceptualization of interplay of shocks and shock coping mechanisms
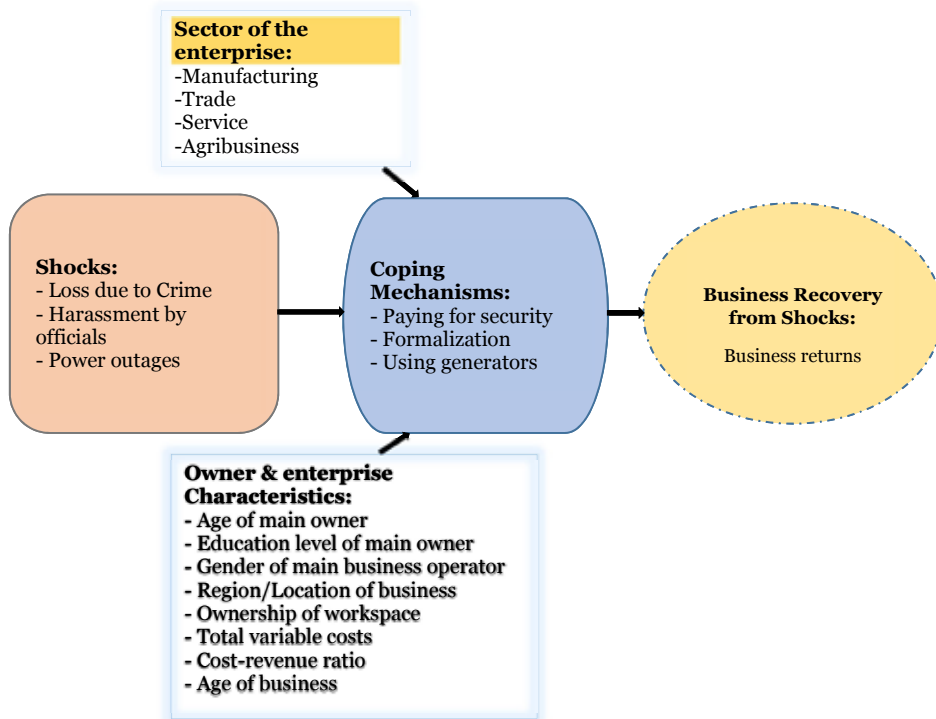
The dependent variable is coping mechanisms which enable the owner of an informal enterprise get back to business once hit by a shock. These shocks are: harassment by government officials, losses due to crime, and power outages and the coping mechanisms for the shocks include formalization of the enterprises, paying for private security, and using generators, respectively.

The literature has showed that owner, location and enterprise characteristics of an informal business influence the nature of shocks they face, and shock-coping mechanisms adopted. This study conceptualized that size of the business significantly influences the ability of an enterprise to adopt a particular shock-coping mechanism such as paying for private security. Similarly, the region within which an enterprise is located determines the type of shocks that face a business and the coping mechanisms. A business located in regions that are less prone to crime could pay less for private security. The age of the enterprise could influence their shock coping strategies. Younger businesses may not have the experience and finances to adopt some coping mechanisms that older enterprises have. Ownership of a work location or work space could influence the ability to adopt a given shock-coping mechanisms, and not others. It is conceptualized that there is variation across sectors in terms of the shocks that affect a given sector and how the enterprises in the sector cope with the shocks. Businesses in the manufacturing sector could be more interested to pay for private security compared to small scale traders who do not have a permanent location. Similarly, the proportion of revenue to cost could influence the choice of coping mechanisms, especially if a coping mechanism has a financial implication.

Owner characteristics such as age could influence the ability to choose shock-coping strategies. Similarly, the gender of the owner could influence their decision to adopt a shock coping mechanism. For instance, being male or female could influence the risk-taking ability especially when there are significant financial implications.

3.2 Data and Data Sources

3.2.1 Introduction

Secondary data was utilized as the main data set for this study. Existing secondary data on the shocks affecting the informal sector has captured diverse shocks and challenges affecting business enterprises in different counties in Kenya. This helped uncover the similarities and diversities in shocks and the coping strategies for the shocks. In addition, data on enterprise-specific characteristics was selected to help in determining the factors influencing the shocks and choice of shock coping mechanisms.

3.2.2 Review of secondary data used in the analysis

The World Bank's Informal Enterprise Survey (IFS) was collected in Kenya from 18th April to 11th May 2013. The survey covered urban-based enterprises in Nairobi,

Mombasa, Central, Nyanza, and Nakuru towns of Kenya. Each urban centre was stratified into a suitable number of zones, giving a total of 122 zones in Kenya. Each zone had at least 4 completed interviews, giving a total of 533 interviewed enterprises. The total sample had 522 (98%) businesses which had not registered their activities with the Kenya Revenue Authority (KRA), hence considered informal.

The data captured a total of 195 variables out of which there were a number of variables on the unanticipated major challenges that affect businesses in the informal sector, which were used as proxies for shocks. These included: losses due to crime, harassment by government officials, paying bribes, and power outages. Further, the data captured variables that were used as proxies for shock-coping mechanisms, such as paying for private security, intention to formalize to avoid harassment by government officials, and owning or sharing power generators. The data also contained other variables on the business environment, enterprise characteristics, owner characteristics, labour, sales and supplies that were used to explain the choice of shock-coping mechanisms. These included the main activity of the business, years of operation, location of the business, losses due to crime, total sales, number of male owners of the business, age and education level of the main owner. Data on the ranking of the biggest obstacle faced by the business or activity was used to inform on the severity of shocks that the enterprises faced. The age of the largest owner of the enterprise was used to proxy the level of youth involvement in informal enterprises and the type of shocks that affected their enterprises. To demonstrate the direct effect of shocks the survey provided data for total sales in the month of study and highlights whether it was below, above or what was normally sold by the business. A normal month is a concept referring to a month that did not have shocks such as festivities, crime uncertainties and political uncertainties.

The World Bank's Informal Enterprise Survey (IFS) 2013 data for Kenya was the main data set for analysis. This is because it captured some of the unanticipated major challenges that affect informal enterprises, which were considered by this study as suitable proxies for shocks as informed by literature review and the authors conceptualization. Further, the data captured suitable proxies of the shock-coping mechanisms. The Micro, Small and Medium Enterprises (MSMEs) 2016 was only used to complement the findings on shocks from the World Bank's Informal Enterprise Survey (IFS) 2013.

3.3 Analytical Framework

3.3.1 To identify shocks affecting informal enterprises in Kenya

Recognizing that shocks influence the returns on investment of informal enterprises, this study first identified and characterized shocks affecting the returns of the enterprises in Kenya. Descriptive statistics were used to analyze the number and types of shocks affecting informal enterprises. Inferential statistics such as chi-square were used to test if there was a significance difference in the shocks affecting different types of informal enterprises. In addition, the study provided descriptive and inferential statistics to show the characteristics of enterprises affected by different shocks.

3.3.2 To determine factors influencing shocks facing informal enterprises in Kenya

The study hypothesized that informal enterprises faced different shocks and they took up diverse mechanisms to cope with shocks in order to enhance their survival. It was also hypothesized that different factors influence the shocks that affect an enterprise and the coping mechanisms adopted. It is on this basis that the study used Multivariate Probit (MVP) model to determine the factors influencing the shocks that affected an informal enterprise and their coping mechanisms. Shocks that affected an enterprise and coping strategies adopted are not mutually exclusive; that is, an enterprise could be affected by one shock or a combination of shocks, and they could choose different coping strategies. The MVP was considered an appropriate model for this objective because it allowed possible combination of shocks and shock-coping strategies, simultaneously. This aided in comparison of findings if the factors that influenced the shocks also had a role to play in influencing the choice of the coping mechanisms. The multivariate model adopted was characterized by a set of '*n*' binary dependent variables Yi such that:

$$Y_i = 1 \text{ if } x^1\beta_i + \varepsilon > 0 = 0 \text{ if } x^1\beta_i + \varepsilon \leq 0, i = 1,2,...,n, \tag{1}$$

Where:

- Y_i is the shocks or the shock-coping strategies, which is the dependent variable: Y_i is *1* if a given shock affects an enterprise and *0* otherwise; for the shock-coping strategies model Y_i is *1* if a given shock-coping strategy is adopted and *0*, otherwise;

- β_1, x is a vector of explanatory variables, β_1, β_2, ..., β_n are conformable parameter vectors;

- The random error terms ε, ε_2, ... ε_n were distributed as multivariate normal distribution with mean of zero, unitary variance and a simultaneous correlation matrix.

Informed by literature review and authors' conceptualization, the reduced form of the MVP model for factors influencing shocks as shown in equation (ii).

$$Shock_i = \beta_0 + \beta_1 Bs_{Sector} + \beta_2 Age_{Business} + \beta_3 Region + \beta_4 Have_{Location} + \beta_5 Own_{location} + \beta_6 Cost_{to_{revenue_{ratio}}} + \beta_7 Gender_{main_{BsOperator}} + \beta_8 Age_{owner} + \beta_9 Education\_lev\_owner + \beta_{10} Total\_variable\_costs + \beta_{11} Pay\_security + \varepsilon$$

(ii)

The reduced form of the MVP model for the factors influencing shock coping strategies was as shown in equation (iii).

$$SCS_i = \beta_0 + \beta_1 Shock_{type} + \beta_2 Bs_{Sector} + \beta_3 Age_{Business} + \beta_4 Region + \beta_5 Have_{Location} + \beta_6 Own_{location} + \beta_7 Cost_{to_{revenue_{ratio}}} + \beta_8 Gender_{main_{BsOperator}} + \beta_9 Age_{owner} + \beta_{10} Education_{lev-owner} + \beta_{11} Total\_variable\_costs + \beta_{12} Pay\_security + \varepsilon$$

(iii)

Where:

BS_sector - is the sector that an enterprise operates in

SCSi - is the shock-coping strategies for a shock under consideration

Age_Business - is the age of the number of years an enterprise has been in operations

Region - Where business is located (Nairobi, Kisumu, Nakuru, Central, or Mombasa)

Having_location - Whether a business has a workspace, or the owners keep shifting

Location_ownership - Whether the enterprise owns a business location, or it has rented

Revenue - Cost ratio; indicating the proportion of revenue obtained from an investment

Gender – The sex of the main owner; whether the owner is male or female

Age_owner - is the age of the main owner of the business

Education_lev_owner is the level of education of the main owner

Pay_security - Whether a business pays for private security

Shock_type - is the type of shock facing the business

Total_variable_cost - is the sum of all the variable costs incurred by a business

3.4   Description of Variables

Table 1: Description of variables used in the Multivariate Probit Model on factors influencing shocks and shock-coping mechanisms

Code Variable	Description of the Variable	Variable type	Unit of measurement/ coding
Dependent variable for shock coping strategies			
Shock			
Crime_loss	Suffered loss due to crime	Dummy	1=Yes 0=No
Harassment_by_officials	Harassment by officials	Dummy	1=Yes 0=No
Power_outage	Power outage	Dummy	1=Yes 0=No
Shock coping strategies			
Pay_security	Pay for private security	Dummy	1=Yes 0=No
Intent_formalize	Intention to formalize	Dummy	1=Yes 0=No
Own/share_generator	Insuring employees	Dummy	1=Yes 0=No
Independent variables			
Sector_or_enterprise	Sector of enterprise	Categorical	1= Manufacturing 2= Trade 3= Services
Num_years_oper	Number of years of operation	Continuous	Years
Region	Sector of enterprise	Categorical	1= Central 2= Nyanza 3= Mombasa 4= Nairobi 5= Nakuru
Have_location	Have a work location	Dummy	0= No 1= Yes
Own_location	Own a work location	Dummy	0= No 1= Yes
Cost_revenue_ratio	Cost-revenue ratio (Cost/revenue)	Continuous	Number
Gender_main_operator	Gender main operator	Dummy	0= Female 1= Male
Age_owner	Age of main owner of enterprise	Continuous	Years

Educ_lev_owner	Education level of main owner of enterprise	Categorical	1=No formal education 2=Primary 3=Secondary 4=Tertiary
Total_variable_costs	Total variable costs	Continuous	Ksh
Pay_security	Pay for private security	Dummy	0= No 1= Yes
Shock_type	Type of shock	Categorical	1= Loss due to crime 2 = Harassment by officials 3= Power outage

3.5   Definition of Terms

Harassment by government officials: This entails harassment of the informal businesses by either county officials or national government officials, including the police. This entails threats, harm, unlawful confiscation of goods, and corruption in collecting county business operation fees, among other considerable harassment of the lawful businesses.

Informal sector: In this study, informal sector means those businesses that have not been registered by the registrar of company in Kenya and they don't pay taxes.

Security coping mechanism: This entails informal enterprises hiring private security either as individual or as a group to safeguard their businesses.

4. Results and Discussions

4.1 Introduction

This section presents the study findings and results from data analysis. Discussions of the findings in triangulation with previous studies were incorporated. The study used the World Bank's Informal Enterprise Survey (IFS) 2013 as the main data set. The study further used the Micro Small and Medium Enterprises (MSME) Survey 2016 and Kenya's National Police Service Annual Crime Report, 2016 to corroborate some of the findings of IFS data. The IFS survey covered urban-based enterprises in Nairobi, Mombasa, Central, Nyanza, and Nakuru towns with total of 122 zones in Kenya. Each zone had at least 4 completed interviews giving a total of 533 interviewed enterprises. The total sample had 522 (98%) businesses which had not registered their activities with the Kenya Revenue Authority (KRA), hence considered informal.

The informal enterprises were grouped into 3 sectors, namely: trade, manufacturing and services, as defined in the MSME Act of 2012. In this study, manufacturing is referred to as changing the physical form of a product to make a new usually more value-added item for sale; trade refers to just selling (without being involved in value-addition like processing) tangible items; while services refers to selling non-tangible products. The enterprises that fall into the different categories by sector are as shown in Figure 2.

Figure 2: Classification of the informal enterprises by sector
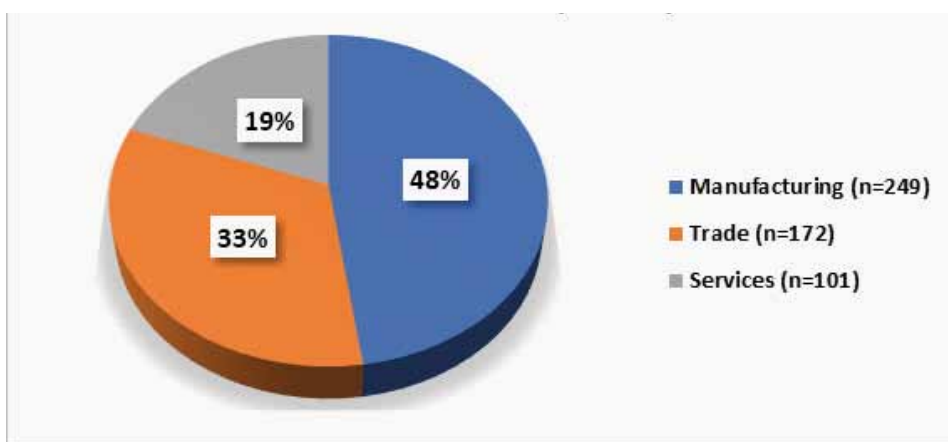
The classification of the enterprises across the three sectors are as shown in Table 2.

Table 2: Classification of informal enterprises by sector

Classification of informal businesses	
Trade	**Manufacturing**
• Selling of clothes or household items • Selling of business/computer/ phone services • Selling food or groceries (street food sellers, restaurants) • Selling of other goods **Services** • Cleaning and washing services • Hairdressers and barber shops • Professional services (including internet services) • Other services (not included above) • Repair of motor vehicles and motorcycles • Repair of machinery and equipment • Repair of computers and personal and household goods	• Manufacturing of clothes or shoes • Manufacturing of handcrafts • Manufacturing of furniture • Manufacturing of metal products • Manufacturing of household items • Manufacturing of baked food (baker) • Manufacturing of coffee, sugar, oil, dry fruits and other processed foods (exclude restaurants, street food-sellers) • Other manufacturing (not included above)

From the survey, majority of the informal sector enterprises were owned by the youth (57%) as shown in Figure 3. Only a very small proportion of the informal enterprises were owned by persons who were above 65 years (3%). This shows that the informal sector in Kenya employs more youth than the aged.

Figure 3: Informal businesses by the age of the main owner
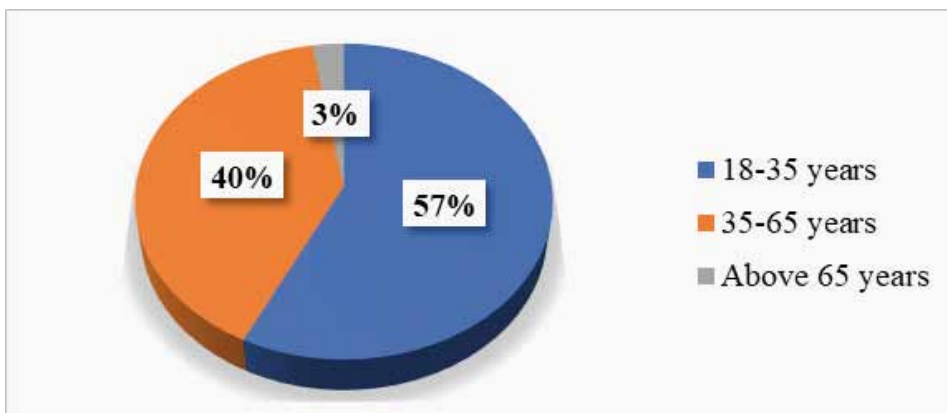
Before the regression analysis, the study presents the preliminary analysis of the variables used in the regression models. This includes descriptive statistics, pairwise correlation, and summary statistics of all the target explanatory variables. Pairwise correlation indicated a low correlation (below 0.5) for all the variables used in the regression, therefore implying a low multicollinearity among the variables as shown in Table 3. Further, a test of significance at 1 per cent level showed that despite low correlation in terms of magnitudes, few variables were significantly correlated. The summary statistics show that only two variables (owning a location and owner having vocational training) had missing values, with 462 and 511 observations, respectively. The other explanatory variables entailed all the observations (522). Some of the regression model standard errors were large and had wide variation across the variables, and the three categories of the dependent variables (either shocks or shock-coping mechanisms) indicated presence of violation of homogeneity of variance assumption in the regression (presence of homogeneity). This problem was corrected by reporting robust standard errors to correct this bias. The Wald chi² p-value (being significant) and the marginal effects after mvprobit linear prediction of *y* were used to indicate that Multivariate Probit Models (MVP) was suitable for the analysis. The parameter estimates of the MVP were presented in the same table with the marginal effects for all the regressions. The marginal effects results were the ones discussed in all the sections to show both the direction and magnitude of the effect of an explanatory variable on the dependent variables.

Table 3: Pairwise correlation of explanatory variables for shocks and shock coping mechanisms

	Harassment by government officials	Crime losses	Power outage	Central-location dummy	Nyanza-location dummy	Mombasa-location dummy	Nakuru-location dummy	Trade-sector dummy	Services-sector dummy	Age of business-group	Work location-have	Work location-own	Gender of main respondent	Age group main owner	Vocational train main owner	Working hours
Harassment by government officials	1															
Crime losses	0.34*	1														
Power outage	-0.02	-0.03	1													
Central - location dummy	-0.18*	-0.06	0.24*	1												
Nyanza - location dummy	-0.15*	0.01	-0.10	-0.23*	1											
Mombasa - location dummy	0.28*	-0.08	-0.16*	-0.25*	-0.24*	1										
Nakuru - location dummy	-0.06	0.02	-0.03	-0.22*	-0.21*	-0.2313*	1									
Trade - sector dummy	0.02	-0.05	-0.03	0.10	-0.03	0.03	-0.09	1								
Services - sector dummy	-0.06	0.04	0.17*	-0.08	0.08	-0.05	0.05	-0.34*	1							
Age of business – group	0.02	0.08	0.01	0.05	-0.09	0.09	0.01	-0.20*	-0.03	1						
Work location – have	0.02	0.11	0.03	-0.34*	0.09	0.12*	0.02	-0.05	0.12*	0.06	1					
Work location – own	0.20*	0.04	0.02	-0.09	-0.06	0.12*	-0.05	0.03	0.01	0.03	0.00	1				
Gender of main worker	0.04	0.07	0.02	0.03	-0.10	-0.03	0.02	-0.27*	0.11	0.23*	-0.02	-0.09	1			
Age group main owner	0.05	0.01	-0.05	0.12*	-0.14*	-0.03	0.08	-0.12*	-0.10	0.37*	-0.04	0.05	0.14*	1		
Vocational train main owner	0.01	-0.02	0.05	0.07	0.10	0.04	-0.07	-0.32*	-0.07	0.15*	0.01	0.05	0.01	0.11	1	
Working hours	-0.02	0.01	0.11	0.07	-0.06	0.04	-0.03	0.12*	0.08	0.12*	-0.02	0.00	0.05	0.02	0.01	1

Note: * denotes significance at 1% level

4.2   Shocks Affecting the Informal Sector and the Coping Mechanisms

The study identified three shocks from the World Bank's Enterprise Survey: loss due to crime, harassment by government officials or police, and power outage.

4.2.1   Losses due to crime

Descriptive statistics of losses due to crime shock

About 7 per cent of informal enterprises experienced losses such as loss of stock and cash due to crime (Figure 4). Half of the firms that experienced losses due to crime were in the manufacturing sector as indicated in Figure 5.

The World Bank's Informal Enterprise Survey (2013) indicated that among the businesses that faced losses due to crime, Nairobi was the highest followed by Nyanza and Nakuru (Figure 6). Mombasa had the least number of losses due to crime. The MSME Survey 2016 had similar results in terms of crime, where poor security was cited as a major obstacle mainly in Nairobi. Other towns which reported poor security as a major obstacle were Nakuru and Kisumu (Figure 7). Mombasa had the least indication of existence of poor security.

The National Police Service Annual Crime Report (2016) indicated that based on the prevalence and incidence of crime, Nairobi was the leading county out of the five selected counties for this study (at number 3 nationally), followed by Nakuru (at number 4 nationally) and Mombasa (at number 5 nationally). These

Figure 4: Losses due to crime
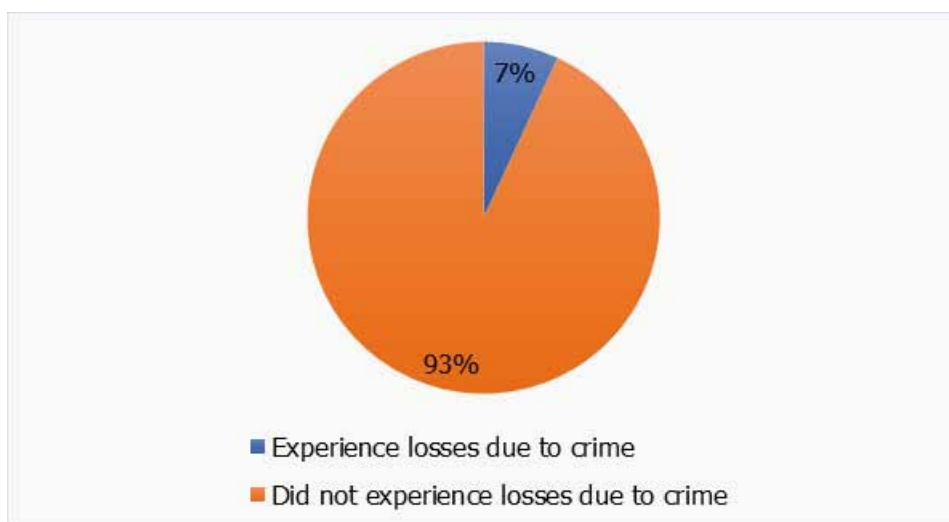
Figure 5: Losses due to crime by sector

Figure 6: Losses due to crime by region
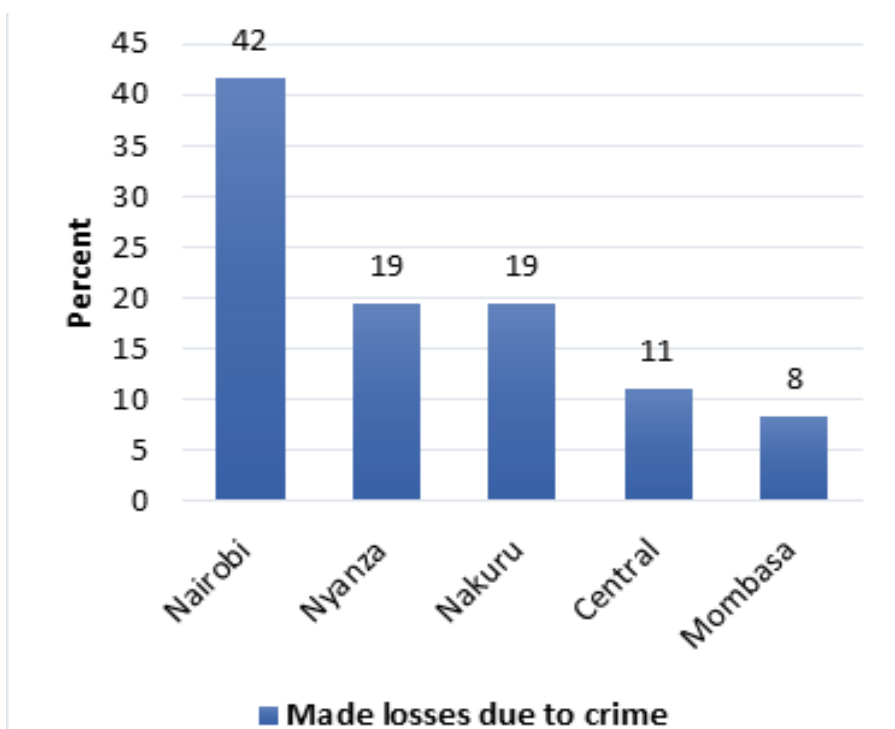
Source: World Bank's Informal Enterprise Survey (IFS) 2013

Figure 7: Enterprises faced poor security
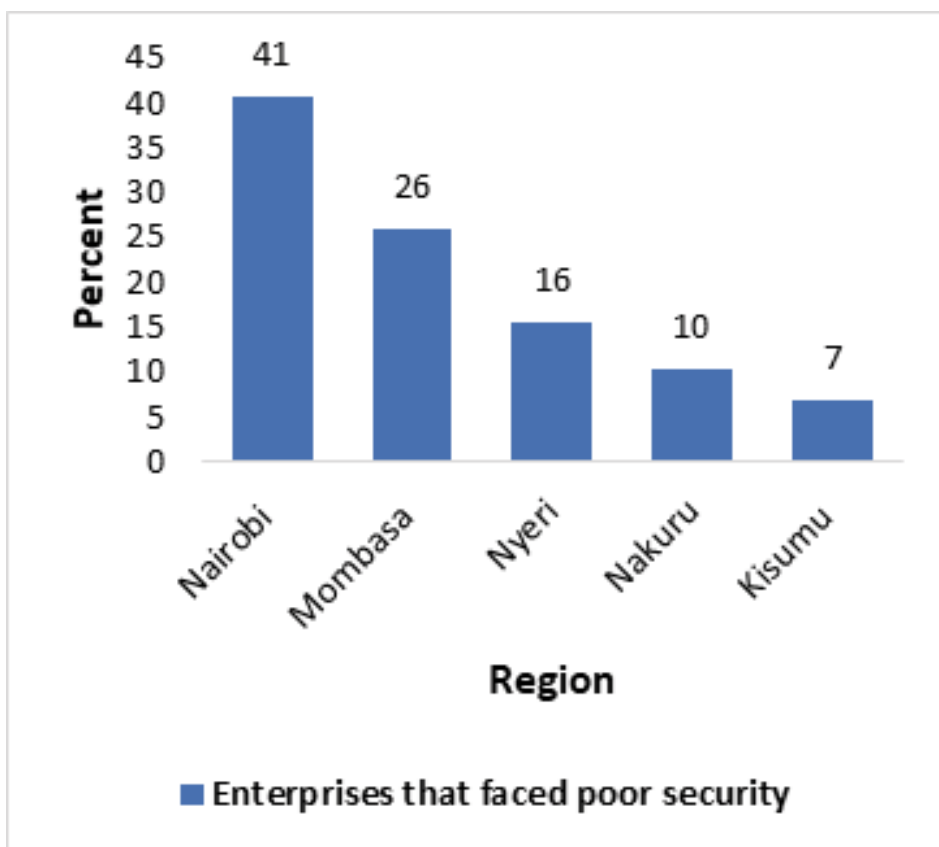
Source: MSME Survey 2016

results show that in the different indicators of crime from the different data sets (World Bank's IFS 2013, MSME Survey 2016 and National Police Service 2016) crime is more prevalent in Nairobi and Nakuru counties (Figure 8). In addition, according the police report of 2016, Kiambu County led in number of reported crimes according to prevalence. This could have led to spillover effects to Nairobi since Kiambu closely neighbours Nairobi.

In comparing the crimes, some of the crimes that could have affected business enterprises include stealing (13%), breakings (7%), criminal damage (6%), robbery (4%), theft by servant (3%) and vehicle and other thefts (2%) according to the National Police Service Annual Crime Report of 2016 as shown in Figure 9.

Ownership of a location or business space was considered important in the analysis of the shocks facing informal enterprises, since the enterprises could have operated in spaces that had not been legally allocated to them.

Figure 8: County crime figures according to prevalence for the year 2016
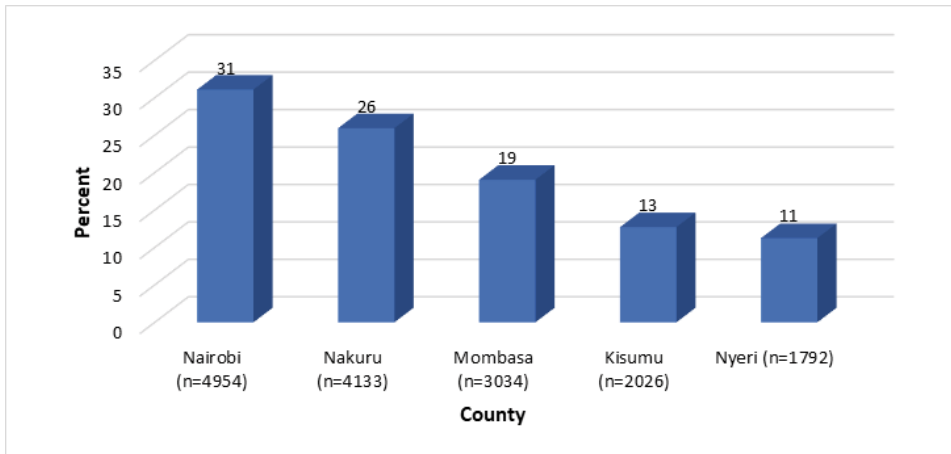
Source: National Police Service Annual Crime Report, 2016

Figure 9: Comparative crime chart for the period Jan-Dec 2016

Source: National Police Service Annual Crime Report, 2016

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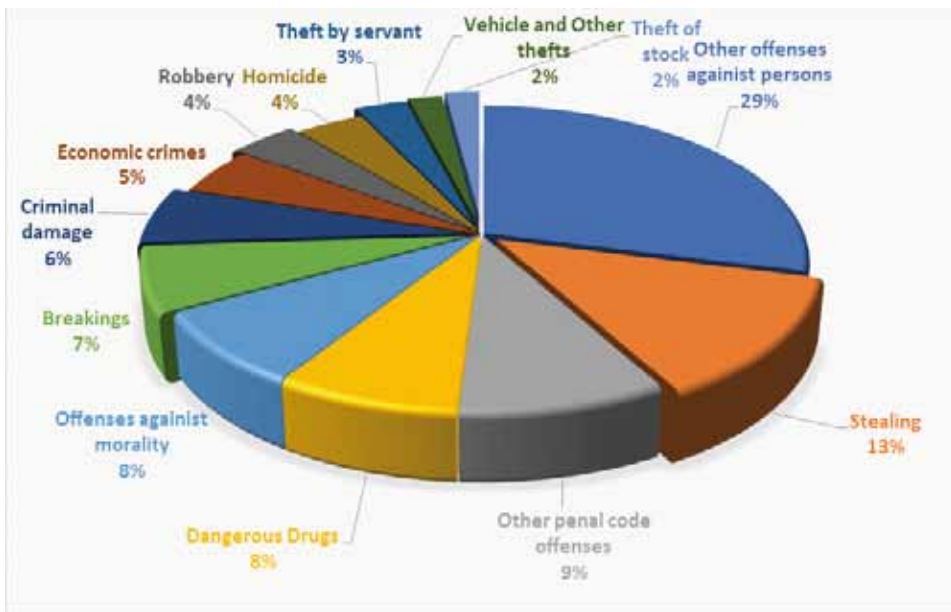
Out of the enterprises that experienced losses due to crime, 81 per cent did not own the location they were situated in, as indicated in Figure 10. This suggests that businesses located in rented premises or unauthorized work locations could have been more vulnerable to crimes. Probably, enterprises operating in rented or unauthorized spaces did not have adequate security compared to those operating from owned business spaces. This could be because such enterprises were reluctant to source for pooled or individual security when operating in rented spaces.

Figure 10: Loss due to crime by ownership of the business space/ location
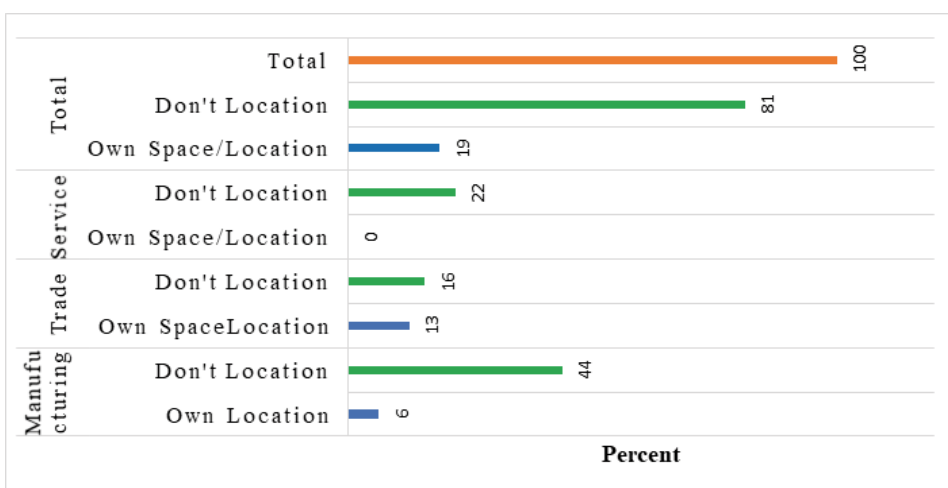
Table 4: General characteristics (averages) of enterprises affected by crime by location

	Central	Nyanza	Mombasa	Nairobi	Nakuru	Total
Total loss crime per month (Ksh)	12,250.0	1,971.4	4,666.7	8,692.3	18,257.1	9,341.2
Total cost of private security per month (Ksh)	2,000	0	1,000	927	500	1,120
Loss due to crime to sales ratio	0.3	0.3	0.3	0.3	1.2	0.5
Crime incidents per month (No.)	1.0	1.7	2.3	2.3	1.3	1.8
Age of business (years)	14.3	5.6	10.3	7.9	12.3	9.2
Revenue to cost ratio	4.7	1.1	0.7	1.9	1.4	1.9
Paid worker to total worker ratio	1.0	1.0	1.0	0.9	1.0	1.0

Family worker to total worker ratio	0.3	0.3	1.0	0.5	0.0	0.4
Crime loss to revenue ratio	0.3	0.3	0.3	0.3	1.2	0.5

On average, most enterprises experienced two crime incidences in a month, leading to a loss of Ksh 9,341 on average (Table 4). Considering the total loss due to crime per month, on average, enterprises in Nakuru and Central regions had the highest losses (Ksh 18,257 and Ksh 12,250, respectively) compared to other regions. Losses due to crime experiences varied with the age of businesses across the regions. Businesses that experienced losses due to crime in Nyanza and Nairobi had an average of 6 and 8 years, respectively. This is lower than regions that reported higher losses due to crime, such as Central and Nakuru where the businesses were on average 14 and 12 years. Probably younger businesses had taken up more security measures compared to older business. On the other hand, there seemed to be a low relationship between paying for private security and incurring loss due to crime. For instance, despite Central having enterprises that paid the highest amounts for security, on average, they incurred the second highest losses on average (Ksh 12,250) per month. Enterprises in Nakuru region spent on average Ksh 500 but still experienced the highest average losses per month (Ksh 18,257). On average, Nyanza region enterprises do not pay for private security probably because they do not incur huge losses due to crime (Ksh 1,971 losses on average).

Table 5: Other general characteristics of enterprises affected by crime categorized by sector

	Manufacturing			Trade			Services		
	mean	min	max	mean	min	max	mean	min	max
Total loss crime per month (Ksh)	7,211	800	25,000	11,144	1500	17,000	12,500	1,000	50,000
Loss due to crime to sales ratio	0.4	0.0	0.8	0.3	0.1	0.9	1.0	0.1	3.3
Crime incidents per month (No.)	1.8	1.0	6.0	1.6	1.0	3.0	2.1	1.0	3.0
Age of business (years)	9.1	2.0	23.0	10.2	2.0	25.0	8.4	4.0	16.0
Revenue to cost ratio	1.3	0.5	6.0	4.1	1.1	5.7	1.5	0.8	3.0

Paid worker to total worker ratio	0.9	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Family worker to total worker ratio	0.4	0.0	1.0	0.2	0.0	1.0	0.4	0.0	1.0

An analysis per sector indicates that, on average, the service enterprises were the most affected by crime (Table 5). They lost Ksh 12,500 in a month whereas the manufacturing businesses are the least affected with a loss of Ksh 7,211, on average, due to crime. Similarly, loss due to crime to sales ratio indicated that the service business's sales were almost equivalent to the losses they made. This means that they were left worse off due to crime compared to trade and manufacturing enterprises which had lower ratios. Most businesses that experienced losses due to crime across the sectors were on average 9 years old. Loss due to crime seems to have affected services and manufacturing businesses more than trade businesses. For every shilling invested as indicated by revenue to cost ratio, trade businesses made Ksh 4, on average, whereas the services and manufacturing businesses made Ksh 1.5 and Ksh. 1.3, respectively. This means that despite trade enterprises making huge losses due to crime, their revenues were high, which raised the ratio. The results also indicate that among the businesses that experienced losses due to crime across the sectors, all workers were paid workers despite close to half of the workers being family members.

Table 6: Crime incidences and cost of losses due to crime

	mean	sd	min	max
Crime incidents per month (No.)	2	1	1	6
Total cost of private security per month (Ksh)	1,120	856	100	2,500
Total loss crime per month (Ksh)	9,341	9,927	800	50,000
Loss due to crime to sales ratio	0.5	0.6	0.0	3.3

Evidence indicates that the maximum loss due to crime in a month was Ksh 50,000 and a minimum of 800 as indicated in Table 6. On average, businesses lost Ksh 9,341 in a month. On average, informal businesses faced two incidences of losses due to crime, with six being the maximum incidences some businesses experienced. Most enterprises paid an average of Ksh 1,120 for private security per month.

Regression analysis for factors influencing loss due to crime

Using Multivariate Probit Model (MVP), the study sought to determine factors influencing loss due to crime shock among informal enterprises in Kenya. The MVP model converged satisfactorily using 446 observations out of 522, a Wald chi^2 (46) of 164.27 and a p-value of 0.000 (Table 7). The marginal effect results have been reported and discussed.

The factors expected to influence the probability of an enterprise facing a certain shock were grouped into 4 broad categories, namely: business environment, enterprise characteristics, and owner and employee characteristics. This helped identify which category had a higher and significance probability of influencing the shocks.

An informal enterprise having a business location or workspace increased the probability of incurring losses due to crime such as loss of stock and cash by 75 percentage points at 10 per cent significance level. This could be because criminals who could have posed as customers to find out what was inside the business structure or building also knew when the owner was not available, like at night, therefore taking advantage and breaking in. In addition, such enterprises could have been operating in areas prone to crime, and did not invest in hiring private security.

Table 7: Multivariate Probit Model (MVP) results of factors influencing loss due to crime shock

	Parameter estimates	Marginal effects		
	Coefficient	Std. Error	dy/dx	Std. Error
Business environment				
Central - location dummy	-0.327	0.329	-0.327	0.329
Nyanza - location dummy	0.084	0.303	0.084	0.303
Mombasa - location dummy	-0.499	0.306	-0.499	0.306
Nakuru - location dummy	-0.100	0.292	-0.100	0.292
Trade - sector dummy	0.159	0.253	0.159	0.253
Services - sector dummy	0.068	0.261	0.068	0.261
Enterprise characteristics				
Age business group	0.164	0.127	0.164	0.127
Work location – have	0.748*	0.448	0.748*	0.448
Work location – own	0.109	0.258	0.109	0.258

Owner and employee characteristics				
Gender of main worker 1=male, 0=female	0.567*	0.321	0.567*	0.321
Age of main owner – group	0.062	0.192	0.062	0.192
Gender main owner 1=male, 0=female	-0.480	0.306	-0.480	0.306
Education level main owner	-0.026	0.129	-0.026	0.129
Vocational train main owner	-0.065	0.237	-0.065	0.237
Working hours	-0.003	0.005	-0.003	0.005
Paying for private security	0.468**	0.221	0.468**	0.221
Model				
Constant	-2.347***	0.730		
5 arho31	0.067	0.090		
Observations	446			

Note: *, ** & *** Denotes significance at 10%, 5% and 1% levels, respectively

Enterprises managed by male employees were more prone to crime shocks compared to female-managed enterprises at 57 percentage points at 10 per cent significance level. This could be an indication of a probable corroboration between male employees as criminals who broke into work premises. Paying for private security variable was included in the crime shock explanatory variables. This was in consideration that when an enterprise hires private security, it could lower the probability of incidence losses due to crime. Contrary to expectations, paying for private security increased the probability of incurring losses due to crime by 47 percentage points at 5 per cent significance level. This may be attributed to either insecurity in the regions or crimes being organized by workers or the private security employees who may have collaborated with criminals.

Coping mechanism for loss due to crime shock

The analysis considered paying for private security as a coping mechanism for loss due to crime for informal enterprises. This entailed informal enterprises hiring private security either as individuals or as a group to safeguard their businesses.

Apparently, 61 per cent of the informal businesses that experienced losses due to crime did not pay for private security (Figure 11). The study also considered variation of businesses that pay versus those that did not pay for private security across the sectors as indicated in Figure 12.

Out of the businesses that experienced losses due to crime, only 39 per cent of them paid for private security (Figure 12). This means that majority (61%) of the businesses that experienced crimes did not pay for private security services for their business premises. The manufacturing sector had the highest number of enterprises that paid for private security (25%).

Figure 11: Characteristics of enterprises coping with crime shock by paying private security
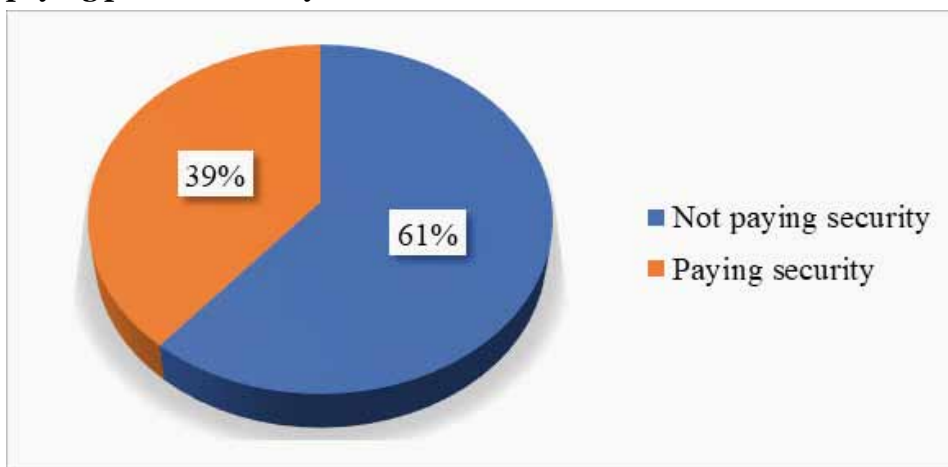

Figure 12: Firms affected by loss due to crime paying for private security
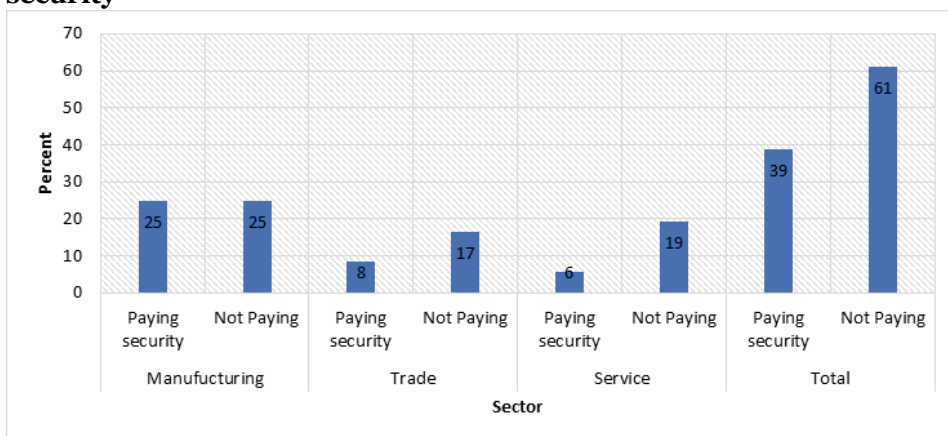
Table 8: Crime incidences and cost of losses due to crime

	mean	sd	min	max
Crime incidents per month (No.)	2	1	1	6
Total cost of security per month (Ksh)	1,120	856	100	2,500

Most enterprises experienced an average of two crime incidences per month. The highest number of times recorded by a single enterprise was 6 among firms that recorded facing crime incidences (Table 8). The minimum amount spent by enterprises on private security was Ksh 100 whereas the maximum was Ksh 2,500 per month.

Comparison of enterprises that suffered crime losses and those that did not suffer crime losses

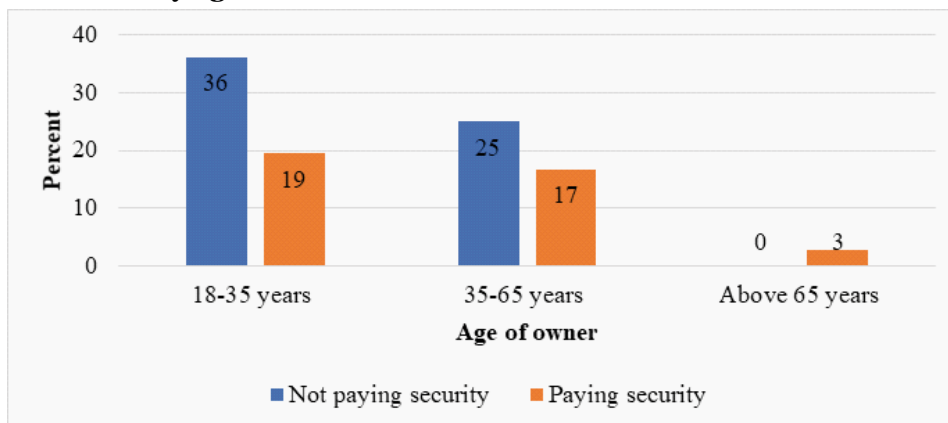**Table 9: Paying for private security for enterprises that experienced losses due to crime compared to those not affected by crime, by paying rent**

	Pay rent				Own premises			
	mean	sd	min	max	mean	sd	min	max
Experienced crime loss	1,671	787	600	2,500	477	305	100	1,000
Did not experience crime loss	1,086	1,116	100	3,500	2,383	6,245	100	40,000
Pooled	1,203	1,075	100	3,500	2,154	5,884	100	40,000

The study further explored the possibility of variation in paying for private security between the enterprises that paid for rent and those that owned the premises as shown in Table 9. On average, among enterprises that experienced loss due to crimes, those that paid rent paid more for private security (Ksh 1,671) compared to enterprises that did not pay rent (Ksh 477). This could mean that enterprises that did not pay rent could be operating from the owner's premises with good security measures or probably because they are located near residential areas, which could have pooled private security or less incidences of crimes hence no need to pay for private security.

The age of the main owner was put into consideration to assess whether age was likely to influence the decision to pay for private security (Figure 13).

Figure 13: Paying for private security by enterprises that experience crime loss by age of owner

The findings indicate that age had low variation in paying for private security among the enterprises that faced loss due to crime as indicated in Figure 13. On the other hand, gender of the owner of the enterprise seemed to influence the decision to pay for private security. There was a higher number of male-owned enterprises that faced loss due to crime and paid for private security (36%) compared to only 3 per cent of female-owned enterprises that paid for private security (Figure 14).

Figure 14: Paying for private security for enterprises that experience crime loss, by gender of owner
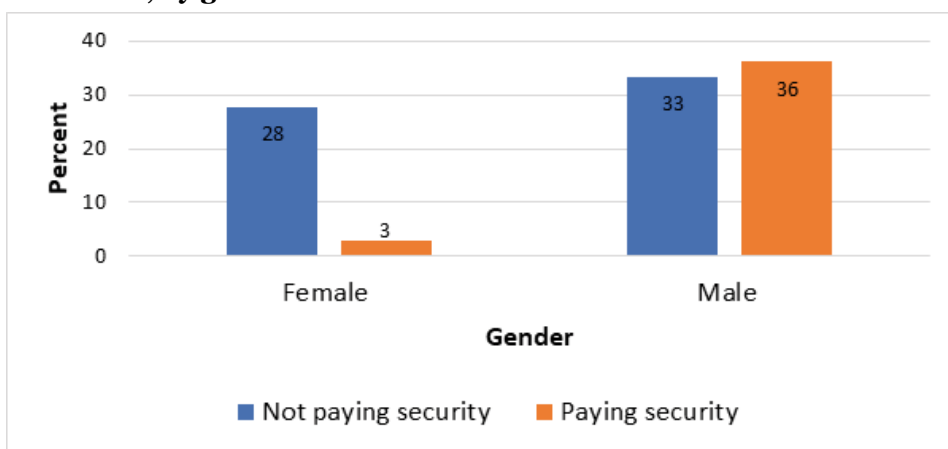
Education level of the owner varied across the decision of an enterprise to pay for private security (Figure 15).

Figure 15: Paying for private security for enterprises that experienced crime loss, by education level of owner
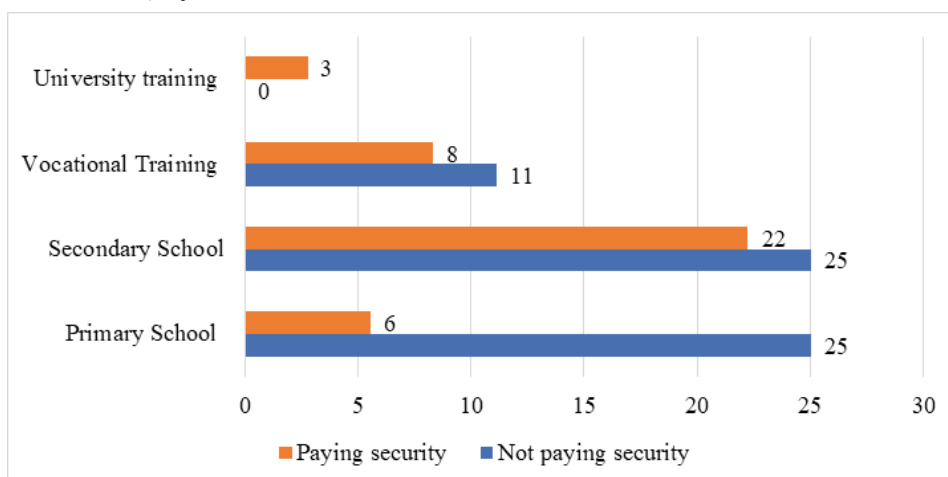
Majority of the businesses that paid for private security were those whose owner had secondary education followed by vocational training. Apparently, all the enterprises owned by persons with university training paid for private security. This could be influenced by the fact that with their education level, they could be more aware of the importance of private security in safeguarding the losses that could occur as result of crime. Therefore, as a risk preventive measure, they considered hiring private security.

The study further explored a possibility of age of the enterprise influencing decisions to pay for private security as indicated in Figure 16.

Figure 16: Paying for private security for enterprises that experience crime loss, by age of business
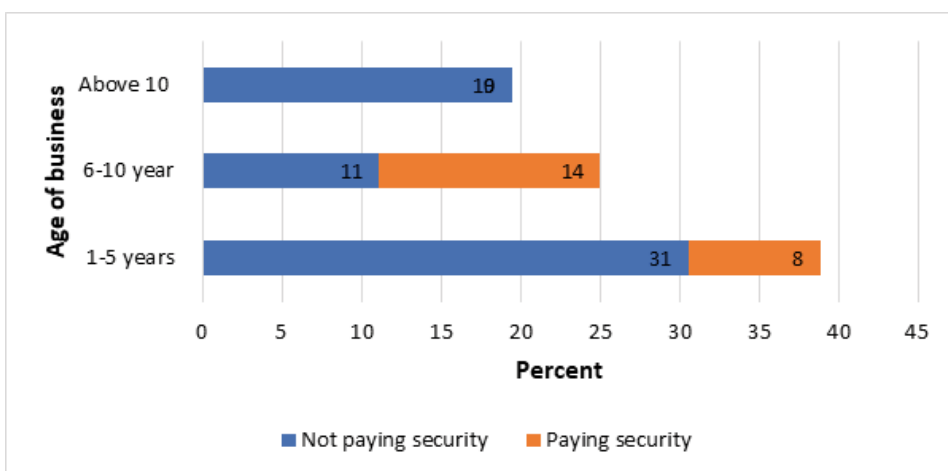
The results show that out of all the enterprises that experienced losses due to crime, majority did not pay for private security. Majority of enterprises that had been in operation for a relatively longer period (between 6 and 10 years) paid for private security compared to businesses that have been in operation below 6 years. This could further be explained by the fact that most businesses that faced crime incidences had been in operation for an average of 9 years as it was indicated earlier in the paper. Interestingly, none of the businesses above 10 years paid for security.

Regression analysis for factors influencing paying for private security as a coping mechanism for crime shock

Multivariate Probit Model (MVP) was adopted to determine factors influencing paying for private security as a coping mechanism for crime shocks among informal enterprises in Kenya. The MVP model converged satisfactorily with a Wald chi^2 (39) of 918.20 and a p-value of 0.000 as shown in Table 10.

Table 10: Factors influencing choice of paying private security to cope with crime shock

	Parameter estimates		Marginal effects	
	Coefficient	Std. Error	dy/dx	Std. Error
Shock				
Crime losses	0.588	(0.363)	0.588	0.363
Business environment				
Central - location dummy	-0.310	(0.294)	-0.310	0.294
Nyanza - location dummy	-1.550***	(0.493)	-1.550***	0.493
Mombasa - location dummy	-1.030***	(0.358)	-1.030***	0.358
Nakuru - location dummy	-0.479	(0.317)	-0.479	0.317
Trade - sector dummy	-0.215	(0.325)	-0.215	0.325
Services - sector dummy	-0.296 (0.322)		-0.296	0.322
Enterprise characteristics				
Age of business – group	0.105	(0.168)	0.105	0.168
Work location – have	0.079 (0.309)		0.079	0.309
Work location – own	0.840***	(0.323)	0.840***	0.323
Owner and employee characteristics				
Gender of main worker (1=male, 0=female)	0.523**	(0.251)	0.523**	0.251
Age group main owner	-0.139	(0.244)	-0.139	0.244
Vocational train main owner	0.0542	(0.256)	0.054	0.256
Working hours	-0.014**		-0.014***	0.005
Marginal effects after mvprobit				
y Linear prediction =	(0.00528)	-0.898		
Constant	0.062	(0.630)		
(5) atrho31	-0.017	(0.368)		

Note: *, **, *** Denotes significance at 10%, 5% and 1% levels, respectively

Based on the business characteristics, an informal enterprise located in Nyanza, which had faced loss due to crime, relative to one located in Nairobi had a lower probability of paying for private security by 155 percentage points at 1 per cent significance level. This could be because Nyanza had lesser incidences of crime

compared to Nairobi. According to the National Police Service Annual Crime Report 2016, the incidence of crime shown by the number of reported crimes according to prevalence indicated that Nairobi led among the 5 selected counties for this study (at number 3 nationally). Kisumu (which is in Nyanza) was ranked number four (4) out of five (5). Similarly, an informal enterprise that had faced loss due to crime and was in Mombasa relative to one located in Nairobi had a lesser probability of paying for private security by 103 percentage points at 1 per cent significance level. This could also be because Mombasa had fewer incidences of crime compared to Nairobi. The National Police Service Annual Crime Report 2016 ranked Mombasa number five (5) out of five (5) among the five selected regions for this study.

Based on enterprise characteristics, the probability of an informal enterprise that owns a location, or a work space relative to those that did not own work space paying for private security increased by 84 percentage points at 10 per cent significance level. This could be because in shared locations or in open access work sites, owners of businesses were reluctant to invest in pooled or individual security compared to enterprises that own their location or work space.

The findings indicate that the probability of a male-owned enterprises paying for private security relative to a female-owned enterprise increased by 52 percentage points at 5 per cent significance level. Probably, male-owned enterprises were more capital intensive and had valuable equipment compared to female-owned enterprises, and therefore the need to pay for private security to secure the valuables.

The probability of enterprises working for long hours paying for private security relative to those working for few hours reduced by 1 percentage point at 1 per cent significance level. Probably, businesses that opened for long hours did not see the need to have security since the owners were within the business premises for long and leave the premises late at night.

Interestingly, the sector in which an enterprise operated in had no significance influence on the paying for private security among businesses that experienced loss due to crime.

Other shocks faced by some of the enterprises that experience losses due to crime

Some businesses that experienced crime shocks also experienced other shocks such as electricity outage, and harassment by government officials.

Majority of the firms that experienced loss due to crime (69%) also experienced harassment by government officials or police as shown in Figure 17. Similarly, out of the businesses that experienced loss due to crime, 80 per cent also experienced power outages (Figure 18).

Figure 17: Experienced losses due to crime and harassment
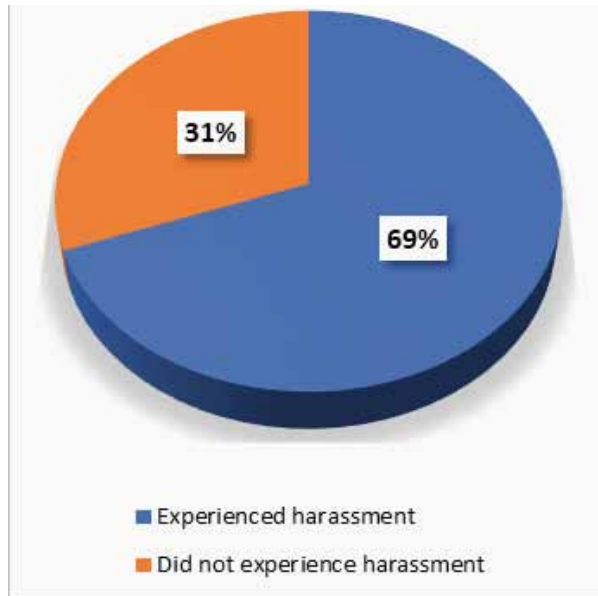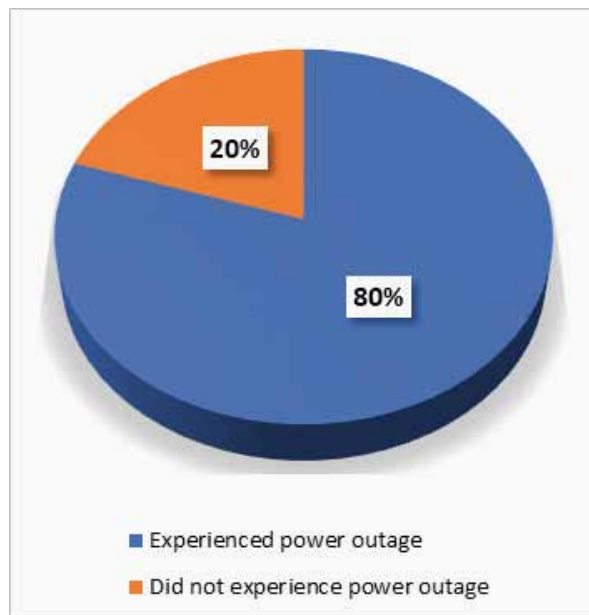

Figure 18: Experienced losses due to crime and power outage

The highest proportion of enterprises that experienced losses due to crime and were harassed were in the manufacturing sector. Similarly, some enterprises experienced losses due to crime and faced power outages shocks (Figure 19). Those that experienced both shocks were 20 per cent of the enterprises that were affected by power outages. Trade sector had most enterprises that experienced loss due to crime also experiencing power outage (50%), whereas manufacturing had the least (17%).

Figure 19: Suffered losses due to crime and other shocks distributed by sector
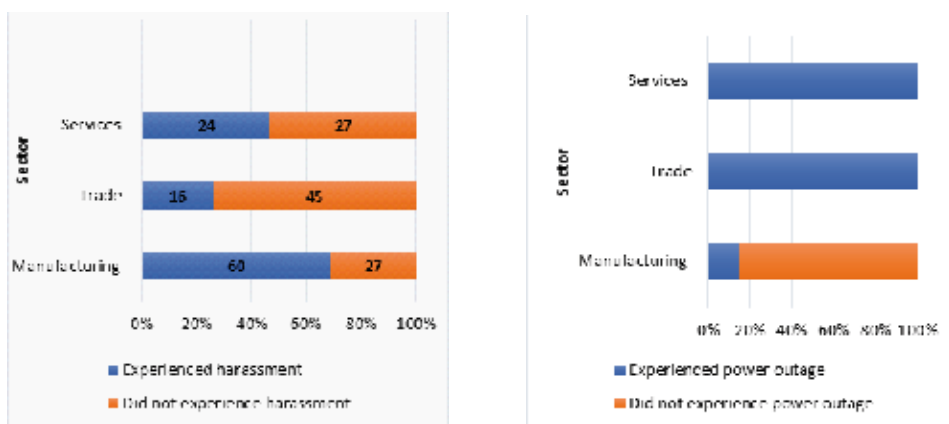
*Source: World Bank Enterprise Survey 2013*

4.2.2 Harassment by government officials

Descriptive analysis for harassment by government officials

The results indicate that 20 per cent of the sampled businesses were harassed by government officials (Figure 20). This includes physical harassment and paying bribes.

The study sought to find out which sectors were more prone to harassment by government officials or police as indicated in Figure 21.

Half (50%) of the harassed informal enterprises operated in the manufacturing sector as indicated in Figure 21. This could be because most manufacturing activities require a relatively permanent physical work space to operate. Therefore, it could have been easy for officials to locate them and if they had not complied with government regulations or just because the officials knew they really needed the space to do their operations, they tended to be harassed. Enterprises in the services industry were least harassed (15%).

Figure 20: Harassment by government officials
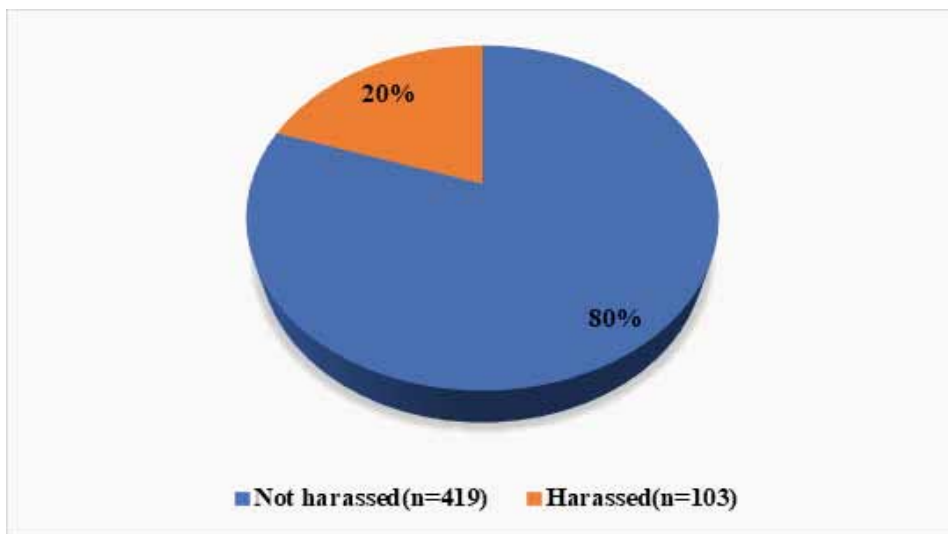
Figure 21: Harassment of the enterprises by government officials by sector
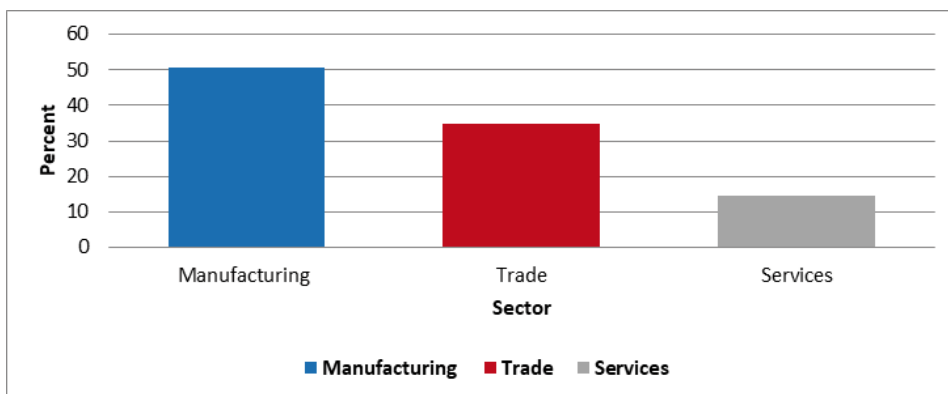
The World Bank IFS 2013 results show that majority of the harassed businesses were in Mombasa and Nairobi, with a proportion of 44 per cent and 33 per cent, respectively (Figure 22). Central and Nyanza regions enterprises were the least harassed with a proportion of 5 per cent and 6 per cent, respectively. The MSME 2016 shows that majority of Nairobi-based enterprises stated interference by authorities as a main constraint (at 50% of stated cases) while Nakuru followed with 28 per cent (Figure 23). The results were relatively similar to the World Bank IFS 2013 where Nairobi and Nakuru were ranked second and third, respectively, in terms of harassment by government officials. This could be because of more vibrant informal business activities and incidences of informal businesses operating in

Figure 22: Harassment of the business by region
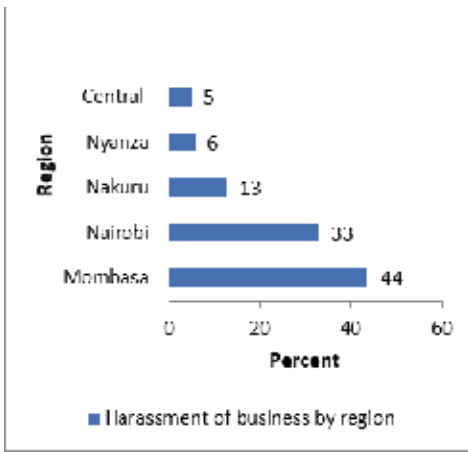
Figure 23: Interference by authority by region

Source: World Bank's Informal Enterprise Survey (IFS) 2013
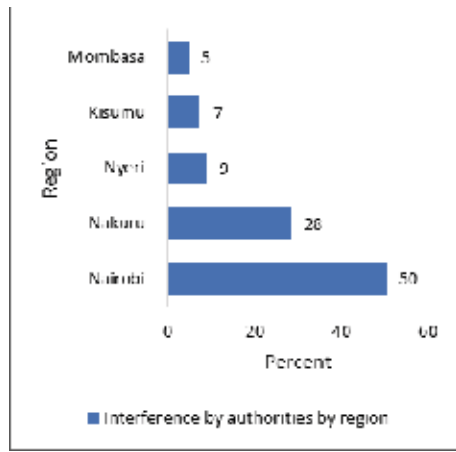
Source: MSME Survey 2016

undesignated areas in these two towns. Nyeri, Kisumu and Mombasa enterprises had the least proportion of enterprises that felt interference by authorities was a main constraint. Notably, Mombasa was leading in 2013 in terms of harassment as indicated by World Bank's IFS 2013. However, in the MSME Survey, it came last. This indicates a significant reduction in interference by government officials, which could be attributed to new strategies or policy changes.

The gender of the main operator of an enterprise was put into consideration to understand if gender determined the possibility of enterprises being harassed by government officials or police (Figure 24).

Figure 24: Harassment by the gender of the main operator of the enterprise
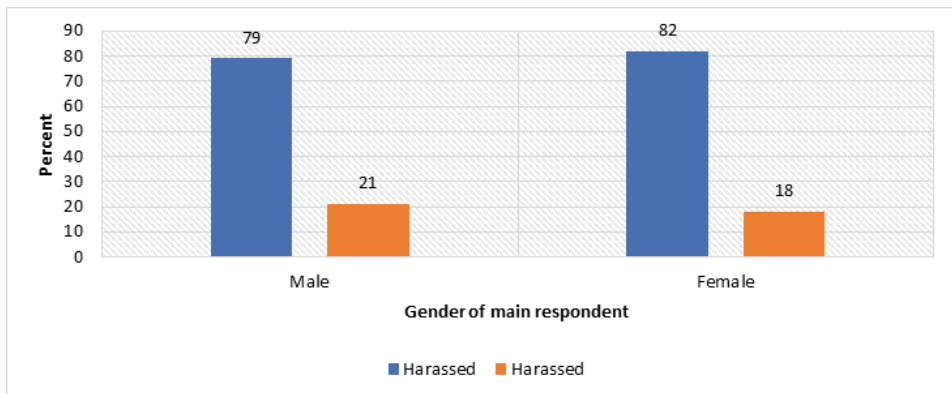
Apparently, the study found that gender of the main operator of the enterprises did not necessarily influence harassment of a business (Figure 24). About 21 per cent of the enterprises were male-operated and were harassed, whereas 18 per cent of the enterprises that were female-operated were harassed. The male-operated enterprises were more than the female-operated enterprises in the survey. Therefore, there was no strong link between gender and harassment by government officials or police.

Majority (80%) of the harassed enterprises had a physical location and very few of the enterprises had no physical location (Figure 25). This could mean that government officials could have had easy access to enterprises with a physical location than those that had no specific location. This could have made it easier to harass such enterprises more because the officials knew the opportunity cost of relocation would be too high to bear for the affected enterprises.

Figure 25: Harassed and having physical location
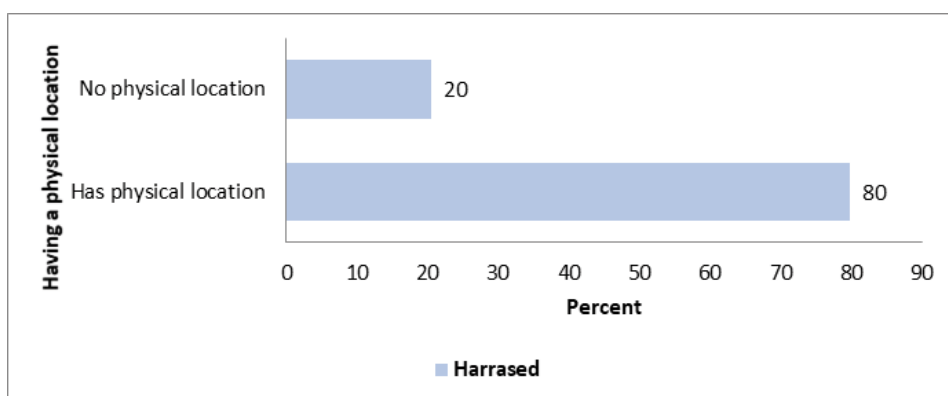
The study also assessed if the age of the business had influence on the likelihood of an enterprise being harassed.

The findings indicate that 50 per cent of the enterprises that are harassed were the young businesses (1-5 years old) as shown in Figure 26. This would probably be because most young businesses had some challenges complying with regulations and laws. Therefore, to some extent, age of the business could have had some influence on an informal enterprise being harassed.

Figure 26: Age of harassed businesses
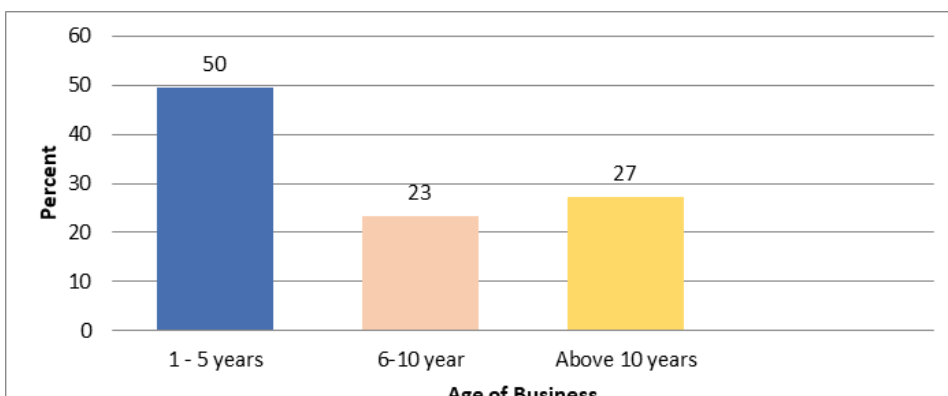
Regression analysis on the factors influencing harassment of enterprises

Regression analysis of factors influencing the likelihood of facing harassment shock among informal enterprises shows that the Multivariate Probit (MVP) model converged satisfactorily using 446 observations out of 522, a Wald chi^2(46) of 164.27 and a p-value of 0.000. The marginal effect results are reported and discussed as shown in Table 11.

Table 11: Multivariate Probit Model (MVP) results of factors influencing harassment shock

	Parameter estimates		Marginal Effects	
	Coefficients	Std. Error	dy/dx	Std. Error
Business environment				
Central - location dummy	-1.149***	0.301	-1.149***	0.301
Nyanza - location dummy	-0.742***	0.256	-0.742***	0.256
Mombasa - location dummy	0.252	0.195	0.252	0.195
Nakuru - location dummy	-0.719***	0.256	-0.719***	0.256
Trade - sector dummy	-0.032	0.201	-0.032	0.201
Services - sector dummy	-0.152	0.217	-0.152	0.217
Enterprise characteristics				
Age business group	-0.046	0.107	-0.046	0.107
Work location – have	0.147	0.250	0.147	0.250
Work location – own	0.702***	0.202	0.702***	0.202
Owner and employee characteristics				
Gender of main worker (1=male, 0=female)	0.179	0.260	0.179	0.260

Age of main owner – group	0.202	0.158	0.202	0.158
Gender main owner (1=male, 0=female)	0.154	0.260	0.154	0.260
Education level main owner	0.195*	0.108	0.195*	0.108
Vocational train main owner	-0.097	0.201	-0.097	0.201
Working hours	-0.003	0.004	-0.003	0.004
Model				
Constant	-1.598***	0.522		
(4) atrho21	0.945***	0.165		
Observations	446			

Note: * & *** Denotes significance at 10% and 1% levels, respectively

An informal enterprise located in Central, Nyanza and Nakuru relative to being located in Nairobi had a significantly lesser probability of experiencing harassment from government officials by 115, 74 and 72 percentage points, respectively, at 1 per cent significance level. This could be due to improved security measures in worksites. This is an indication of a higher incidence of enterprises being harassed by government officials in Nairobi compared to other towns. In addition, it could be because there were more informal enterprises in Nairobi operating in unauthorized worksites, hence increasing the likelihood of being harassed as government officials tried to move them out of such places. This includes street vendors within the Central Business District (CBD) and along major roads of Nairobi city.

An enterprise owning the location of the business increased the probability of being harassed by government officials by 70 percentage points at 1 per cent significance level. This could be an indication of harassment not only being a preserve of enterprises that did not own a work location (work space) but being a tendency of some government officials trying to extort money inform of bribes from informal enterprises. Probably, some of those who did not own a location, like hawkers, were able to run away with their merchandise when such officials appear unlike those who owned worksites and could not run away with their merchandise. This concurs with Webb et al. (2012) who noted that street vendors tend to sell merchandise they can easily carry when government officials crack down on them.

Increase in the education level of the owner of an informal enterprise by one level increased the probability of being harassed by 20 percentage points at 10 per cent significance level. This implies that enterprises owned by more educated people had a higher probability of experiencing harassment. The explanation to this could be due to their awareness and refusal to pay bribes to the officials and therefore

ending up being harassed more than those who were not highly educated.

Coping mechanism for harassment

Intention to formally register an enterprise to avoid harassment was taken as a proxy of how informal sector enterprises coped with harassment by government officials. As a coping mechanism for harassment, most enterprises (68%) were willing to register their businesses to avoid paying bribes and other forms of harassment by government officials (Figure 27).

Figure 27: Harassed and would like to register the business
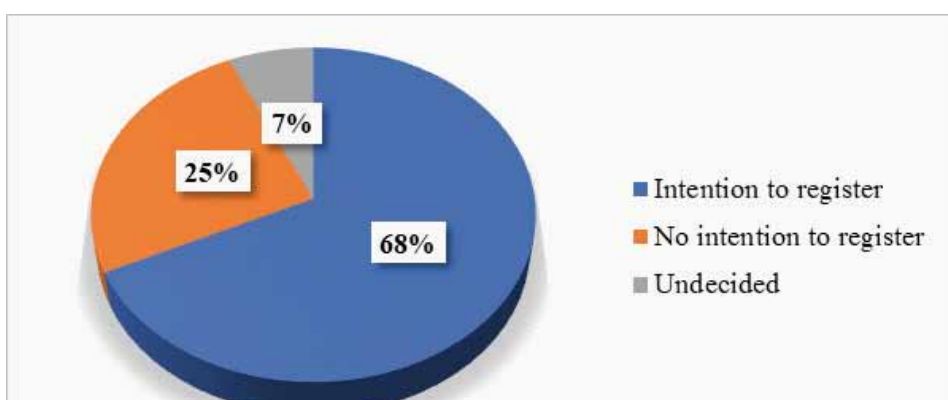
The age of the owner of the enterprise may in a way have influenced the intentions to register a business (Figure 28).

Figure 28: Intentions of harassed businesses to formalize by age of the owner
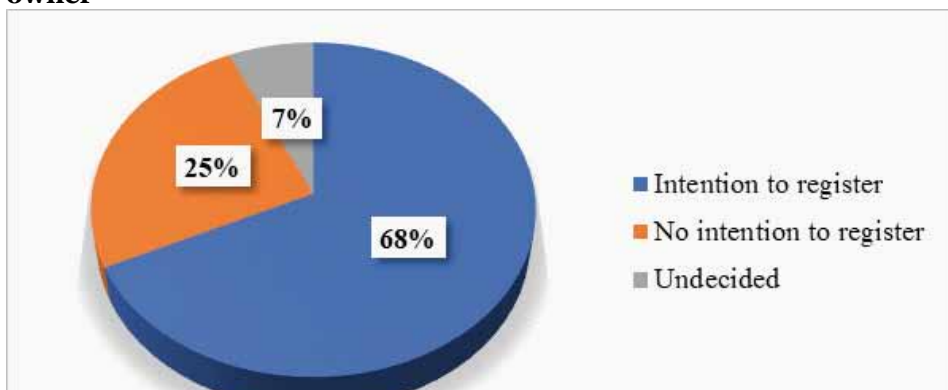
Enterprises owned by individuals who were between 35 and 65 years (senior adults) led in terms of intentions to register business amidst harassment, followed by enterprises owned by youth. Similarly, the gender of the owner of the enterprise seemed to influence the intention to register an enterprise among the harassed enterprises as indicated in Figure 28.

The study also assessed if there was variation in gender of the owner of an enterprise that faced harassment by government officials, and the intentions to formalize (Figure 29).

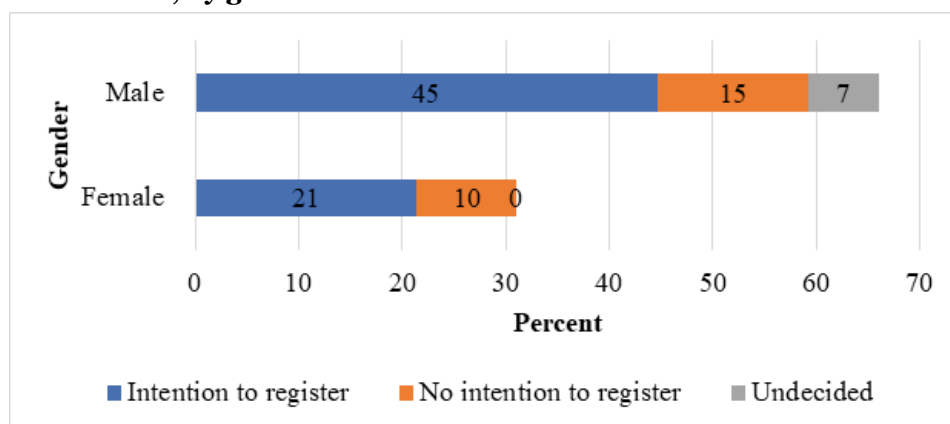**Figure 29: Intention to formalize for enterprises that experienced harassment, by gender of owner**

The findings indicate that the gender of the owner could have been an important determinant of the intentions to formalize. About 45 per cent of the businesses that led with the intentions to register were male-owned compared to 21 per cent women-owned enterprises, with the intentions to register. Similarly, education level of the owner seemed to influence intentions to register informal enterprises to escape harassment (Figure 30).

Enterprises whose owners have secondary and vocational training education level indicate that they would like to register their businesses compared to those with primary and no education. Interestingly, all enterprises owned by persons with university training have intentions to register their businesses. This could be due to the level of awareness of the benefits associated with formalization.

Businesses age is considered an important variable in analysing the intentions to register business among the businesses that were harassed (Figure 31).

Apparently, majority of the businesses with an intention to register were young businesses (1-5 years) as shown in Figure 31. This is an indication that it could be

Figure 30: Intention to formalize for enterprises that experienced harassment, by education level of owner
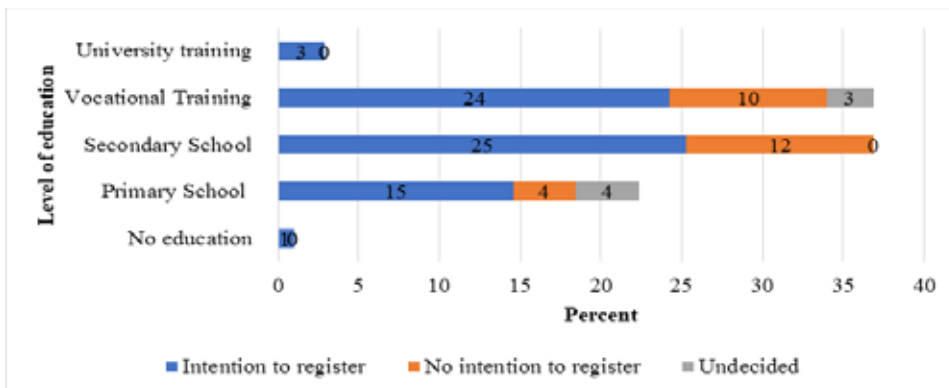
Figure 31: Intention to formalize for enterprises that experienced harassment, by age of business
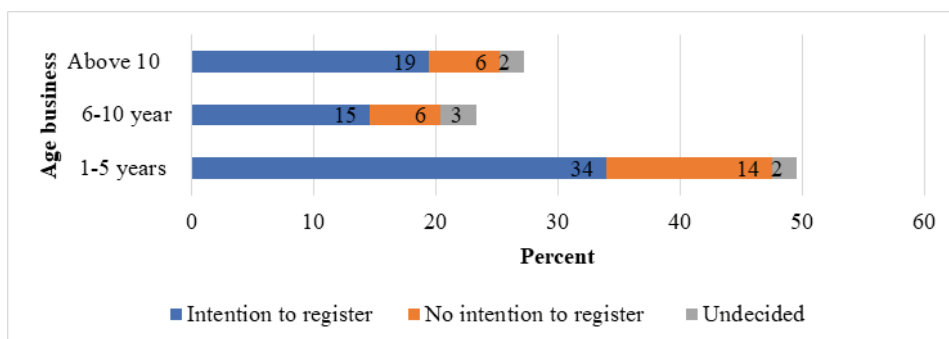
easier to encourage and support new ventures in the informal sector to formalize as a way of helping them cope with harassment by government officials.

Regression analysis on the factors influencing harassment shock coping mechanism

Results from regression analysis of factors influencing harassment shock coping mechanisms using Multivariate Probit (MVP) model shows the model converged satisfactorily with a Wald chi^2 (39) of 918.20 and a p-value of 0.000 as shown in Table 12.

Table 12: Results for the factors influencing intention to formalize as a coping mechanism for harassment shock

	Parameter estimates		Marginal Effects	
	Coefficients	Std. Error	dy/dx	Std. Error
Shock				
Harassment by government officials	1.546*** (0.304)		1.546***	0.304
Business environment				
Central - location dummy	-1.515***	0.345	-1.515***	0.345
Nyanza - location dummy	-0.446	0.474	-0.446	0.474
Mombasa - location dummy	0.283	0.319	0.283	0.319
Nakuru - location dummy	0.574*	0.320	0.574*	0.320
Trade - sector dummy	0.578*	0.312	0.578*	0.312
Services - sector dummy	0.689**	0.317	0.689**	0.317
Enterprise characteristics				
Age of business - group	-0.0950	0.168	-0.095	0.168
Work location – have	0.0693	0.399	0.069	0.399
Work location – own	0.0791	0.298	0.079	0.298
Owner &and employee characteristics				
Gender of main worker (1=male, 0=female)	0.0209	0.241	0.021	0.241
Age group main owner	0.138	0.258	0.138	0.258
Vocational train main owner	0.265	0.268	0.265	0.268
Working hours	0.00706	0.00558	0.007	0.006
Marginal effects after mvprobit				
y Linear prediction =		-0.668		
Model				
Constant	-1.763**	0.723		
(4) atrho21	0.0417	0.134		
Observations	193			

Note: *, **, *** Denotes significance at 10%, 5% and 1% levels, respectively

The results indicate that experiencing harassment by government officials increased the probability of intending to formalize an informal enterprise by 155 percentage points at 1 per cent significance level. This could be because harassment involved paying bribes, which reduced the returns made by informal enterprises hence the need to formalize for enterprises that faced harassment.

A business located in Central region relative to a business located in Nairobi had a lower probability of formally registering the enterprise by 152 percentage points at 1 per cent significance level. This is probably because Central had the least

incidences of harassment in comparison to other regions; therefore, there is no pressure to formalize to escape paying bribe and other forms of harassment. On the other hand, an informal enterprise located in Nakuru relative to one located in Nairobi had a higher probability of formally registering the enterprise to reduce harassment by 57 percentage points at 10 per cent significance level.

An informal enterprise in the trade sector relative to manufacturing had a higher probability of formally registering its business to reduce harassment by 58 percentage points at 10 per cent significance level. This could be because enterprises in trade probably did not have or own work locations or spaces, hence faced higher risk of harassment, unlike the manufacturing businesses. These include hawkers and roadside traders of different traded products, unlike manufacturing where in most cases an enterprise had a specific working site. Similarly, an enterprise in the services sector relative to manufacturing had a higher probability of formally registering business to reduce harassment by 69 percentage points at 5 per cent significance level. Despite the service enterprises being the least harassed, their greater intentions to formalize would probably emanate from the stiff competition within the industry and the need to earn client's trust and confidence in their services by displaying business licenses for services such as salon, barber shops and electric equipment repairs.

Enterprise characteristics such as the age of the business and work location as well as owner characteristics such as gender, age and education did not have a significant influence on the businesses intention to formalize when faced by harassment issues.

Comparison of harassed enterprises with those not harassed

The study considered the importance of assessing the variations between businesses that were harassed and those that were not harassed, putting into consideration factors such as age of the business, revenue cost ratio, paid worker ratio and family worker ratio (Table 13).

Table 13: Comparison of harassed enterprises with those not harassed

		Mean	Sd	Min	Max	T-value	P-Value
Age of business	Harassed	8.2	7.6	1.0	41	-1.7041*	0.089
	Not Harassed	7.0	5.7	1.0	41		
Revenue cost ratio	Harassed	2.2	3.0	0.5	26	1.2062	0.2284
	Not Harassed	2.9	5.4	0.2	50		

Paid worker ratio	Harassed	1.0	0.2	0.0	1	0.6378	0.5239
	Not Harassed	1.0	0.2	0.0	1		
Family worker ratio	Harassed	0.5	0.5	0.0	1	-1.8037*	0.0719
	Not Harassed	0.4	0.5	0.0	1		

Note: * denotes significant difference at 90% level

The findings indicate that there was significant difference between the average age of harassed businesses and those that were not harassed. On average, the business that were harassed had been in operation for 8 years whereas those which were not harassed had been in operation for 8 years. Similarly, there was a significant difference between the average family worker ratios of the harassed businesses and those that were not harassed. The results indicate that businesses that faced harassment had more family workers than businesses that did not experience harassment. Businesses that were harassed also made less returns per unit of capital invested. On average, a shilling invested by enterprises that were not harassed gave a return of three shillings compared to a shilling invested by harassed businesses, which gave two shillings as returns. Interestingly, on average, all the workers in the harassed businesses and those which were not harassed paid their workers as indicated by paid worker ratio.

Other shocks faced by some of the enterprises which were harassed

Besides experiencing harassment, it was important to consider if the businesses also faced other types of shocks which could affect their operations.

The results indicate that, out of harassed enterprises, 88 per cent faced power outage. About 25 per cent of the harassed enterprises also experienced loss due to crime (Figure 33).

The services sector had the highest number of enterprises facing harassment and loss due to crime (Figure 34). Most of those enterprises facing the two shocks were in Nyanza and Central regions (Figure 35). Mombasa, which had the most harassed businesses, had the least enterprises that faced both harassment and loss due to crime. This indicates that harassment was the most prominent shock in Mombasa compared to other shocks that enterprises in other regions faced.

Figure 36 shows how the sectors varied in terms of enterprises that were harassed by government officials and also faced power outage problems.

Businesses in the services sector were most affected by the two shocks (harassment and loss due to crime) compared to trade and manufacturing (Figure 36).

Nairobi region took the lead of the businesses that faced harassment and power

Figure 32: Harassed and faced power outage
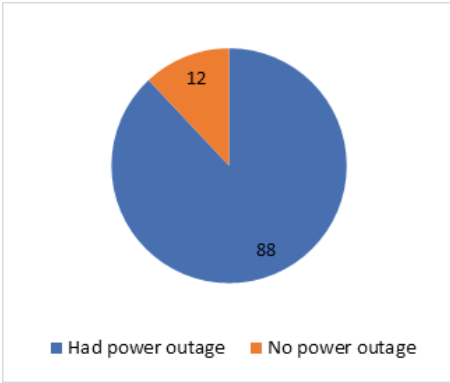

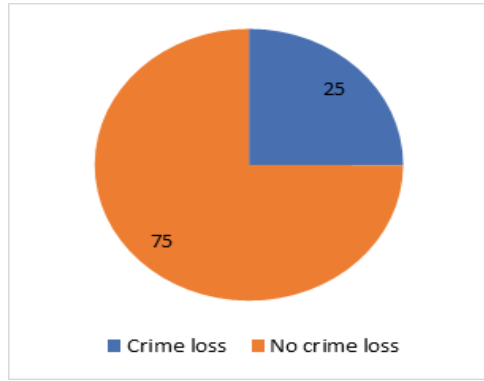**Figure 33: Harassed and loss due to crime**

Figure 34: Harassment and loss due to crime by sectors
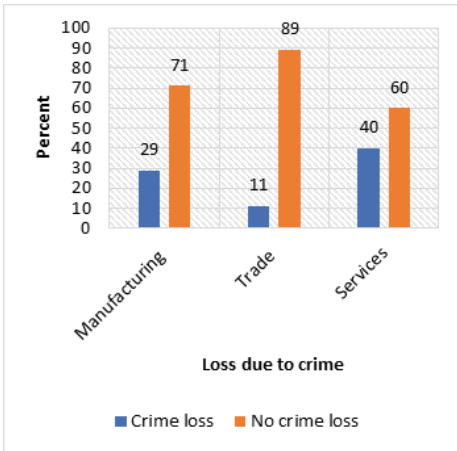
Figure 35: Harassed and had crime loss by regions
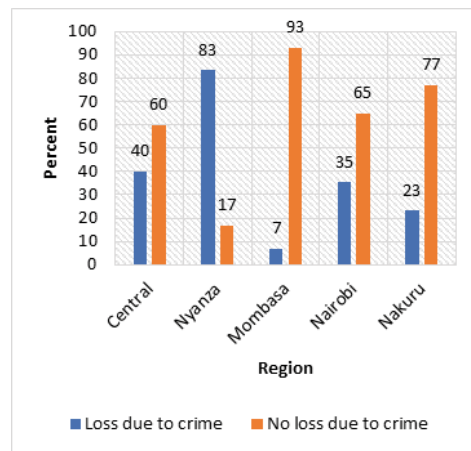
Figure 36: Harassed and had power outage by sector
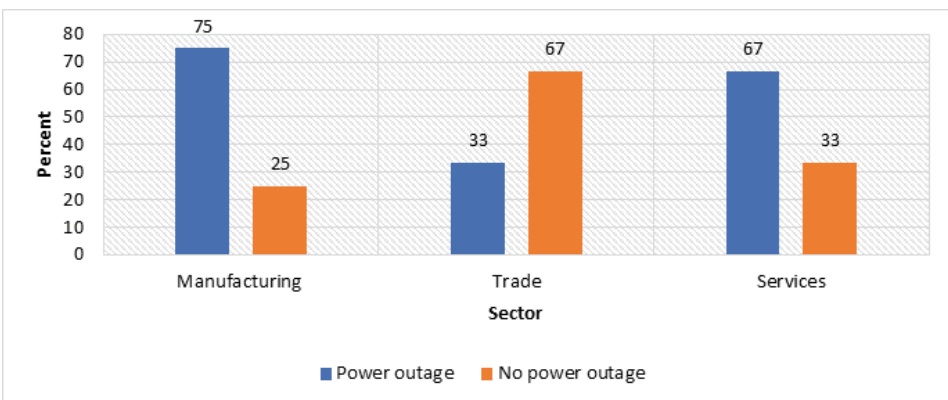
Figure 37: Harassed and had power outage
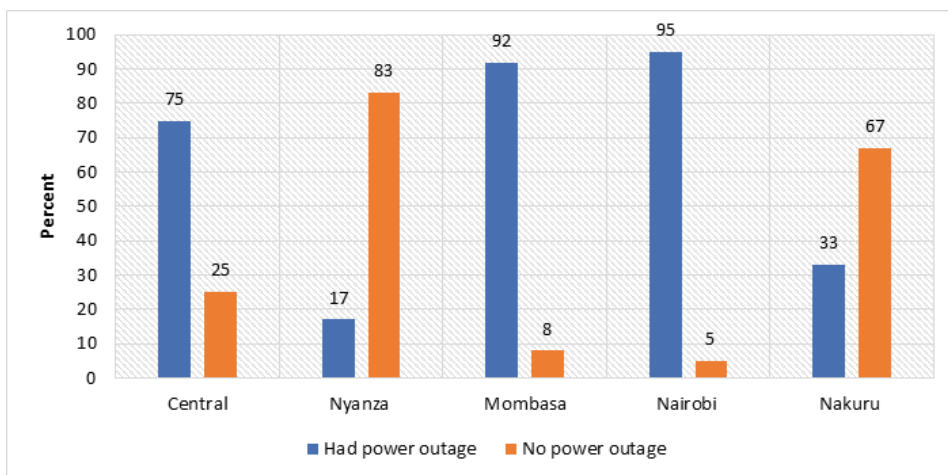
outage (Figure 37). Nakuru region had the least enterprises (33%) that faced both harassment shock and power outage.

4.3.3 Power outages shock

Descriptive statistics of power outages shock

Informal enterprises that were sampled in the World Bank Informal Enterprises Survey 2013 also face power outage as one of the major shocks.

Figure 38: Firms experiencing power outage
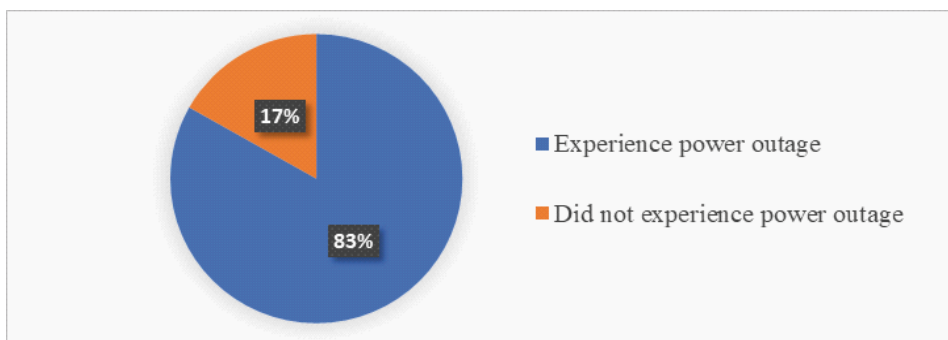
Majority (83%) of informal enterprises experienced power outages. This indicates that power outage was a common shock among the informal enterprises (Figure 38).

Majority of the firms that experienced power outage were in the manufacturing sector (41%) as indicated in Figure 39. This could be because manufacturing

Figure 39: Firms experiencing power outage by sector
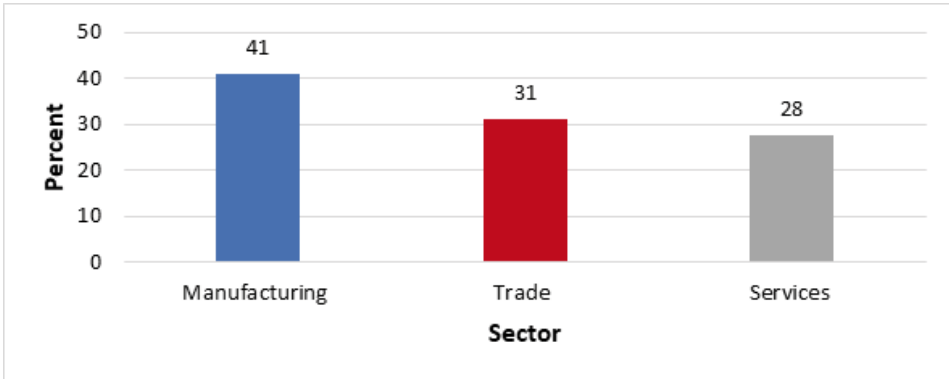
enterprises such as those in metal products, furniture, handcraft and food processing require electricity to run. Therefore, when there is power outage, they easily notice and feel the effect, and are more likely to report having faced power outage.

It was important to analyze power outage experiences by region to find out the variations. The study considered power outage affecting businesses that were sampled by the two data sets; World Bank Informal Enterprise Survey 2013 and MSME Survey 2016 by KNBS.

Figure 40: Experience power outage across regions by region
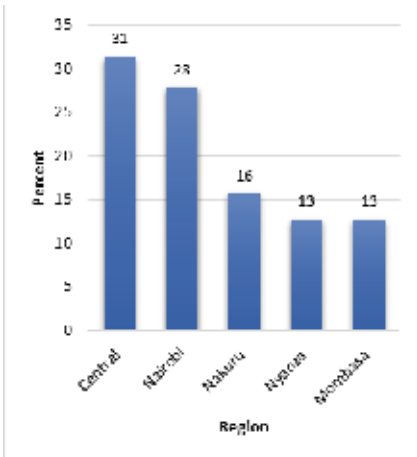
Source: World Bank's Informal Enterprise Survey (IFS) 2013

Figure 41: Power interruption is a main constraint by County
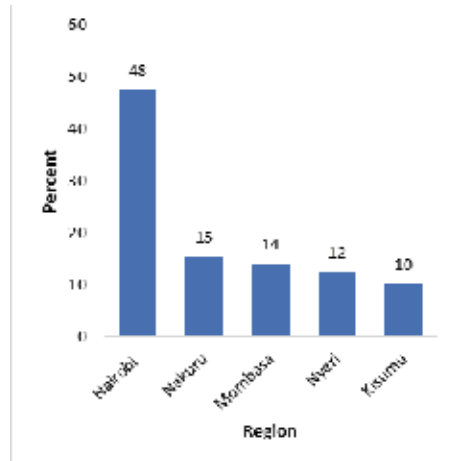
Source: MSME Survey 2016

As indicated by World Bank's Informal Enterprise Survey (IFS) 2013, Central (Nyeri) and Nairobi regions had most enterprises experiencing power outages. Mombasa was the least affected according to the survey (Figure 40). Nevertheless, a survey on power interruption by KNBS in 2016 indicates a shift in variations of power interruptions. The MSME Survey by KNBS shows Nairobi leading followed by Nakuru and Mombasa (Figure 41). Central (Nyeri), which was leading in 2013, was recorded among the regions least affected by power interruption in 2016. This could probably be due to better connectivity under the rural electrification programme in the latter years.

The study explored the possibility of enterprises facing electricity inaccessibility challenges. The analysis was conducted for the regions to check on the variations (Figure 42). Results indicate that Nairobi and Nakuru enterprises encountered more electricity inaccessibility problem compared to Nyeri and Mombasa.

Figure 42: Electricity inaccessibility a main constraint to enterprises
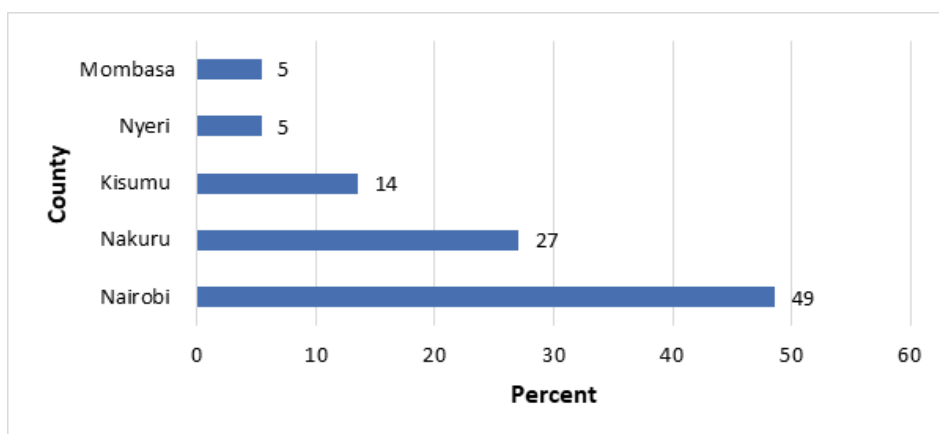
Source: MSME Survey 2016

The study also sought to analyze the frequency and intensity of power outages and the use of generators by region (Table 14).

Table 14: Other general characteristics (averages) of enterprises that face power outage by region

	Central	Nyanza	Mombasa	Nairobi	Nakuru	Total
Number of power outages last 1 month (No.)	7.1	15.7	3.8	7.5	7.9	8.0
Power outages lasted (hours)	1.7	23.3	3.6	11.5	3.8	7.5
Proportion of electricity from generator used (%)	6.0	0.0	0.0	8.5	0.0	7.7
Revenue to cost ratio	2.3	2.5	2.0	5.7	3.1	3.1

Power outages were frequent and lasted longer in Nyanza regions than in Central and Nairobi regions. Enterprises in Nyanza had almost double (15.7 outages on average) the average number of power outages in other regions per month (Table 14). The outages also lasted longer in Nyanza (23.3 hours on average) compared to regions such as Central where it lasted the shortest time at 1.7 hours on average. Mombasa had the least number of power outages, on average, but with zero use of electricity from generators on average. Despite Nyanza-based enterprises having the highest frequency and intensity of power outages, it was among the regions with lowest use of generators. This could be because enterprises in Nyanza could not afford use of generators because of low revenue to cost ratio (2.5) compared to enterprises in other regions such as Nairobi where more enterprises used generators and had a higher revenue to cost ratio (5.7).

Table 15: Other general characteristics of enterprises that faces power outage by sector

	Manufacturing	Trade	Services	Pooled
	mean	mean	mean	mean
Number of power outages last 1 month (No.)	10.5	6.0	6.7	8.0
Power outages lasted (hours)	6.0	5.0	12.5	7.5
Proportion of electricity from generator used (%)	2.0	0.0	10.5	7.7
Revenue to cost ratio	2.0	3.8	2.9	2.8

An analysis by sector indicates that, on average, the manufacturing sector was the most affected by power outage with 11 outages in a month compared to trade and service sectors which experienced 6 and 7 outages, respectively (Table 15). The outages faced by the services sector enterprises lasted for a longer time, averagely 13 hours per outage compared to 5 and 6 hours in trade and manufacturing sector, respectively. Amidst power interruptions, manufacturing enterprises' revenues

could have been affected most by power outages compared to trade and service enterprises. For a shilling invested in an enterprise in manufacturing that was affected by power outages, its return was 2 shillings, which is below the average of 2.8 shillings for all enterprises affected by power outages. Trade businesses, which recorded fewer encounters of power outages compared to other sectors, had higher returns of 3.8 shillings for a shilling invested. This indicates that power outages affect the production and service delivery processes of informal enterprises.

Comparison was also done using the age of the firm (Figure 48). Almost half of the firms that experienced power outages were between one to five years (48%). Probably, this was because younger informal enterprises had no physical workspace with permanent electricity connection, hence more vulnerable to power outages.

Figure 43: Experiencing power outage by age of the enterprise
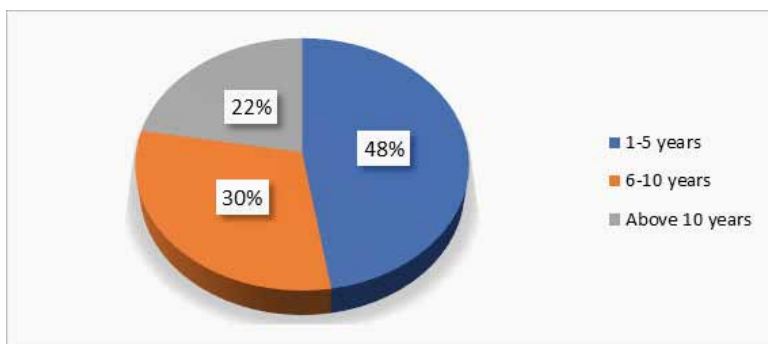
Regression analysis on factors influencing power outage shock

Using Multivariate Probit Model (MVP), the study sought to determine the factors influencing loss due to power outage shock among informal enterprises in Kenya. The MVP model converged satisfactorily using 446 observations out of 522, a Wald chi^2 (46) of 164.27 and a p-value of 0.000. The marginal effect results are reported and discussed in Table 16.

An enterprise located in Central region relative to one located in Nairobi had a higher probability of facing power outage by 67 percentage points at 1 per cent significance level. On the other hand, relative to an enterprise located in Nairobi, a business located in Nyanza and Mombasa had a lesser probability of facing power outage by 47 and 74 percentage points, respectively. This is an indication of more power outages in Central followed by Nairobi. This could be due to a high number of informal enterprises in these two regions which did not have legal power

connections, which were probably disconnected when power companies carry out their regular monitoring activities. Further, probably cases of vandalism of power equipment such as transformers and power lines could have been common in these areas, increasing the likelihood of power interruptions.

Table 16: Multivariate Probit Model (MVP) results for the factors influencing power outage shock

	Parameter estimates		Marginal Effects	
	coefficient	Std. Error	dy/dx	Std. Error
Business environment				
Central - location dummy	0.672***		0.672***	0.210
Nyanza - location dummy	-0.475**	0.203	-0.475***	0.203
Mombasa - location dummy	-0.737***	0.198	-0.737***	0.198
Nakuru - location dummy	-0.055	0.202	-0.055	0.202
Trade - sector dummy	0.043	0.173	0.043	0.173
Services - sector dummy	0.580***	0.184	0.580***	0.184
Enterprise characteristics				
Age business group	0.160*	0.090	0.160*	0.090
Work location – have	0.103	0.193	0.103	0.193
Work location – own	0.322*	0.192	0.322*	0.192
Owner and employee characteristics				
Gender of main worker (1=male, 0=female)	-0.207	0.235	-0.207	0.235
Age of main owner – group	-0.376***	0.138	-0.376***	0.138
Gender main owner (1=male, 0=female)	0.230	0.235	0.230	0.235
Education level main owner	0.325***	0.088	0.325***	0.088
Vocational train main owner	-0.186	0.162	-0.186	0.162
Working hours	0.002	0.003	0.002	0.003
Model parameters				
Constant	-1.137***	0.437		
(6) Atrho32	-0.025	0.100		
Observations	446			

Note: * & *** Denotes significance at 10% and 1% significant levels, respectively

An enterprise in the services sector relative to manufacturing sector had a higher probability of reporting power outage by 58 percentage points at 1 per cent significance level. This could be because enterprises in the service sector tend to require electricity more for their operations compared to those in manufacturing,

which may be in *'jua kali'* making of handicrafts, furniture and metal works; that is, operating in open shades using sources of energy such as gas, wood and charcoal fire. Service sector informal enterprises requiring electricity for operations include cleaning and washing services, hairdressers and barber shops, professional services (including internet services) and repair of motor vehicles, motorcycles, computers and other machinery.

Older informal enterprises (above 5 years) were more likely to face power outage shock compared to younger business by 16 percentage points at 10 per cent significance level. This could be because despite being in operation for many years, they may not have connected their premises to legal power supplies, or probably they carried out their operations in work spaces prone to power outages.

Enterprises that owned a work location had a higher probability of reporting power outages relative to those that did not own by 32 percentage points at 10 per cent significance level. This could be because those that did not own work spaces were more likely to be in rented premises where landlords ensured there was no power interruptions, by for example having back-up generators. For those not in rented premises but owned their work location, they may have been operating in temporary structures which were not connected to the electricity grid, hence they could not report power outages.

Relative to youth-owned enterprises (age of main owner being 18 to 35 years), businesses owned by older people (above 35 years) were less likely to face power outages by 38 percentage points at 1 per cent significance level. This is probably because youth may have tended to be cunning and made unauthorized power connections to their worksites, raising the likelihood of power interruptions when power officials monitor for such connections.

A higher education level of the main owner increased the likelihood of reporting power outages by 33 percentage points at 1 per cent significance level. This could be attributed to ownership of enterprises that require electricity for operations (non-*jua kali*) among the more educated people.

Coping mechanism for power outage; use of generator

All the enterprises that reported owning or sharing a generator also experienced power outage (Figure 44). However, this is a small proportion (3%) of the enterprises that experienced power outage given majority (97%) did not use generators. This is an indication that most informal enterprises had little or no coping mechanisms to address power outage shock. This could be attributed to a low capital base to finance fixed assets or additional high recurrent costs such as

Figure 44: Firms experiencing power outage using generators as a coping mechanism
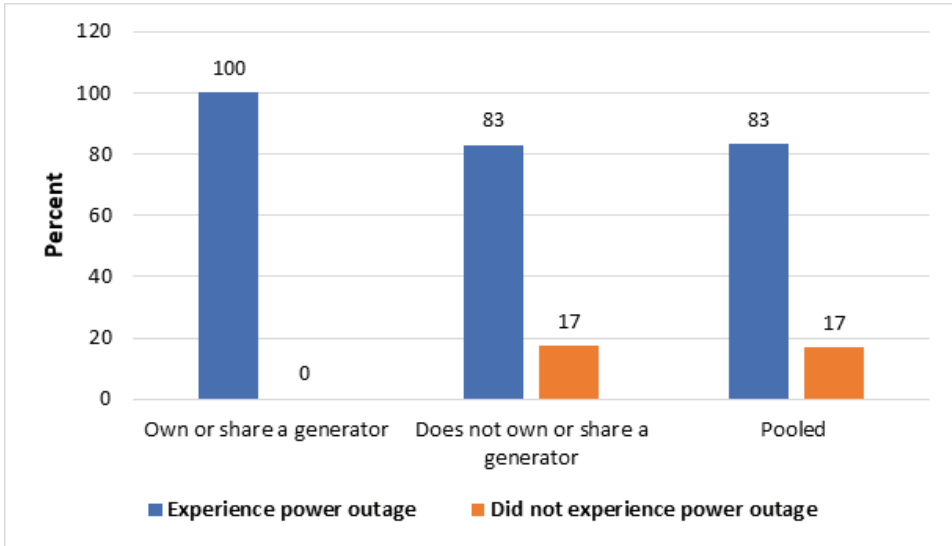
fueling generators to either substitute or compliment electricity from the national grid.

The study considered evaluating whether the age of the owner influenced the decision to use generator among the enterprises that experienced power outages (Figure 45).

Figure 45: Own/share generator for enterprises that experienced power outage, by age of owner
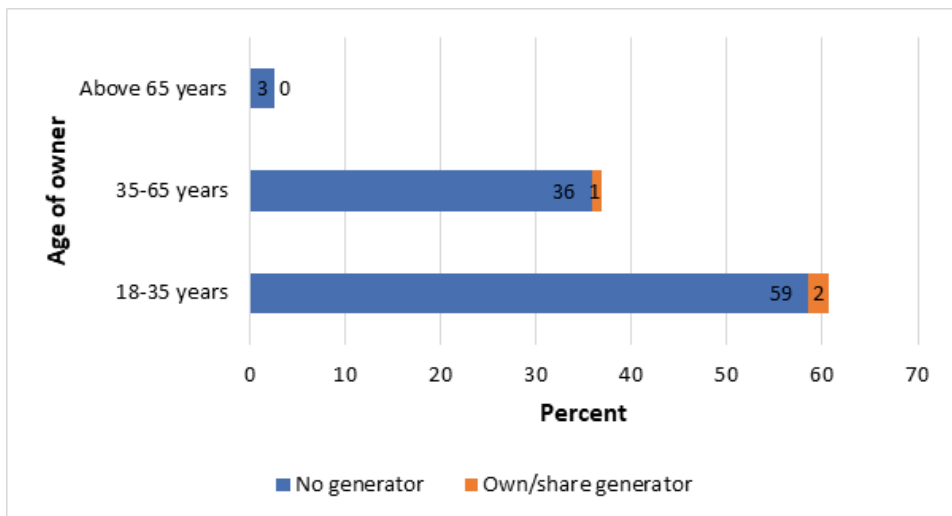
Majority of the businesses across all age groups of the owner did not use a generator after experiencing power outage. Only 2 per cent of the enterprises owned by youths (18-35 years) used generators and 1 per cent of the businesses owned by persons between 35 and 65 years (Figure 50). This implies that the age of the owners had a small relationship with the decision to use generators. Similarly, the gender of the owner of the enterprise did not have much relationship with the decision to use generators as indicated in Figure 46.

Figure 46: Own/share generator for enterprises experiencing power outage, by gender of owner
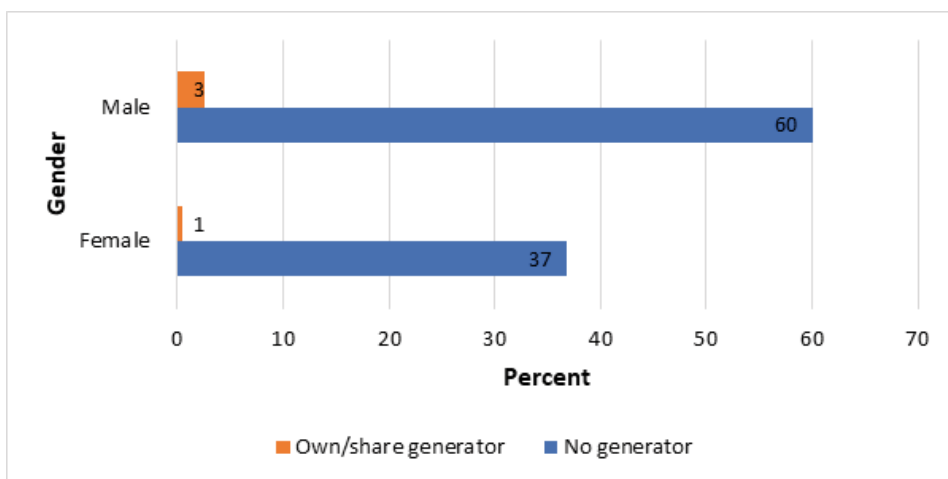
Among the businesses that experienced power outage, only 3 per cent and 1 per cent of the enterprises owned by men and women, respectively, used generators. The results are not different from those of the comparison based on education level as indicated in Figure 47.

Majority of the enterprises that used generators were those whose owners had secondary education (Figure 47). None of the enterprises which used a generator had an owner with primary school level of education indicating higher education level enhanced the likelihood of using generators.

Table 17: Incidences of power outage and use of generator for firms that experience power outage

	Mean	sd	min	max
Number of power outages last 1 month (No.)	8.0	15.9	1.0	144.0
Power outages lasted (hours)	7.5	25.9	1.0	336.0
Proportion of electricity from generator used (%)	7.7	8.7	2.0	25.0

Figure 47: Own/share generator for enterprises experiencing power outage, by level of education of owner
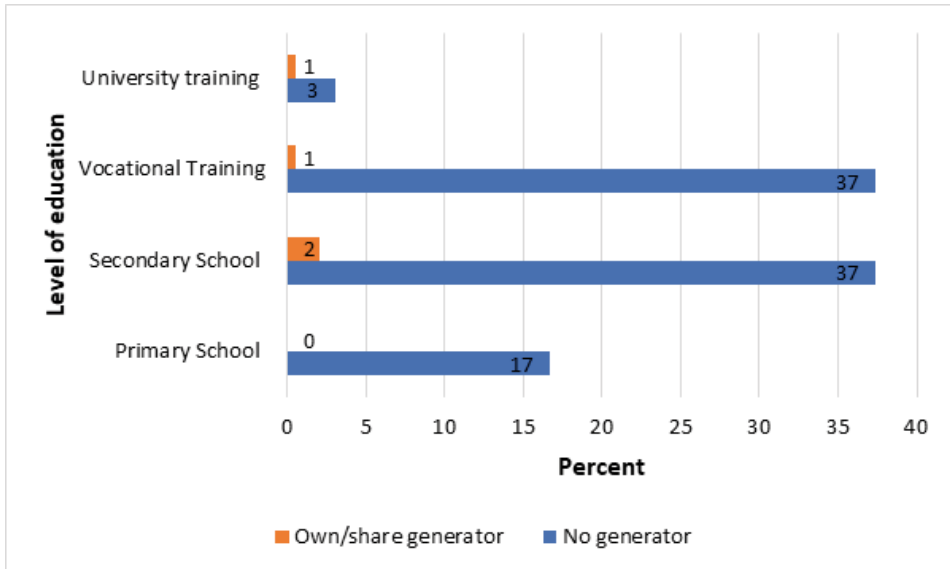
Overall, the enterprises experienced eight (8) incidences of power outage in a month. These outages ranged from a minimum of one outage to a maximum of 144 outages in a month (Table 17). The outages lasted for an average of 7.5 hours with a minimum of one hour to a maximum of 336 hours. As a result, some enterprises chose to use own or shared generators in case of power outages. The generators accounted for an average of 7.7 per cent of electricity consumed by the informal enterprises that reported use of generators. Some of the enterprises reported as high as 25 per cent of electricity being from generators.

Regression analysis on factors influencing use of generators as coping mechanism for power outage shock

Multivariate Probit (MVP) model was adopted to determine the factors influencing using generators as a coping mechanism for power outage among informal enterprises in Kenya. The MVP model converged satisfactorily with a Wald chi^2 (39) of 918.20 and a p-value of 0.000 as shown in Table 18.

Table 18: Multivariate Probit Model (MVP) results of factors influencing use of generators as coping mechanism for power outage shock

	Parameter estimates		Marginal effects	
	Coefficient	Std. Error	dy/dx	Std. Error
Shock				
Power outage	4.106***	0.681	4.106***	0.681
Business environment				
Central - location dummy	-0.158	0.616	-0.158	0.616
Nyanza - location dummy	-5.458***	1.070	-5.458***	1.070
Mombasa - location dummy	-6.209***	1.084	-6.209***	1.084
Nakuru - location dummy	-4.699***	0.584	-4.699***	0.584
Trade - sector dummy	-3.981***	0.663	-3.981***	0.663
Services - sector dummy	1.787**	0.783	1.787**	0.783
Enterprise characteristics				
Age of business - group	0.580	0.391	0.580	0.391
Work location - have	5.498***	0.917	5.498***	0.917
Work location - own	1.513**		1.513**	0.698
Owner & employee characteristics				
Age group main owner	-1.089	0.690	-1.089	0.690
Marginal effects after mvprobit				
y Linear prediction =		-7.128		
Model parameters				
Constant	-11.48***	1.516		
6 atrho32	-0.689**	0.323		
Observations	193			

Note: *, **, *** denotes significance at 10%, 5% and 1% levels, respectively

The results indicated that experiencing power outage increased the probability of using a generator by 410 percentage points at 1 per cent significance level. This could be because, for a business that experienced frequent power outage yet it relied on power to operate, for instance powering machines and equipment, backup plans become imperative for smooth running of the business operations.

The probability of businesses located in Nyanza, Mombasa and Nakuru using generator relative to businesses located in Nairobi reduced by 546, 621, and 470 percentage points, respectively. Descriptive analysis results in this study indicated that Nyanza, Mombasa and Nakuru were among the regions with low level of power outages, therefore businesses may not have seen the need of owning or sharing generators.

An informal enterprise being in the services sector relative to being in manufacturing increased the probability of owning or sharing a generator by 179 percentage points at 5 per cent significance level. This could be because most informal service enterprises needed electricity more than those in manufacturing, which were most likely '*jua kali*' (artisan work which tend to use gas and firewood for energy). The services enterprises requiring electricity include hairdressers and barber shops, cleaning and washing services, professional services (including internet services), repair of computers and personal and household goods, and repair of motor vehicles and motorcycles. On the other hand, an informal enterprise being in the trade sector relative to being in manufacturing reduced the probability of owning or sharing a generator by 398 percentage points at 1 per cent significance level. This could be because many trade businesses did not require power for operation compared to manufacturing business. This includes traders in general shops (kiosks) and roadside traders in temporary structures (*vibanda*).

The findings also indicated that an informal enterprise which had a physical location relative to businesses that did not have physical location had a higher probability of owning or sharing a generator by 550 percentage points at 1 per cent significance level. Therefore, most enterprises with temporary work locations, such as hawking, did not require power to operate compared to enterprises such as a barber shop that requires a permanent location. Similarly, an informal enterprise that owned a business location, relative to one that did not own physical location, had a higher probability of owning or sharing a generator by 151 percentage points at 5 per cent significance level. This could be attributed to a higher tendency for enterprises that owned locations to invest in fixed assets such as generators compared to those that rented or did not own.

Comparison of enterprises that faced power outage and those that did not face power outage

There was no statistically significant difference between enterprises that experienced power outage and those that did not, in terms of age of the business and revenue cost ratio (Table 19). However, the two categories of enterprises differed significantly in terms of crime loss to revenue ratio. Enterprises that experienced power outage had a crime loss to revenue ratio of 0.2, which was significantly lower than that of those that did not experience power outage (0.3) at 5 per cent significance level. This implies that losses due to crime may not be attributed to power outage; other underlying security factors could be the triggers of crime-related losses.

Table 19: Comparison of general characteristics of firms that experienced power outage and those that did not experience power outage

	Experienced power outage			Did not experience power outage				
	mean	min	max	mean	min	max	t-value	p-value
Age of business (years)	7.4	1.0	41.0	7.8	1.0	23.0	-0.380	0.705
Revenue - cost ratio	3.1	0.5	50.0	3.3	0.6	19.9	-0.151	0.880

Other shocks faced by some of the enterprises which experience power outage

Other than experiencing power outages, some businesses also experienced other shocks such as losses due to crime and harassment by government officials. Losses due to crime were relatively low across the firms that experienced power outages (Figure 48). However, these losses were highest among firms in the trade sector.

Figure 48: Experience power outage and losses due to crime distributed by sector
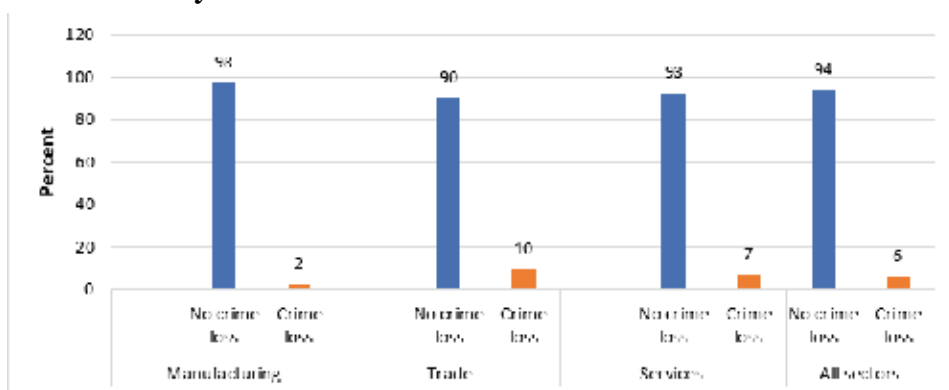
Harassment by government officials was a more common shock among enterprises that faced power outage compared to losses due to crime. On average, 19 per cent of the enterprises that experienced power outages also faced harassment by government officials, including paying bribes to operate informally (Figure 49).

Figure 49: Experience power outage and harassment by government officials distributed by sector
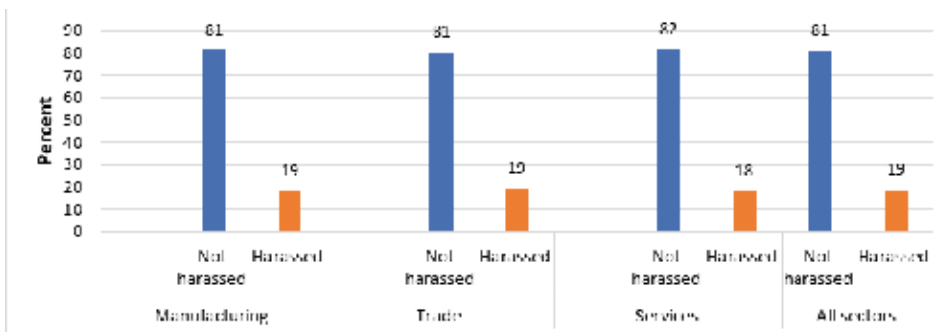
5.   Conclusion and Recommendations

5.1   Conclusion

The study found that informal sector enterprises faced three major shocks which reduced efficiency of their operations, in some cases led to losses and overall led to lower returns on investments. Majority of the informal enterprises were owned by the youth. This shows that the informal sector was important in creating employment to the huge youthful population. Therefore, there is need for an elaborate policy framework and sustainable coping mechanisms to address the shocks that affect the enterprises.

5.1.1   Loss due to crime

Loss due to crime substantially affected the informal enterprises, especially manufacturing and service enterprises. Apparently, the coping mechanism they adopted, which was paying for private security, did not significantly reduce incidences of crime. Enterprises whose owners were at an advanced level of education paid for private security compared to those that were at a lower level. This could be attributed to a higher level of awareness among the more educated on the importance of paying for private security as a risk mitigating measure. Crime varied across regions, with a high prevalence in Nairobi region compared to other regions. In addition, it seems that few enterprises paid for private security especially those that did not own the location of their businesses.

5.1.2   Harassment by government officials

Several enterprises experienced harassment by government officials or police. Such harassment forced the enterprises to lose revenues through paying bribes. Harassed enterprises substantially recorded lower returns per unit of capital invested. This was a clear indicator that harassment reduced the returns of the informal enterprises. Factors such as region where the enterprise was located, the sector of an enterprise, ownership of the enterprise location, and education level of the owner influenced the likelihood of facing harassment shock. For instance, half of the harassed enterprises were in manufacturing. In addition, enterprises in Nairobi were harassed more compared to enterprises located in other regions such as Central region. However, enterprises in Nairobi relative to other regions and those in trade and services relative to manufacturing were less likely to seek formal registration to cope with harassment.

5.1.3 Power outage

Power outage was the most common shock among the informal enterprises, affecting 83 per cent of the enterprises. This majorly resulted to lower returns on investment. Regional disparities in power outage were noted where enterprises located in Central and Nairobi regions were most vulnerable to power outages compared to businesses located in regions such as Mombasa. However, over the years, the differences had changed as noted by comparing the findings from World Bank Informal Enterprises 2013 Survey and MSME Survey 2016 by KNBS where regions such as Central reported lower incidences of power outage in 2016. This could probably be due to better connectivity under the rural electrification programme. Although enterprises opted to use generators to cope with power outages, only a small proportion of the enterprises used them. This could be an indication that using generators was an expensive venture for informal enterprises. Enterprises located in Nairobi relative to other regions and having a physical location increased the likelihood of using generators. In addition, enterprises in the services sector, such as hair-dressing, barber and computer repairs were more likely to use generators as a backup power source compared to those in manufacturing, such as metal works which could use alternative sources of energy, such as gas.

5.2   Recommendations and Policy Implications

To provide an enabling environment for enterprises in the informal sector and reduce business risks associated with security, harassment by government officials and power outage shocks, the following recommendations could be considered.

Overall, the informal enterprise owners need sensitization on risk and risk mitigating measures, especially those with lower levels of formal education given most of the shocks led to lower returns on investment. This can be done by both private and public sector actors seeking to enhance the quality of jobs and returns for people employed in the informal sector. Such actors included the Micro and Small Enterprise Authority (MSEA), and Kenya National Alliance of Street Vendors and Informal Traders (KENASVIT).

5.2.1 Losses due to crime

•   To further complement hiring private security, informal enterprises can consider using technology such as Closed Circuit TV (CCTV) cameras in their working premises to record incidences of crime.

- The government could consider beefing up security around business sites for the informal enterprises to ensure that enterprises that are not able to pay for private security are in secure premises. To complement the government security provision efforts, owners of informal enterprises in a given locality could consider having pooled private security at a lower cost.

5.2.2 Harassment by government officials

- To reduce incidences of informal sector enterprises being harassed by government officials, the enterprises can consider formalization as it would imply they have complied with most requirements that make them vulnerable to harassment by the officials.

- Further, there is need for an elaborate and reliable framework for reporting and dealing with genuine cases of harassment. The government could ensure that officers reported to have harassed informal sector enterprises are punished, to act as a warning. This can be done even at the county level for counties such as Nairobi where most cases of harassment were reported.

5.2.3 Power outages

- Given there was a minimal use of power generators as a coping mechanism for power outage, despite power outage being a major shock among the informal enterprises, enterprises could consider cheaper renewable sources of energy such as solar panels to power equipment and solar chargeable lamps for lighting. This can be done in partnership with private sector companies such as Safaricom, which is already offering solar powered equipment in rural areas (M-kopa solar) at fair repayment terms.

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Annex: Snapshot the secondary data used in the study

World Bank's Informal Enterprise Survey (IFS) 2013

The World Bank's Informal Enterprise Survey (IFS) 2013 data captures data for variables which could be used as proxies for shocks and shock coping mechanisms for informal enterprises in Kenya as shown in the following questions.

General information

a.   What is your main activity or business? These were classified into two categories as either Making goods (Manufacturing) or Selling goods or services (Services).

b.   What year did this business or activity originally start?

c.   What is the gender of the main respondent (main operator of the business)?

d.   What is the age of the largest owner?

e.   How many owners are male?

f.   What is the highest level of education of the largest owner?

g.   Where is this business or activity located?

h.   Does the business or activity have a physical location?

i.   Does the owner or owners own the location or space occupied by the business or activity?

j.   What were the total sales of this business or activity in [insert last completed month]?

k.   Was the total sales in [insert last completed month] below, above or what is normally sold by this business?

l.   Which of the following elements of the business environment, if any, currently represents the biggest obstacle faced by this business or activity.

m.   Is corruption a severe obstacle to the current operation of this business or activity?

n.   How many hours per week does this business or activity normally operate?

o.   Does the largest owner have insurance?

p.   In [insert last completed month], how many people who work in this business or activity were: INTERVIEWER: include family members, owner and respondent if applicable. (Paid/Unpaid)?

•   This was used to get the total workers and the paid/unpaid worker ratio

q.   In [insert last completed month], how many family members of the owner(s) of this business or activity were working in this business?

•   This was divided by total employees to get total workers/family member worker ratio

Proxies for shocks

1. Crime shock - variable i3 - In [insert last completed month], did this business or activity experience losses as a result of crime? (Yes/No)

2. Harassment - In this study harassment as a shock was considered as a combination of; if a business experienced harassment by government officials or police (variable i6) and or the business or activity had to give gifts, informal payments or bribes to remain unregistered (variable r5) Harassment shock – i6 - In [insert last completed month], did this business or activity experience harassment by government officials or police? (Yes/No)

3. Power outage Shock- variable C32 - In [insert last completed month], did this business or activity experience power outages? (Yes/No)

Proxies for shocks coping mechanisms

1. Power outage shock coping mechanism - variable c36. Do you own or share a generator for business activities? (Yes/No)

2. Crime shock coping mechanism 1 - variable i1- In [insert last completed month], did this business or activity pay for security, for example equipment, personnel, security services, or protection payments? (Yes/No) Crime shock coping mechanism 2 – variable b30b- Does the largest owner have non-life insurance the following type of insurance? (Yes/No)

3. Harassment shock coping mechanism - r6c - Please indicate if having less bribes to pay represents a benefit for your business or activity that could be obtained from being registered by KRA

4. Harassment shock coping mechanism 1 – r5 - Does this business or activity have to give gifts, informal payments or bribes to remain unregistered? (Yes/No)